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Our Reference: P2105.001L
Your Reference:

14 December 2015

LEDA Holdings
Suite 14, Level 1, 46 Cavill Avenue
Surfers Paradise QLD 4217

Attention: Reg Van Rij
Sent via email: regvanrij@ledaholdings.com.au

Dear Reg,

RE: COBAKI TRAFFIC MODELLING COVERAGE

LEDA has previously proposed a modification to the Cobaki Concept Plan approval to include university and ancillary uses within the Cobaki Town Centre. Bitzios Consulting has completed a significant level of strategic and traffic microsimulation modelling to determine the appropriate town centre road structure plan and intersection treatment requirements. This work has been undertaken in consultation with all relevant government agencies.

Since the completion of the traffic modelling in September 2015, LEDA has considered the implementation of a number of minor modifications to the town centre land uses proposed. These alterations mostly relate to uses being relocated to other areas within or around the town centre area.

From a traffic modelling perspective, these minor changes are unlikely to have any significant impact on the town centre network, as the Cobaki Town Centre road structure plan and the road access plan to Cobaki Parkway to the south has sufficient network capacity and intersection capacity to handle these minor internal land use amendments.

It is expected that when the relevant stage of development is ready for formal submission to Council through the development application process, the traffic model will be updated to more accurately reflect the land use and road network at year of opening, 10 years plus year of opening and Masterplan year.

This level of assessment will adequately address any minor network refinements required to respond to any minor land use change.

Adrian Bitzios
Principal Engineer
BITZIOS CONSULTING

COBAKI CONCEPT PLAN APPROVAL MODIFICATION

MP 06_0316 MOD 2 - ADDITION OF UNIVERSITY AND INCREASED TOWN CENTRE RELATED USES

TRANSPORT AND ACCESSIBILITY REPORT

FOR

LEDA MANORSTEAD PTY LTD

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P2105.001R Cobaki MOD2 SCU TIA	Adrian Bitzios	A.Eke/D.Bitzios	Adrian Bitzios	25/09/2015	Reg V Rij - LEDA

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EXECUTIVE SUMMARY

This report provides a traffic and transport assessment for the proposed modification to the Cobaki Concept Plan Approval to accommodate university and other supporting town centre related uses. Below details how the revised development addresses the Secretary's Environmental Assessment Requirements (SEAR) under Section 75F of the Environmental Planning and Assessment Act (1979) responding specifically to the items raised under "Transport and Accessibility".

SEAR 1 - Compliance with Relevant Development Standards and Strategic Plans

The SEAR has required that the assessment of the proposed modification to the Cobaki Development considers its compliance to the following State, Regional and Local Strategies:

- *NSW 2021;*
- *Far North Coast Regional Strategy;*
- *NSW Long Term Master Plan 2012;*
- *NSW Bike Plan;*
- *Planning Guidelines for Walking and Cycling; and*
- *Healthy Urban Development Checklist, NSW Health.*

The majority of the above strategies relate to the 'Transport and Access' component of the SEAR. The proposal to include a university use within the town centre aligns well with each of the above strategies, particularly when considering the current alternative to continue with the expansion of the Southern Cross University operations at the Bilinga site and an 'urban sprawl' style land release for the current Concept Plan approved Cobaki Development.

The Cobaki University Town Centre has been masterplanned in a manner that will deliver upon the objectives of each of the above plans. The placement of university uses and student accomodation within the town centre will provide a critical mass that will encourage investment in improved public transport, cycling and pedestrian facilities, as well as a high quality public domain that will attract local residents. This local attraction for retail and employment trips will enable sustainable transport initiatives to be realised resulting in the likley achievement of attaining low "car as driver" travel modes shares. The additional land uses are also expected to internalise many of the trips that would have otherwise been completed external to the Cobaki area.

The outcome likely to be achieved by the proposed modifications to the current Concept Plan aim towards fewer motorised trips and shorter trips due to land use-transport integration which leads to a more sustaible land use transport form.

A detailed response to each of the above listed strategies is included in Section 2.1 of this report.

SEAR 5 – Transport and Accessibility

The SEAR has identified that the assessment of the proposed modification to the Cobaki Development responds to the following key requirements, which includes the provision of:

- *Detailed plans of the proposed layout of the internal road network and on-site parking in accordance with the relevant Australian Standards;*
- *Analysis of any proposed changes to the road network approved under the Concept Plan;*
- *Modelling of any traffic impacts associated with the proposed modifications to the Concept Plan, including an estimate of the total daily and peak hour vehicles generated by the new uses within the Town Centre;*
- *An assessment of the impacts of all modifications to the approved road network and infrastructure, and use of the Austroads Guidelines to identify appropriate mitigation measures;*
- *Identification of any funding required to facilitate any road upgrade or road improvement works (if required);*
- *An assessment of any impacts on the functionality of the Tugun Bypass and the Boyd Street intersections, and identification of any traffic mitigation measures required at these locations;*

- *An assessment of the impacts of any proposed modifications to the Access Network and Potential Bus Route Plan approved under the Concept Plan; and*
- *An assessment of the adequacy of the existing public transport services to meet the likely future demand of the proposed development.*

The above stated requirements have been categorised into three key sub-areas, as follows:

SEAR 5A - Cobaki Development Internal Road Modifications and Impacts Assessment

The town centre masterplan has been designed to separate and protect vulnerable roads users from high speed, high volume and heavy vehicle traffic. Corridors have been identified for Supermarket and heavy vehicle site servicing access, whilst separate corridors have been identified for pedestrian, cycling and local destination based parking.

Town centre parking stations and bus nodes have been designed to reduce the attractiveness of car access, but to also promote walking along the 'main street'.

The internal street network has been designed with the assistance a Paramics microsimulation model established for the project area. The street network will have sufficient capacity to cater for the forecast traffic volumes. Key access intersections along Sandy Lane have been designed with consideration given to queue-back effects to Cobaki Parkway. To manage this risk, the access intersections have been designed as T-intersection to minimise the probability of this occurring.

Street cross-sections have been provided for the range of uses consistent with Urban Growth cross-sections adopted for contemporary town centre plans across the Sydney Metropolitan area. In addition, parking demand calculations have been based on a combination of RMS standard parking rates as well as the use of consistent standard parking rates across office/retail/business uses which is consistent with many local government practices across the Sydney Metropolitan area to allow flexibility for future interchangeability of uses based on market demand at the time.

The total quantum of parking supply will be in the order of 4,300 car spaces of which approximately 3,000 car spaces will be publicly available. More importantly the town centre has been planned to provide in excess of 1,800 bicycle racks of which over 500 spaces will be publicly available.

Off-street parking stations are likely to require some form of 'pay parking' when constructed. The introduction of 'Pay Parking' however would need to comply with the processes outlined in RMS guidelines prior to implementation. The introduction of 'Pay Parking' will further assist with encouraging students to live in close proximity and/or rely on the use of public transport / cycling which will improve the transport mode share, and ultimately reduce the impact on the surrounding road network.

Further detail relating to the assessment of the proposed internal road network and town centre design is contained in Section 2.2 of this report.

SEAR 5B - Cobaki Development External Traffic Impact Assessment and Road Modifications

The key purpose of this report (assessment) was to analyse whether the introduction of additional university and town centre land uses will increase traffic impacts to the surrounding road network. The EMME modelling conducted verified that the introduction of the SCU/Additional Town Centre uses will not increase traffic impacts to the M1 / Tugun Bypass.

AM and PM 2hr peak microsimulation models were created to refine the required surrounding intersection requirements. They were also used to be able to extract more refine peak hour traffic volume forecasts across the project area. The results of assessing the forecast traffic demands using the Concept Plan approved road network, and considering the current planning position associated with the Cross Border Traffic Masterplan Final Report (August 2011)(or commonly referred to as the Cross Border Trafic Study - CBTS), the modelled traffic network was continually refined. This resulted in the following network changes from that assumed to be included under the Concept Plan Approval (it should be noted that many of the below changes are not as a direct result of the proposed development, but rather a change in state/local agency position as a result of the Cross Border Study or other planning initiatives, such as the upgrade to Kennedy Drive interchange):

- *Upgrade to the Kennedy Drive interchange to discourage unreasonable route diversions via Cobaki Parkway;*
- *New north facing ramps at the Boyd Street interchange, with the on-ramp containing ramp metering managed by Queensland DTMR and the Boyd Street / Ramp intersections signalised;*
- *A single traffic lane in each direction along Cobaki Parkway, except at intersection approaches;*
- *A single traffic lane in each direction along Boyd Street, except at key intersection approaches;*
- *A reduced intersection arrangement at the Boyd Street / Gold Coast Highway intersection, incorporating bus priority;*
- *Refinement of the intersection confuguration at the Piggabeen Road / Kennedy Drive intersection;*
- *Refinement of the Cobaki Parkway/ Piggabeen Road intersection confguration to a single lane roundabout (in lieu of a channelized right turn intersection);*
- *Replacement of the roundabout at the Sandy Lane / Cobaki Parkway intersection with a signalised intersection; and*
- *Introduction of an additional left in-left out along Cobaki Parkway into the Town Centre.*

The introduction of the north facing ramps at the Boyd Street interchange results in heavily reduced traffic volumes along Boyd Street, to an extent that it can remain as one lane in each direction. In addition, the extent of the upgrade at the Gold Coast Highway intersection can be reduced and re-focussed on delivering bus and cycle priority-based solutions to support active transport. It should be noted that the addition of north facing ramps also offers substantial access benefits to John Flynn Hospital.

The introduction of north facing ramps on the Tugun Bypass at Boyd Street is consistent with the findings of the Cross Border Study. The Cross Border Study however also recommended the need to upgrade the M1 to six lanes between Boyd Street interchange and Stewart Road interchange should the north facing ramps be installed.

Under the Modified Plan, comparing traffic volumes on the M1 north of Boyd Street under the 'with' and 'without' north-facing ramps on the M1, there is a clear increase in trips expected to use that section as a direct result of the ramps being installed. There is also a distinct reduction in daily trips on the M1 to the south of the Boyd Street interchange. The daily traffic volumes rise from 94,000vpd to 104,000vpd between the Boyd Street and the Stewart Road interchanges whilst the volume reduces from 94,000vpd to 83,000vpd between Boyd Street interchange and Tugun Bypass (which has clear capacity benefits to the RMS owned asset). It should be noted however that the traffic distribution outputs from EMME are strategic forecasts and the above stated volumes may be subject to change pending local operational issues that may exist along alternative route options in the area.

The EMME modelling shows that there is a dis-benefit that is placed on the Queensland DTMR owned asset north of the Boyd Street interchange and this is offset by a benefit to the RMS owned asset to the south of the Boyd Street interchange. Cross border negotiations between the two State agencies should occur to discuss appropriate funding mechanisms for this 'cross-border' section of road in the longer term. A memorandum of agreement (or similar) between agencies should be established to facilitate an agreed way forward in the future if/when traffic performance thresholds over this section of motorway are exceeded and an upgrade is required.

The current deed agreement conditions placed on the applicant are considered inappropriate as they are constrained by traffic volume thresholds and intersection Level of Service. Once road upgrades have been undertaken by the applicant, there is no restriction on other external developments using the created capacity resulting in the applicant funding major infrastructure upgrades with little development income assurance.

It is recommended to pursue the more equitable, more appropriate option to construct the north facing ramps at Boyd Street at the early stages of the development, once the identified active transport measures are in place along Boyd Street and at the Boyd Street / Gold Coast Highway intersection. To operationally manage the peak period operating conditions of the M1 it is recommended to include ramp metering for the northbound entry ramp. Consideration should also be given to ramp metering influential ramps to the north (in the southbound direction) such as Bermuda Street interchange and Tallebudgera Drive interchange. There is currently a large volume of traffic exiting the M1 at Stewart Road interchange. Whilst some of that traffic will divert to the Boyd Street interchange, the majority will be

retained along the Gold Coast Highway corridor. The subsequent volume drop south of the Stewart Road interchange is unlikely to necessitate any ramp metering on the southbound entry ramp at Stewart Road interchange.

With the north facing ramps in place at Boyd Street (with ramp metering), the need to upgrade the M1 section between Boyd Street and Stewart Road would only be required once the following occur:

- *the M1 is widened to six lanes between Robina and Stewart Road interchange; and*
- *the through traffic on the M1 continues to rise from the south (which is expected with residential releases at Casuarina, Pottsville, etc); and*
- *SCU, Cobaki, Bilambil Heights, and other northern NSW surrounding developments occur as forecast (i.e. fully developed by 2031, which is very unlikely).*

The M1 between Nerang and Worongary was experiencing traffic volumes in excess of 100,000vpd as four lanes prior to its upgrade to six lanes. The effects of peak hour spreading enabled those higher daily traffic volume thresholds to be achieved. It is noted that those volumes did reflect flow breakdown during peak periods and no ramp metering was in place to manage merge capacities..

Ramp metering should be implemented at the Boyds Street northbound entry ramp to assist with better managing the available merge capacity. It should be noted that the need for ramp metering is not necessarily a direct reflection of impacts associated with the development proposed, but rather a tool to manage the combined development and background traffic in the area. In essence, the solution to implement ramp metered north facing ramps at Boyd Street is a much more efficient network management outcome than adopting the current Concept Plan requirements.

The funding logistics of managing the inequality of cross-border network benefits is something that needs to be carefully managed between NSW RMS/TfNSW and Qld DTMR. Ideally a Cross-Border joint funding agreement (NSW/Qld State Government and the Federal Government) should be established to enable the M1 six laning between Boyd Street to occur in sequence with other upgrades along the M1 and when it is required. Based on current traffic growth rates, and the rate of M1 upgrades, this is not expected to be required until after 2036.

Further detail relating to the assessment of the proposed external road network traffic impacts is contained in Section 2.3 of this report.

SEAR 5C - Public Transport Impact Assessment

The Concept Plan approval for Bus Service provisions only contained information as to which roads were 'bus capable'. There was little information available that specified proposed bus routes or frequencies. This report has investigated the bus servicing requirements in consultation with Translink and the Transit Australia Group.

The bus servicing strategy within the Cobaki town centre is proposed to be established such that Queensland-based services will stop/pick-up on side of Sandy Lane whilst the NSW based services will stop/pick-up on the other side of Sandy Lane.

The proposed servicing frequencies are based on the forecast student number requiring to utilise public transport to/from the university. During normal sessions, under a 10,500 EFTL Staff/Student loading there is expected to be approximately 6,000 staff and students on-site for a typical weekday.

There is forecast to be a total student bus demand of approximately 1,000 students requiring the use of a bus to access the university grounds throughout the day. Public transport demand for town centre residents will be able to be catered for through the provision of returning outbound services (buses that have come to campus to drop students off). The creation of these bi-directional demands will assist with the feasibility and viability of operating bus services to the Cobaki Campus.

Bus services for both NSW and Qld based services have been forecast within Section 2.4 of this report.

Translink have advised that there are contractual and legislative issues that are required to be resolved for service extensions from the existing '768' service to occur into NSW. Notwithstanding this constraint, in the interim it is recommended to operate an 'on demand' chartered bus service until public bus services can cater for the demands. The chartered bus service should aim to pick up / drop off patrons at key destinations such as the bus stop at the Boyd Street / Golden Four Drive intersection and the Gold Coast Airport Bus Stop. These bus stops will provide patrons with direct access to all the necessary high frequency and express bus services on the Translink network

such as connections to Varsity Rail Station, Broadbeach Transit Interchange, The Pines Shopping Centre, Coolangatta and Tweed Heads town centres.

To facilitate ease of access to the Boyd Street / Golden Four Drive bus stop, bus priority is proposed to be incorporated into the proposed future Gold Coast Highway / Boyd Street intersection. Continuing to run bus services down Golden Four Drive enhances the opportunity to also pickup students that choose to live in the medium-high density apartments that exist along the beachfront within that corridor.

Bus services in NSW appear to be able to be fairly simply extended from the existing '601' service up to Cobaki.

To manage the existing cross-border issue that exists it is recommended that TfNSW and Translink agree on a contractual arrangement that enables Surfside Bus Lines to operate a bus service for the Cobaki land release area across the border that will promote the use of sustainable modes of transport.

Further detail relating to the assessment of the public transport accessibility issues is contained in Section 2.4 of this report.

Sustainable Transport

The proposed mode share targets specifically for the SCU and Cobaki land release areas are as follows:

Cobaki:

- *Car Transport : 65% (previously 70% in the Cross-Border Study)*
- *Public Transport : 15% (same in the Cross-Border Study)*
- *Active Transport : 20% (previously 15% in the Cross Border Study)*

SCU:

- *Car Transport : 50% (note: 30% of the staff/students will have on-site accommodation)*
- *Public Transport : 25% (it is proposed to market student/staff accommodation in local centres)*
- *Active Transport : 25% (mostly catered for from on-site staff/student accommodation)*

Key measures to complement or facilitate the realisation of reducing the reliance of private motor vehicle travel include:

- *Plan for higher density development around public transport nodes;*
- *Plan for higher density development within a walking catchment to the university;*
- *Plan for higher density development in locations where good cycle access is provided to the university;*
- *Integrate retail / commercial uses with areas of higher residential and student uses;*
- *Locate retail / commercial uses to promote active streets for large periods of the day;*
- *Locate active and passive open space facilities in walking / cycling distance of higher density development areas;*
- *Locate parking stations for the university on the outer areas of the university to give priority to those that walk / cycle or use public transport;*
- *Locate parking stations in areas that will encourage the creation of active streets;*
- *Develop university marketing and education material promoting on-site accommodation, accommodation within the Cobaki area and accommodation in close proximity to major bus nodes as part of information material used to assist students to determine which university they wish to attend;*
- *Develop transport access guides and green travel plans that can be continually refined to support sustainable transport choices;*
- *Promote and incentivise the use of car-pooling through the improvement of SCU's current car-pool database / program;*

- *Encourage the introduction of car share schemes;*
- *Ensure appropriate 'end of trip' facilities are provided for staff/students;*
- *Consider the implementation of an 'App' based chartered bus service for staff/students (similar to Uber) where staff/students may be collected either 'door to door' or at a series of collection points;*
- *Consider opportunities to negotiate with other key trip attractors in the area to create a 'free shuttle' bus service;*
- *Consider the use of the revenue stream from any 'Pay Parking' strategy to directly fund improved chartered bus services;*
- *Facilitate improved bus connections to existing key public transport stations where good bus connections exist (ie express Bus Services to Broadbeach, services to Varsity Heavy Rail Station, services to Coolangatta / Tweed Centres);*
- *Promote the 'unbundling' of private parking as part of the sale of residential apartments;*
- *Undertaking of periodic travel mode share surveys to continually refine strategies and actions to promote non-car based modes of travel;*
- *Undertaking of periodic parking surveys / studies to continually refine the appropriate balance between parking access and sustainable transport access; and*
- *Conduct formal assessments of trials or initiatives that aim to encourage non-car based modes of travel.*

Club / Child Care Additional Uses

Proposed additional uses (child care and Tavern) are nominated at the southern corner of Cobaki Parkway and Sandy Lane. It introduces a slight increase in traffic on the southern part of the road network. The Paramics microsimulation modelling used to assess the development's impacts shows that the Cobaki transport network has suitable spare capacity to cater for the additional trips generated. In addition, the proposed child care uses will result in a large proportion of 'diverted' trips whilst the tavern uses will contain traffic demands outside of typical AM and PM peak periods.

The area provided for the proposed facility is considered to be sufficient enough to cater for the required parking and site servicing requirements. The non-coinciding peak demands of the child care centre and the tavern uses will also result in the ability to cross-utilise the availability of parking.

1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting has been engaged by LEDA Manorstead Pty Ltd to prepare a Transport and Accessibility Report to address the transport aspects of the *Secretary's Environmental Assessment Requirements* (SEAR) for Major Project Application No. MP 06_0316 MOD 2 known as "Cobaki Residential Development". The current Concept Plan Approval is proposed to be modified to include a University and additional supporting increases in land uses within the town centre.

Bitzios Consulting recently prepared a Traffic Impact Assessment for the Southern Cross University Building C development application at Bilinga. This work also included the completion of a Travel Mode Share survey which informed the parking and traffic currently generated by the university and where opportunities exist to reduce the demand on car use. One of the key recommendations of the study was to encourage the co-location of students within (or within walking distance) of the University Campus.

The existing University site at Bilinga is currently constrained by other office / retail uses complimentary to the Airport operations. Subsequently, the objective of encouraging students to live within close proximity of the University is challenging, particularly given the other existing and longer term infrastructure barriers such as the Gold Coast Highway, Old Pacific Highway, Bilinga Overpass, overhead flight path restrictions, and the future heavy rail corridor.

The proposal to integrate any future expansion of the university operations into the Cobaki Town Centre and away from the constrained Bilinga site should be welcomed by state and local government agencies; particularly if it is planned in a manner that supports the internalisation of trips and promotes the use of non-cars based modes of travel.

The placement of a university within the confines of the Cobaki Land Release Area will assist with creating an active town centre, with increased employment opportunities for the immediate residential catchment area. In addition, the introduction of a university use within the Cobaki Land Release area has a very strong potential to internalise travel demand within the precinct, as opposed to the current approval where trips are required to be made external to the precinct to key nodal employment and retail based centres.

The Cobaki Town Centre will also be in close proximity to a future proposed Cobaki heavy rail station. Whilst the heavy rail connection from Varsity Lakes to the Gold Coast Airport has reduced in priority over the longer term, the structural framework for integrated land use and transport planning should be established from the outset. In the nearer term, there are opportunities to provide efficient bus connections to the future light rail corridor, proposed along the Gold Coast Highway.

This study assesses the potential the proposed land use addition (i.e. university use) will have on converting vehicle trips that would now remain internal to the release area that would have otherwise had to travel externally onto the surrounding road network. In addition, the inclusion of a university will result in an improved level of public transport servicing and pedestrian and cycle infrastructure, and as such, is likely to have a further reducing effect on the amount of traffic likely to travel outside of the release area.

Understanding the benefits associated with the co-location of a university within the Cobaki Town Centre is a major focus of this transport and accessibility report.

1.2 SITE LOCATION

Figure 1.1 shows the location of the proposed Cobaki Estate development along with the key roads surrounding the development. Road names have been referenced in the figure and will be used throughout the report for consistency purposes.

SOURCE: Map data @ 2015 Google

Figure 1.1: Cobaki Estate and Surrounding Access Roads

1.3 SCOPE

The scope of this Transport and Access Report is defined by the SEAR. The SEAR required for the following traffic and transport related matters to be addressed as part of the proposed Modification to the current Cobaki Development Concept Plan approval:

SEAR 1

- Compliance with Relevant Development Standards and Strategic Plans

SEAR 5

- Detailed plans of the proposed layout of the internal road network and on-site parking in accordance with the relevant Australian Standards;
- Analysis of any proposed changes to the road network approved under the Concept Plan;
- Modelling of any traffic impacts associated with the proposed modifications to the Concept Plan, including an estimate of the total daily and peak hour vehicles generated by the new uses within the Town Centre;
- An assessment of the impacts of all modifications to the approved road network and infrastructure, and use of the Austroads Guidelines to identify appropriate mitigation measures;
- Identification of any funding required facilitating road upgrades or road improvement works (if required);
- An assessment of any impacts on the functionality of the Tugun Bypass and the Boyd Street intersections, and identification of any traffic mitigation measures required at these locations;
- An assessment of the impacts of any proposed modifications to the Access Network and Potential Bus Route Plan approved under the Concept Plan; and

- An assessment of the adequacy of the existing public transport services to meet the likely future demand of the proposed development.

The above stated requirements in SEAR 5 have been categorised into three key sub-areas:

- Cobaki Development Internal Road Modifications and Impacts Assessment
- Cobaki Development External Traffic Impact Assessment and Road Modifications;
- Public Transport Impact Assessment.

In line with the SEAR, this report has been produced in accordance with the *RTA's Guide to Traffic Generating Developments, RMS Traffic Modelling Guidelines* and *Austroads Road Design and Traffic Management Guidelines*.

1.4 RESPONSE APPROACH

Overview

The existing planning approval requirements are based on transport planning principles from the late 1980's/early 90s and as such do not reflect current transport planning practices. The proposal to incorporate the expansion of Southern Cross University's uses into the Cobaki land release area presents significant opportunities through design to reduce the reliance on private motor vehicle travel. There are many examples and learnings from integrated transport and land use developments that can be readily deployed at Cobaki particularly given that it's a 'greenfield' site. The only significant constraint is its proximity to the NSW/Qld border and the implications that may arise from the need for co-ordination of cross-border operations.

After reviewing the deed agreements currently in place, combined with the more recent Cross Border Study strategic traffic assessment, it is believed that the proposed traffic and transport infrastructure requirements associated with the Concept Plan approval need to be reconsidered.

The timing for introduction of the Piggabeen Road connection to the south provides essential bus connectivity for future university uses. The opening of the southern connection is then likely to place pressure on the Boyd Street connection to the Gold Coast Highway bringing forward the need to provide north facing ramps at the Boyd Street / M1 interchange. The current Concept Plan approval requires to the developer to provide upgrades based on Level of Service and traffic threshold, but there is nothing stopping other developers from absorbing this capacity.

The early provisioning of north facing ramps at the Boyd Street / M1 interchange will reduce the infrastructure requirement along Boyd Street (east of the M1) and provide a more appropriate transport network framework into the future, as the urban (softer) side of Boyd Street (towards the east) can then be more appropriately planned for active transport.

The primary purpose of this assessment is to ascertain whether the inclusion of the Southern Cross University campus and its associated uses will benefit/dis-benefit the overall transport access strategy for the Cobaki development. This report is also to provide initial guidance as to the appropriate transport access strategy for the combined development and whether the existing conditions are still considered appropriate given that the likely transport strategy should have a greater focus on the use of active transport methods and internalisation of trips.

The university currently has Federal Government funding approval for a new building at the current Bilinga Campus. This facility was planned to accommodate in the order of 2,000 Effective Full-Time staff and students (EFTL). The assessment for the Cobaki Town Centre has been undertaken on the basis of the ultimate masterplanned forecast figure of 10,500 (EFTL).

The assessment has been undertaken at three different levels, described as follows:

- Town Centre Masterplan;
- Strategic Assessment of Impacts; and
- Review of Intersection Treatments and Design Layouts.

Town Centre Masterplan

The town centre road access layout was developed in co-ordination between a team of traffic planners, urban planners and statutory planners. The focus of this exercise was to ensure both land use and transport access were well-integrated in developing the town centre masterplan. This component of work also identified town centre parking supply needs and locations, bus stop servicing requirements, pedestrian and cycle access and site servicing (waste collection, loading/unloading) requirements.

A street hierarchy system was designed for the town centre to complement the land use and transport access strategy. The street hierarchy system was specifically designed to meet the needs of the proposed town centre and is different to the cross-sections submitted for the current Concept Plan approval.

Strategic Assessment of Traffic Impacts

This task involved using the Cross Border Traffic Study EMME model to ascertain if the additional university and town centre uses increased the traffic loading to the external road network or whether the proposed uses internalised an equivalent (or greater) proportion of vehicle trips to offset any increase in University vehicle traffic. The assessment considered the following options:

- Scenario 1: Current Approved Land Use, Current Approved Network;
- Scenario 2: Current Approved Land Use, Revised Traffic Network to include North Facing Ramps at the Boyd Street interchange (M1) and the reduction of Boyd Street to one lane each way between the M1 and the Gold Coast Highway;
- Scenario 3: Proposed Modification of Land Uses, Current Approved Network; and
- Scenario 4: Proposed Modification of Land Uses, Revised Traffic Network.

Review of Intersection Treatments and Design Layouts

A Paramics microsimulation model has been developed that extends from Stewart Road interchange to the north and Kennedy Drive interchange to the south. The model has been validated to 2015 year traffic counts and background traffic inflated up to 2031 demands. Traffic generation from the additional uses associated with the town centre and surrounding Cobaki residential lands were added to the model and then validated against the 2031 EMME model volumes as a check. Minor modifications to Origin-Destination trip pairs were manually undertaken to reflect the proportion of traffic forecast to use the Cobaki Parkway connection once established.

The Paramics Model has been used on the basis of Scenario 4, to provide detailed information relating to the necessary intersection requirements. The modelling of Scenario 4 also includes the provision of ramp metering to assist with protecting the capacity of the M1 (northbound). Previous reports and assessments had deduced that north facing ramps will require the need for six lanes on the M1 between Boyd Street and Stewart Road. The Paramics modelling will be used to visualise the extent of impacts to better understand what issues are likely to exist and whether they can be mitigated. The Paramics model will also be useful for testing options during construction staging.

Through consultation with DTMR, general satisfaction was identified with the approach to manage peak hour operations through the use of ramp meters (pending suitable justification), however they raised concerns regarding the management of southbound traffic which is expected to originate from multiple motorway ramp sources to the north. The management of this issue is discussed within this report.

Additional Club / Child Care Uses

It is proposed to locate a Function Centre/Club and Child Care Centre at the southern end of the land release, located at the intersection of Sandy Lane and Cobaki Parkway. The proposed land uses are complimentary of each other, with peak demands for traffic and parking not coinciding. The facility has been designed to cater for Cobaki / Piggabeen locals and is not expected to cater for events that would attract patrons from outside of the local catchment.

The assessment of the additional use is included in Section 3.

2. RESPONSE TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEAR)

2.1 SEAR 1: DEVELOPMENT STANDARDS AND STRATEGIC COMPLIANCE

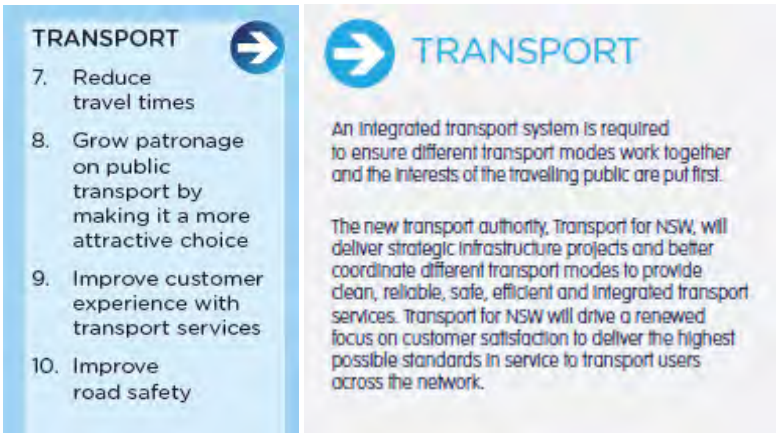
Overview

The SEAR has required that the assessment of the proposed modification to the Cobaki Development considers its compliance to the following State, Regional and Local Strategies:

- NSW 2021;
- Far North Coast Regional Strategy;
- NSW Long Term Master Plan 2012;
- NSW Bike Plan;
- Planning Guidelines for Walking and Cycling; and
- Healthy Urban Development Checklist, NSW Health.

The majority of the above strategies relate to the 'Transport and Access' component of the SEAR. The proposal to include a university use within the town centre aligns well with each of the above strategies, particularly when considering the alternative to continue with the expansion of the Southern Cross University operations at the Bilinga site.

NSW 2021



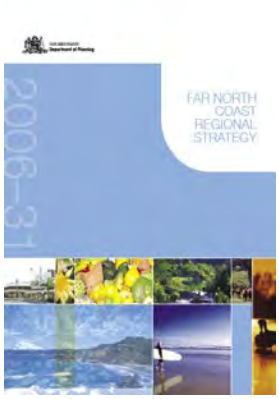
NSW 2021 is a high level overarching plan devised to guide the overall direction for the State of NSW. The element relating to "Transport" is highlighted above. The transport objectives listed are consistent across most states of Australia focussing on travel efficiency, road safety, sustainable transport choices and user satisfaction / travel reliability. The subsequent text within the plan however has a greater emphasis on the integrating transport and customer satisfaction.

The proposed modifications to the Cobaki development will create opportunities to provide higher levels of bus patronage. In the short to medium term, bus connections can be provided to the north-south express bus service corridor along the Gold Coast Highway. Ultimately this corridor will contain light rail, which will increase the importance of having well-established bus connections from Cobaki Town Centre to this service. Importantly, any proposed bus service between Cobaki Town Centre and the Gold Coast Highway well travel past John Flynn University which is also a major employment node.

The attributes of the proposed Cobaki Town Centre and John Flynn Hospital, whilst to a lesser scale, is not too dissimilar to the precinct created at the light rail terminus in Southport (Gold Coast University Hospital Precinct). It is important that NSW and Queensland transport authorities work together to deliver a public transport system for these high employment generating cross-border land uses which can potentially have a high conversion of vehicle trips to public transport trips.

It should also be highlighted that in the longer term, a heavy rail station has been identified for Cobaki. The Cobaki heavy rail station is proposed to be located adjacent to John Flynn Hospital, further re-iterating the importance of establishing an east-west bus service from Cobaki Town Centre to the Gold Coast Highway.

Far North Coast Regional Strategy

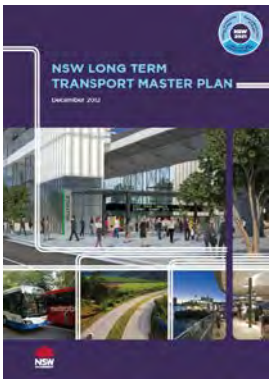


The Far North Coast Regional Strategy is the planning document with objectives and strategies specifically targeted for the North Coast Region. The plan contains the following relevant references to transport issues:

- *The identification of local transport hubs will assist in linking the Region's major urban centres with each other and with destinations/ origins outside the Region;*
- *Through its settlement planning and urban design actions, the Strategy will improve connectivity and accessibility within urban areas;*
- *The development of improved transport linkages with South East Queensland will be considered during the ongoing review of the Strategy;*
- *Local environmental plans will provide for passenger interchanges in all major regional centres, major towns and towns. These interchanges will be well connected to pedestrian and cycle ways; and*
- *Land use and transport planning must be integrated to minimise the need to travel, and to encourage energy and resource efficiency.*

The proposed modified plan for Cobaki to intensify uses within the town centre is very well aligned with the directions sought after within the Far North Coast Regional Strategy. The proposed modification addresses all of the above items through the ability to encourage increased levels of walking, cycle, and public transport use. In particular, the proposed changes will result in a significant increase in localised employment lands enabling locals to live, work and play within the one catchment area. Pending the introduction of efficient bus services to the Gold Coast Highway, there would be little need for multiple car ownership within a single dwelling.

NSW Long Term Master Plan 2012



The NSW Long Term Masterplan is a document that sets out the future transport plan for the State of NSW. The directions of the masterplan are not too dissimilar to that identified in NSW 2021. Below is a relevant extract from the forefront of the plan:

The Master Plan provides the evidence, the challenges and the right priorities to guide the many investment and service delivery decisions that will need to be made in the future. It sets the strategy and the direction required to deliver the customer-focused, integrated transport system that NSW needs.

The current proposed modification to the Cobaki development encourages the implementation of integrated transport through the planned complementary land uses and as a result, a likely increase in the internalisation of trips. The current approved concept plan is outdated and based on the model of delivery standard residential stock under an 'urban sprawl' scenario which his now no longer preferred.

The following are the eight (8) key objectives were identified in the NSW Long Term Masterplan:

Improve quality of service – by putting the customer at the centre of transport planning and service delivery, improving the quality of travel experiences, offering more travel choices and providing integrated services that directly meet our travel requirements

Improve liveability – by shaping our cities and major centres, improving connectivity, providing services that support jobs growth in centres close to where people live, and facilitating ease of movement in our major cities and activity centres

Support economic growth and productivity – by providing a transport system that responds directly to customer needs, is more efficient, increases freight efficiency and improves the connectivity and accessibility of people to other people, opportunities, goods and services

Support regional development – by improving accessibility to jobs, services and people, improving freight connections to markets and providing better links between clusters of business activity

Improve safety and security – by placing a high priority on addressing the causes and risks of transport accidents and security incidents

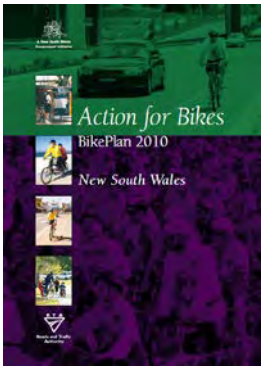
Reduce social disadvantage – by improving access to goods, services and employment and education opportunities for people across all parts of the State

Improve sustainability – by maintaining and optimising the use of the transport network, easing congestion, growing the proportion of travel by sustainable modes such as public transport, walking and cycling, and becoming more energy efficient

Strengthen transport planning processes – by improving integrated transport planning processes, including with land use planning; identifying areas where evidence should be collected for future decision making; and continually improving governance and administration of the transport system.

The proposal to incorporate university uses within the Cobaki Town Centre complements each and every one of the objectives stated within the transport masterplan. The proposed modification to the Cobaki development should be welcomed by State and Local Government agencies.

NSW Bike Plan



The NSW Bike Plan "Action for Bikes – Bike Plan 2010" provides overarching state level support and commitment towards the ongoing improvement for bicycle amenity. The plan covers many topics such as:

- Bicycle infrastructure (on-street and off-street);
- Commitment to maintenance;
- Communication, education and awareness;
- End of trip facilities; and
- Improved signage.

The proposed modification to the Cobaki Town Centre uses introduces opportunities to create a 'cycle' friendly town. Both on-street and off-street cycle provisions are made throughout the town centre. All land uses will include high levels of cycle amenity, including end of trip facilities.

The university campus is currently proposing to provide in excess of 500 bicycle racks installed to current endorsed practices. In accordance with Austroads Guidelines, 50% of these spaces will be provided upfront, with areas for expansion protected for future use. Student accommodation (in the order of 3,000 beds) is proposed to be designed to enable bike storage to be provided within the apartment. Anecdotally, it is understood that preference is given for users to be able to store bicycles within the apartment, rather than in a communal locker style system in a basement car park. This is particularly the case when owners of expensive bicycles are involved.

Other initiatives that will be proposed over-time within the university is an on-site bicycle shop and bicycle mechanic. There is also potential to incorporate a 'bike hire' scheme from the proposed campus bike store. The university will also investigate incentives to encourage cycle use in lieu of driving into the town centre.

These individual strategies will form part of an overall sustainable transport strategy which will include other initiatives such as carpooling incentives, car share schemes, pay parking, and bus incentives.

Experience from other successful operating universities is the development of transport access guides and marketing material promoting sustainable transport access as part of the overall university campus promotional material, along with a strong emphasis of sustainable transport access during orientation week.

Planning Guidelines for Walking and Cycling

The planning guidelines for walking and cycle contain the following four-point action plan:

1. Improving the bike network
2. Making it safer to cycle
3. Improving personal and environmental health
4. Raising community awareness

In the area of "planning", the document specifically states the following:

"Land use planning has an important role to play in improving conditions for walking and cycling. Importantly, planning influences urban density and form and the broad interaction between land use and transport, which sets the scene for walkability and cycleability for decades to come. Planning also provides an opportunity for community engagement on walking and cycling issues, developer financing of walking and cycling facilities and monitoring of the walking and cycling environment."

It is clear from the above statement that the proposed modification to the Cobaki development is delivering upon the requirements of the 'Planning guidelines for walking and cycling". The proposed masterplan associated with the response to the SEAR along with the additional details contained within this report should provide state and local agencies with a high degree of comfort that the town centre is being planned in accordance with the guidelines, and more importantly, to deliver a town centre that will welcome and encourage pedestrian and cycle use.

Healthy Urban Development Checklist, NSW Health

The "Healthy Urban Development Checklist" contains the following direct extract:

The following elements of urban form have been found to have a positive influence on physical activity and health generally:

- *Mixed land use including housing, industrial, retail, commercial, education, recreation, etc. in close proximity;*
- *More compact developments characterised by higher densities of people, dwellings and employment opportunities;*
- *Quality and proximity of destinations, with a 400-500 metre radius (considered to be a comfortable walking distance for most people) as a common basis for access to a range of daily needs including shops, open space, community facilities and public transport. Current NSW guidance recommends that 400 metres is considered to be a reasonable walking distance to a bus stop and that for metropolitan railway stations households should be within 800-1000 metres;*
- *Street connectivity and continuity that promotes directness of routes;*
- *Neighbourhood environment including aesthetic appeal, presence of footpaths, cycleways, shade trees, separation of pedestrians from vehicle travel, interesting streetscapes;*
- *Walking and cycling infrastructure linking key destinations and providing safe and inviting alternatives to automobile travel.*

Urban sprawl, although often poorly defined, has generally been identified as an anathema to the creation of healthy communities. Some of the consequences of urban sprawl have been identified as "increased reliance on automobile transportation and decreased ability to walk to destinations, decreased

neighbourhood cohesion, and environmental degradation". There is growing evidence regarding links between contemporary public health epidemics, such as obesity and depression, and aspects of our urban environment, which have emerged in parallel with the increasing suburbanisation of Australian cities.

Lack of local employment opportunities requiring some people to travel long distances from home to work, meaning that they "do not have the time or energy to form meaningful relationships with their neighbours" as well as a lack of time for their own family relationships and activities.

The "Healthy Urban Development Checklist" provides a very good overarching summary of the key benefits associated with delivering a well-planned medium-high density mixed use town centre, as opposed to the current approved arrangement of low density residential sprawled over a large area.

It should be noted that whilst the total number of residential dwellings (5,500) remain unchanged. Under the current concept plan approval there were 5,300 low density residential dwellings and 200 medium density residential dwellings within the town centre. Under the proposed modification, there are approximately 3,300 additional university related bedrooms proposed that will be directly related to the proposed university uses. The alterations proposed to the town centre land uses to include an increased level of development intensity will create a town centre environment that promotes pedestrian and cycling interactions through the passive surveillance that will exist with the critical mass of public activity. In addition, the strategic placement of supermarkets and either end of the town centre will assist with ensuring the passive surveillance extends into the night-time hours when the university is expected to still be operational.

2.2 SEAR 5A: INTERNAL ROAD NETWORK TRAFFIC IMPACTS AND ON-SITE PARKING

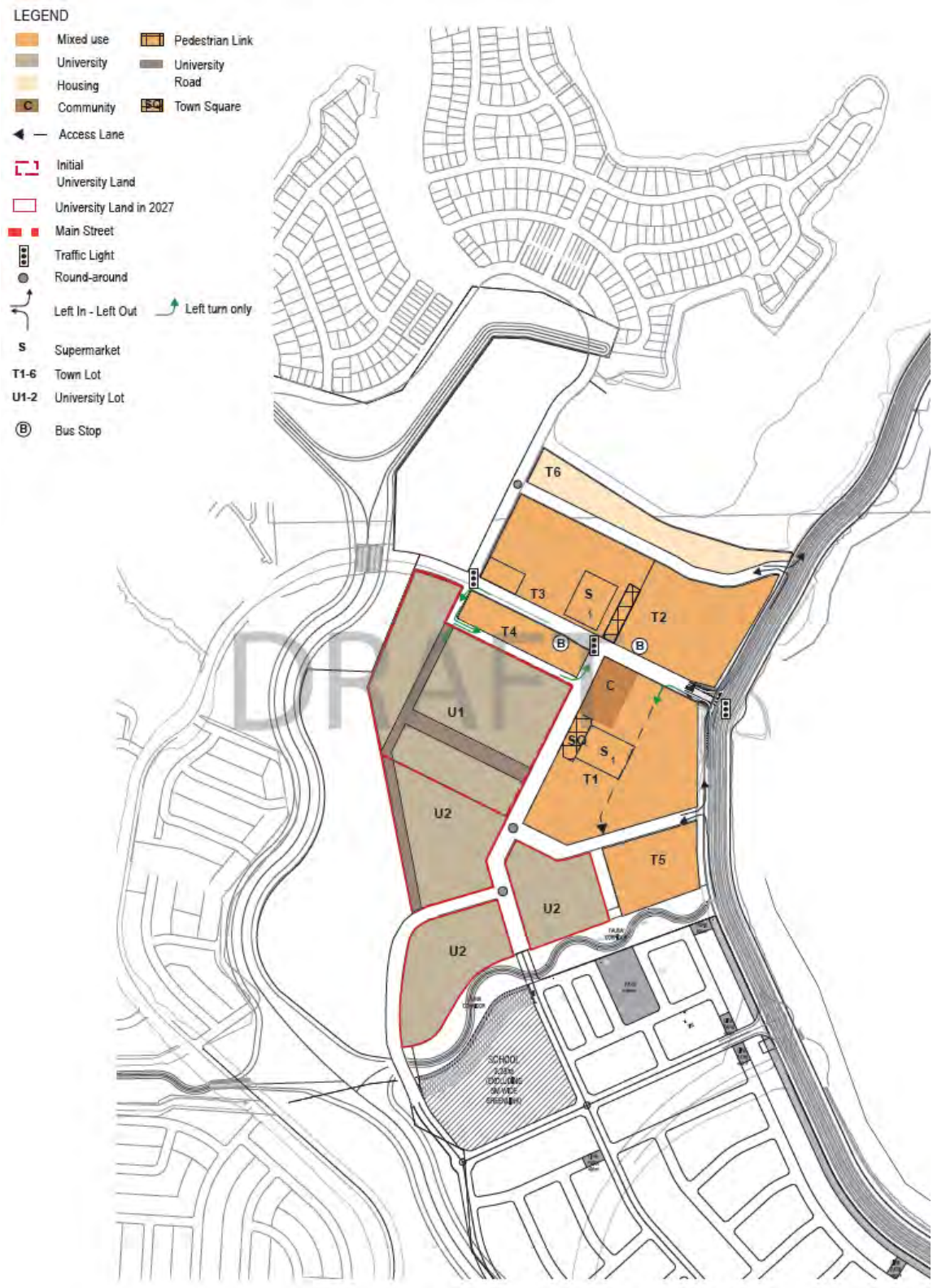
2.2.1 Town Centre Masterplan and Proposed Additional Uses

The project team has worked collaboratively to ensure that the Cobaki Town Centre was master planned in a manner that would encourage a lower reliance on private motor vehicle use. It has also been designed to maximise the potential for increased 'foot traffic' along the 'main street'. The 'main street' has been anchored with a 'high quality' bus stop at one end of the 'main street' in the centre of the town and main multi-storey car parks located at the other end. The primary pedestrian access to the university is proposed to be located mid-way along the 'main street' and as a result of the location of the key transport and land use nodes; it is expected to be heavily pedestrianised.

A mixture of student accommodation and apartment style dwellings are proposed within the town centre to assist with increasing the centre's activity into the evening. A supermarket has been located on both the northern and southern sides of Sandy Lane to also increase night-time pedestrian and vehicle activity to increase passive surveillance within the centre.

Figure 2.1 below shows the current masterplan for the town centre, whilst Table 2.1 provides a comparison between the current approved Concept Plan uses and the proposed modified uses within the Town Centre.

It should be noted that the town centre street network (and its permeability) will be enhanced with additional town streets as development applications for each block are submitted. Additional detail relating to connections to open space areas and the relocated public school will be given additional consideration in due course. At this stage it is planned to co-locate the facilities in close proximity of each other to enable the sharing of ovals and car parking necessary for both facilities to successfully operate (refer Appendix F).



Source: GMU Architects (2015)

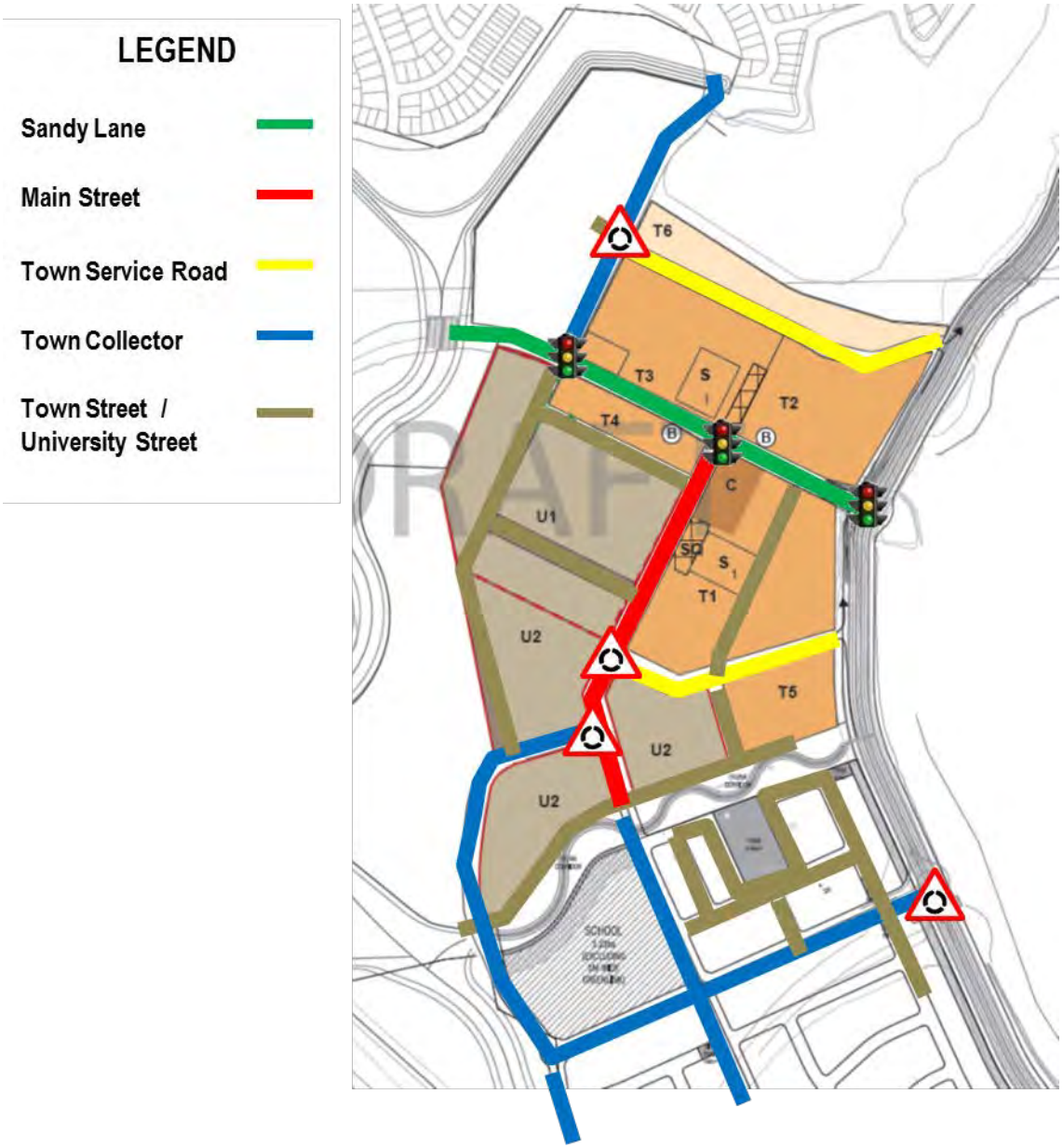
Figure 2.1: Town Centre Masterplan

Table 2.1: Land Use Modifications Proposed

USE	Unit	Original Qty	Proposed Qty	Difference Qty
Town Centre Residential	Unit	200	200	0
Retail / Shop	GLFA (m2)	3000	6904	3904
Office / Commercial / Medical	GLFA (m2)	2500	3576	1076
Supermarket	GLFA (m2)	4000	7680	3680
Community Use	GLFA (m2)	1000	2230	1230
University	EFTL (Staff+Student)	0	10500	10500
Student Accommodation	Beds	0	3300	3300
Surrounding residential	Dwelling	5300	5300	0

2.2.2 Town Centre Road Hierarchy

The road hierarchy for the town centre is shown in Figure 2.2.



Source: Base Map Source (GMU Architects – 2015)

Figure 2.2: Town Centre Road Hierarchy

The street network has been designed such that all external traffic will enter the town centre via Sandy Lane and Main Street. Heavy vehicle movement needs for site servicing and waste collection can occur from the Service Lane/s which will have direct access (left in – left out) to Cobaki Parkway. U-turn movements for the large vehicles will be able to be undertaken along Cobaki Parkway at the larger roundabouts located on each approach to the town centre.

The internal road network has been designed to protect the capacity of Sandy Lane through the creation of T-Intersections (greater efficiency than four-way intersections. Whilst the western signalised intersection at Sandy Lane is shown as a four-way intersection, the only permitted movements into the southern lane-way will be 'left in' or 'straight ahead' from the town collector road opposite.

Internal local area style roundabouts are proposed on the approaches to the 'Main Street' and 'Sandy Lane' to facilitate improved access to key parking stations, but to also act as traffic calming devices upon entering the town centre.

Signalisation of multiple intersections along Sandy Lane will promote safe pedestrian access across the higher order road. The provision of multiple pedestrian crossing facilities will reduce the 'barrier' effect Sandy Lane may have on connection the northern and southern sides of the centre.

The road environment proposed to be created along this section of Sandy Lane is similar to that provided in most town centres across the Sydney Metropolitan area. An example is provided in Figure 2.3 below.

SOURCE: Streetview @ 2015 Google

Figure 2.3: Sandy Lane Cross-Section Example (Chatswood)

The cross-section of Sandy Lane however is proposed to be slightly modified to include a wider kerb-side lane to enable shared cycle / traffic use. The key benefit with adopting this cross-section in the town centre is that it maintains the compactness required of a town centre to achieve the right urban environment, but also enables the flexibility and balance between the need to provide on-street parking and traffic capacity (i.e. directional peak hour clearways).

Areas in the Sydney Metropolitan Area such as Newtown and Burwood have created a very vibrant and successful main traffic route environment without totally discarding the consideration for all other town centre amenity requirements (refer Figure 2.4).

SOURCE: Streetview @ 2015 Google

Figure 2.4: Successful Active High Traffic Volume Town Centre Arterials (Newtown/Burwood)

The proposed street cross-sections for all of the proposed town centre road types are described in Section 2.2.3 below.

2.2.3 Town Centre Road Cross-Sections

Sandy Lane

The proposed street cross-section for Sandy Lane is shown in Figure 2.5 below.

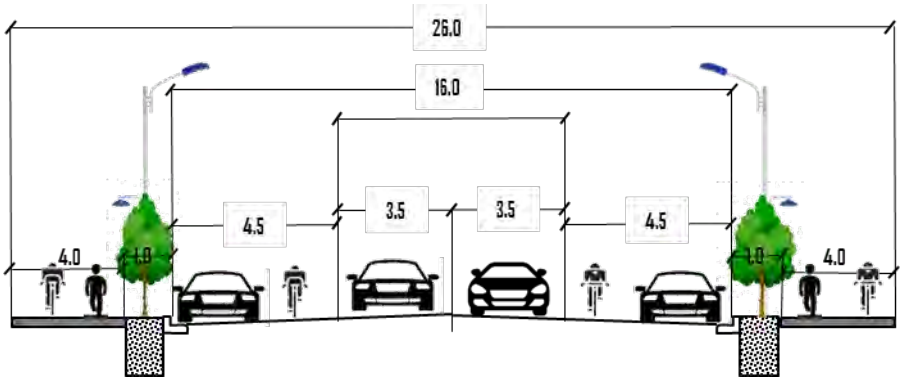


Figure 2.5: Sandy Lane Cross-Section

The proposed cross-section provides safe informal provision for on-road cycling. It is proposed to install cycle warning advisory marking midway between the centre and right-hand side of the kerbside lane to ensure both parked cars (off-peak) and through traffic (peak periods) are advised of possible cycle use in the wider kerbside lane.

A wide shared path is also proposed off-street on both sides of the road to promote pedestrian and cycle travel.

It is expected that the speed limit through this section of Sandy Lane (and Cobaki Parkway approaches) will be restricted to 60kph.

Main Street

The proposed cross-section for 'Main Street' is shown in Figure 2.6 below.

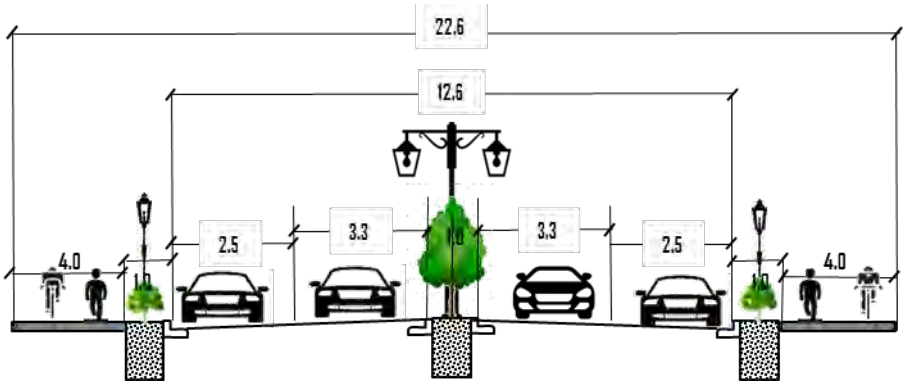


Figure 2.6: Main Street Cross-Section

The proposed cross-section has been designed to promote an intimate and narrow town centre 'main street' environment. Wider footpath areas have been included to promote increased pedestrian and cycle use. It is envisaged that this section of road will include marked foot crossings at regular intervals to promote safe pedestrian movement across the "Main Street".

The "Main Street" is proposed to be signposted as a "High Pedestrian Activity Area" and speed limit restricted as 40kph.

Town Service Road

The proposed cross-section of the service roads is included in Figure 2.7 below. The service roads have been designed with additional lane width to accommodate service vehicles required to access the town centre rear servicing areas. Forecast pedestrian and cycle movements long these corridors are expected to be of a lower volume within these road sections.

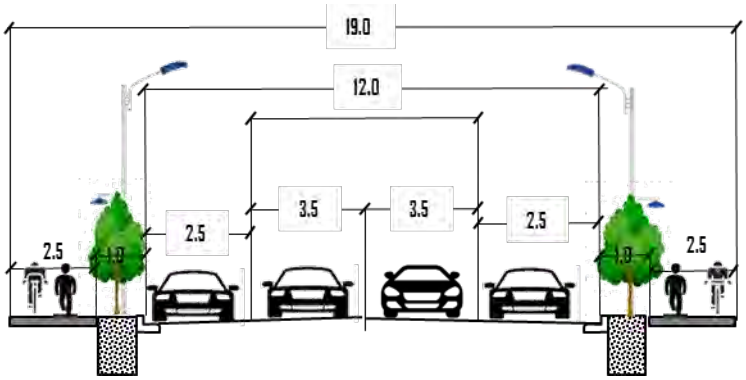


Figure 2.7: Town Service Road Cross-Section

Town Collector Street

The proposed street cross-section for the Town Collector streets is shown in Figure 2.8 below.

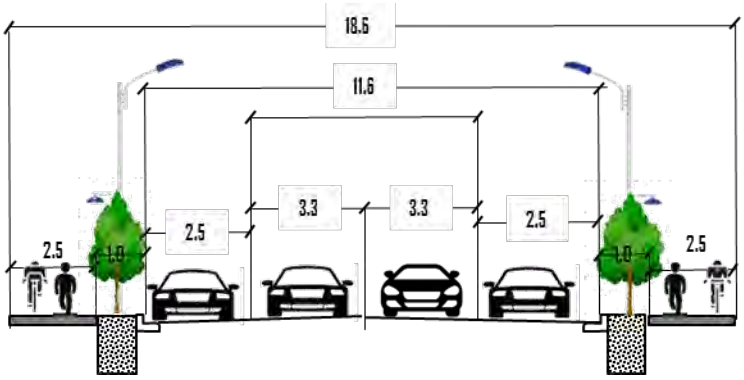


Figure 2.8: Town Collector Street Cross-Section

The Town Collector streets have been designed with slightly wider shared pathways, as they are mostly accommodating the movement of pedestrians and cyclists from adjoining residential areas into the town centre.

Narrower lane widths have been provided to encourage lower vehicle speeds. The Town Collector streets are expected to contain the default 50kph speed limit.

Town Street

The remaining streets within the Town Centre have been labelled as 'Town Streets'. A number of these streets will appear as internal roadways / laneways. Whilst these streets won't be signposted with a speed limit (ie default 50kph speed limit would apply), the design environment will be such that it will be difficult for motorists to travel in excess of 30-40kph.

Parking along these streets will be staggered to ensure suitable driveway access and emergency service vehicle access is maintained. Where service vehicles are required to traverse these streets additional parking bans will be required to ensure suitable widths are available for heavy vehicle manoeuvring.

Figure 2.9 below shows the proposed cross-section for the remaining town streets / university streets. The university streets will be owned by the university and they are likely to all be publicly accessible. The decision as to whether they will be proposed to be handed back to Council will be decided at development application stage.

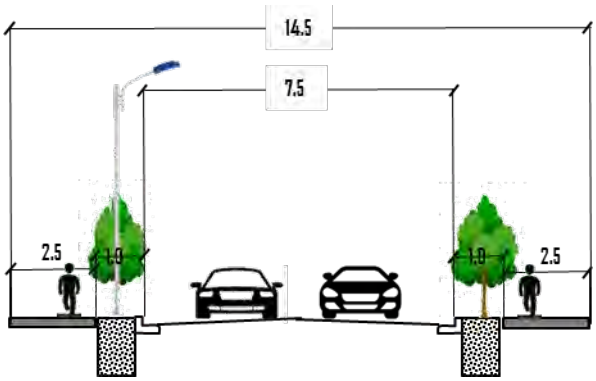
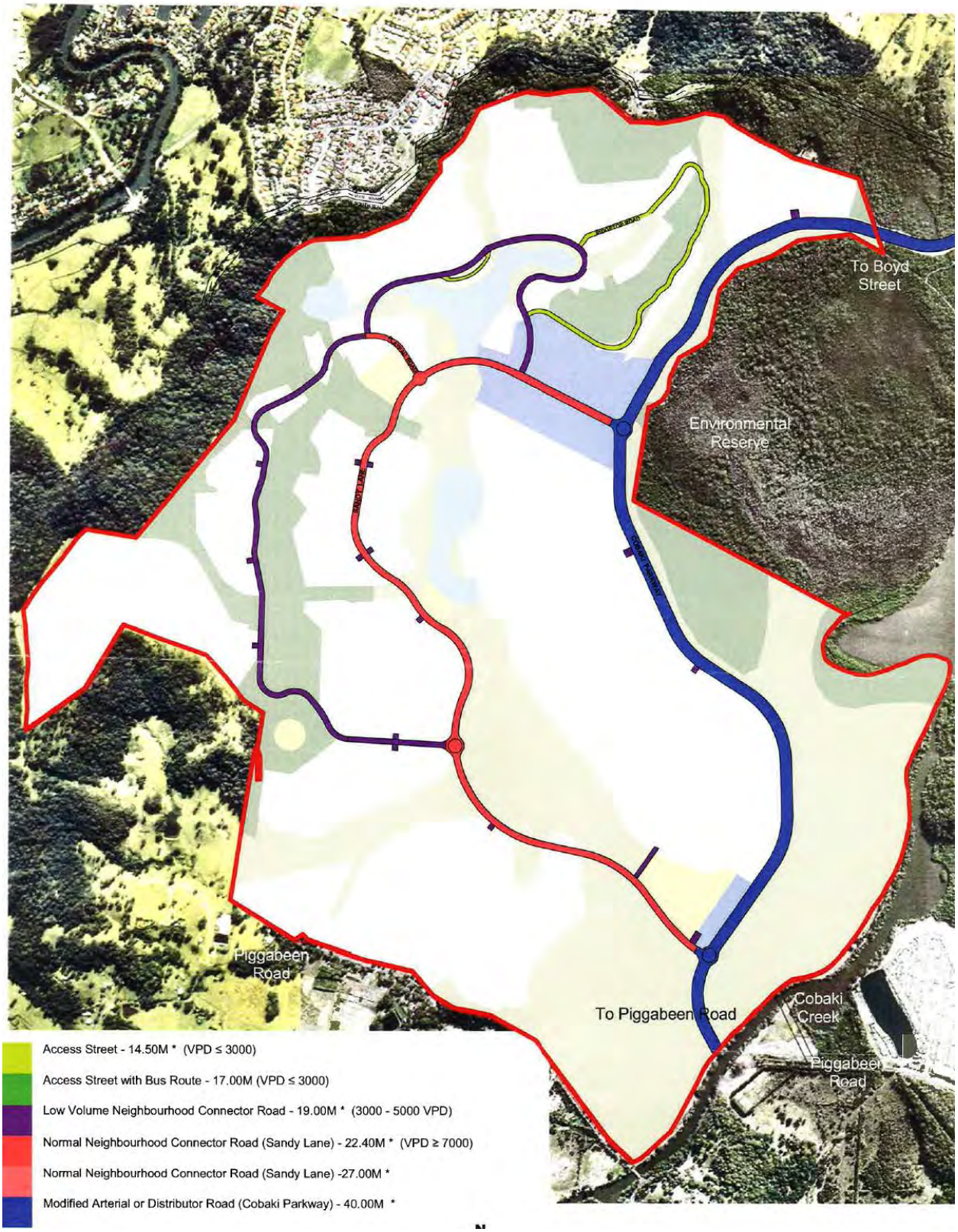


Figure 2.9: Town Street / University Street Cross-Section

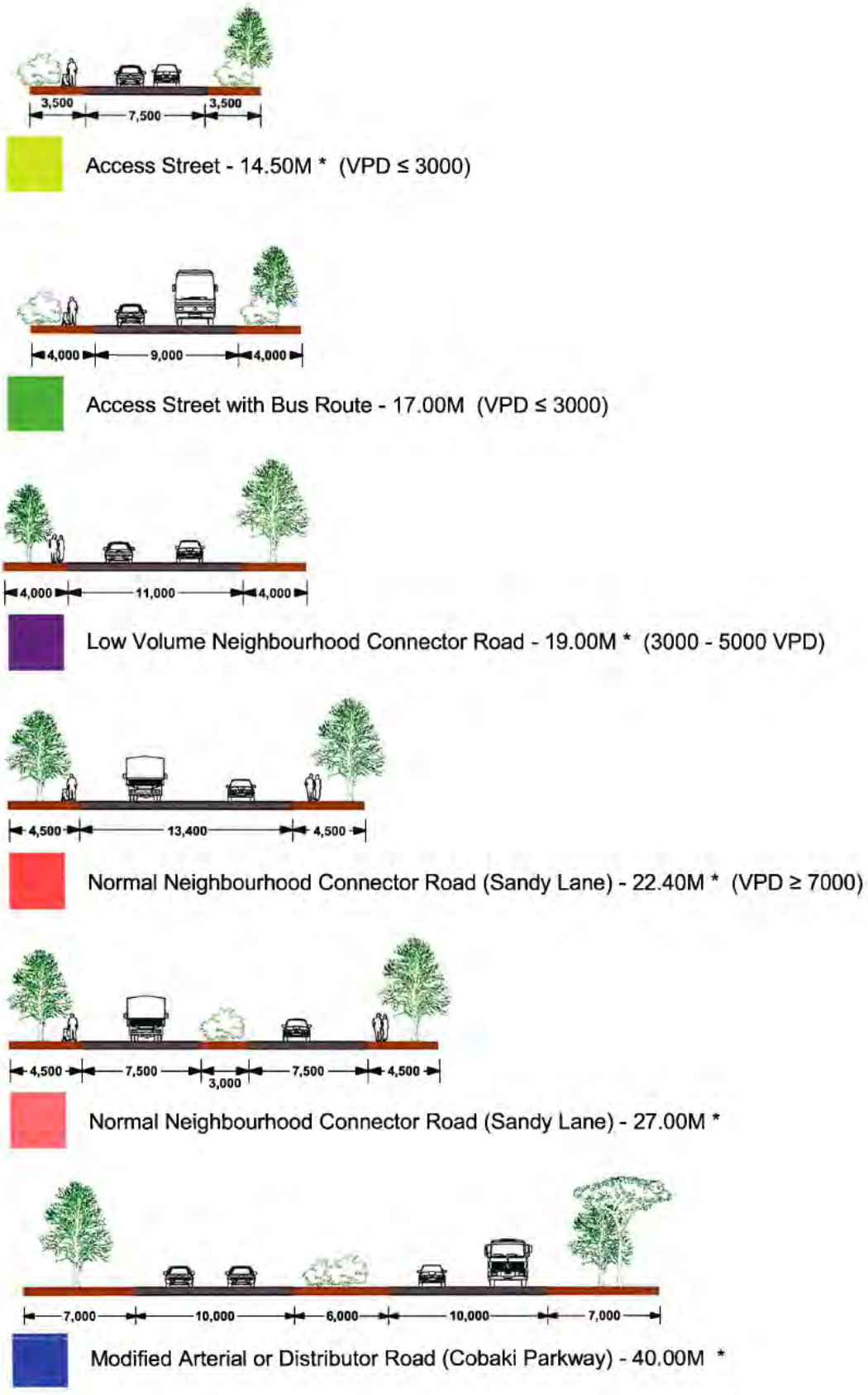
The road cross-sections for roads outside of the town centre area operating under the Concept Plan Approval. The current approved road cross-sections are shown in Figure 2.10 and Figure 2.11 below.

It is proposed that the cross-sections for the areas outside of the town centre be revised to comply with Tweed Shire Council's latest approved 'Urban Road Cross-Section' standard drawings dated August 2014 (except Sandy Lane – Refer Appendix F).



SOURCE: DFa (August 2008)

Figure 2.10: Concept Plan Approval Road Hierarchy – Broader Area



SOURCE: DFa (August 2008)

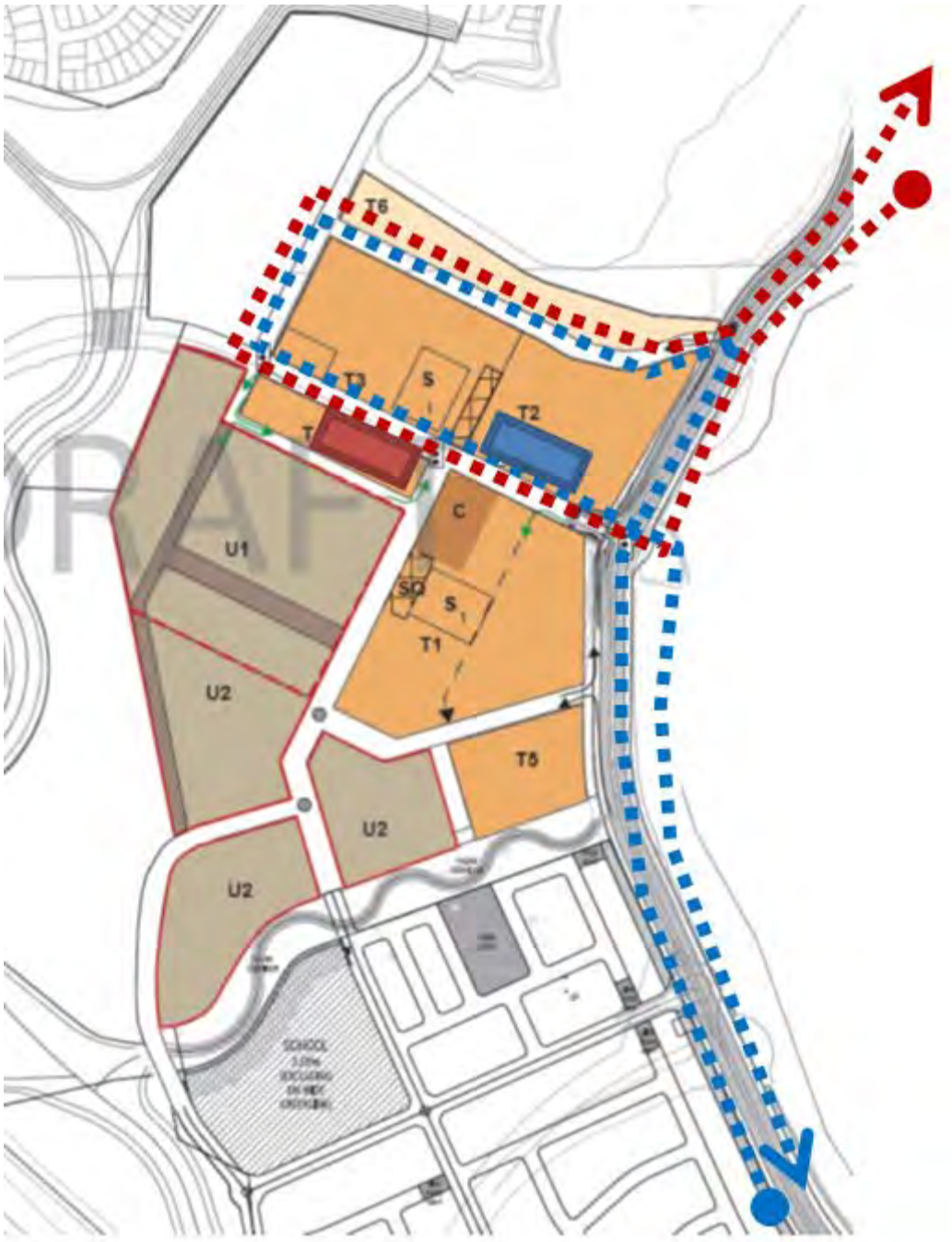
Figure 2.11: Concept Plan Approval Road Cross-Sections – Broader Area

2.2.4 Town Centre Bus Access Strategy

The Town Centre bus access strategy has been designed in consultation with the Transit Australia Group and Translink. Bus access is complicated by the cross-border contractual/ticketing structures and legislative constraints that exist. These aspects are further discussed in Section 2.4.

The town centre bus access strategy has been designed to simplify access requirements between NSW and Qld operations. Figure 2.12 below shows the proposed town centre bus services / routes. Other NSW based bus routes may be developed that pick-up on other surrounding lower density residential areas, however they will stop within the town centre in a similar manner to that proposed below. These additional services are discussed in Section 2.4.

The figure below shows the bus services routes expected to be required to service the town centre. The Maroon service shown is a Queensland based service, whilst Blue service shown is a NSW based service.



SOURCE: Base Map (GMU Architects – 2015)

Figure 2.12: Bus Access Strategy

The bus stops have been located within the middle of the town centre, and has been given the utmost priority in terms of its location, highlighting important role public transport will service for this student based town centre. The bus stops are located in close proximity to two supermarkets and at the main town centre intersections maximising the passive surveillance of patrons waiting for buses well into the evening period.

The bus routing strategy has been designed to minimise impacts to the heavily pedestrianised 'main street' and the proposed amenity that is to be created.

To simplify cross-border issues, it is proposed that the Queensland based service and NSW based service has two separate bus stops. In the interim, students will be required to comply with the two separate ticketing systems.

It should be noted that Translink are unable to install bus stops in NSW. As such, whilst the developer will provide the necessary bus stops, the asset will be ultimately owned by Tweed Shire Council. It is understood, that the NSW traffic act authorises a public route bus service to utilise the bus zones (bus stops). Any proposed Queensland bus service would be a 'route' bus service and as such, it is understood, that they would be able to utilise this facility.

It is further understood that, for Translink to operate services into NSW they would be in breach of their own legislation (requiring services to only operate in Queensland). NSW Services can pick-up patrons from NSW and drop them off in Queensland, however cannot perform multiple pick-up and set-down stops within Queensland. This constraint will reduce the likely take-up of bus use and as such is not considered an option. Translink are currently investigations to obtain a "special exemption" permit to address this situation to enable the provision of services to the Cobaki Town Centre only (as shown above).

Under Queensland legislation it is understood that a chartered transport service can operate if all of the three issues below do not exist:

- It is open to the public;
- A fare is charged; and
- There is a scheduled timetable.

On the basis of the above, there are a number of options to provide a chartered service. Each of this options offer a unique set of benefits:

1. Provide a service free to the general public that runs to a timetable (has the potential to reduce overall traffic demands in the area);
2. Provide a service free (or at a marginal cost) to the students that can either run to a timetable or can be demand based (i.e. develop an App based system similar to Uber). The benefit of the App based solution is that a smaller bus could operate and the service could be door to door, including taking students to key locations such as major bus service interchanges (ie express route 777 into Broadbeach) or major centres such as Coolangatta.

At this stage, Option 2 would be considered to be the preferred option as it has increased flexibility and could be a large attractor for students to study at SCU because of the ease of access. Further investigation is required however into the cost and benefits associated with each of the above options.

Option 1 may have merit if other businesses in the area consider the joint funding of a 'free shuttle' service operating between major retail outlets (Tweed City, The Strand), employment lands (such as the hospital and university), entertainment facilities and higher density residential clusters.

In addition, investigation is required into the ability for a chartered service to stop in the designated bus zone. A separately 'special purpose' parking restriction may be required to be created to cater for the chartered service in lieu of the traditional Bus Zone signposting.

2.2.5 Town Centre Servicing Access Strategy

The proposed waste collection / site servicing access strategy are shown in Figure 2.13 below. The designated routes have mostly been designed with 3.5m wide travel lanes. Parking restrictions will be

required to be implemented along town streets / collector streets where servicing will require additional room for manoeuvring. This will be able to be managed within the pavement width available. The site servicing strategy aims to reduce heavy vehicle movement within the main pedestrianised areas.

SOURCE: Base Map (GMU Architects – 2015)

Figure 2.13: Site Servicing Access Strategy

2.2.6 Pedestrian and Cycle Access Strategy

The proposed pedestrian and cycle access strategy for the town centre is shown in Figure 2.14 below. The strategy aims to use the most direct internal street corridors between the residential land uses and the retail and university land uses. The key access corridors aim to link up retail and university uses to the major bus stops and car park stations. It is expected that a shared path will exist along the western side of Cobaki Parkway to facilitate longer distance cycle travel to the university.

SOURCE: Base Map (GMU Architects – 2015)

Figure 2.14: Pedestrian and Cycle Town Centre Access Strategy

2.2.7 Car Parking

The car parking demand was calculated using contemporary parking rates for healthy 'mixed used' town centres consistent with other similar town centres across NSW. The town centre proposed is likely to contain a large component of internalisation of retail demand with the high number of on-site student accommodation and residential apartments proposed.

The car park demand has been categorised into 'private' and 'public' parking to determine the required parking provisions. Private parking is intended to cater for residents and business owners/staff, whilst public parking is intended to cater for retail/residential and commercial visitors along with students travelling to the town centre. Calculations in a similar manner have been conducted for motorbike and bicycle parking.

Table 2.2 shows the parking requirements for the Town Centre to cater for the proposed modification to the town centre uses to incorporate a university and associated uses.

Table 2.2: Car Parking Demand Calculations

COBAKI / SCU TOWN CENTRE PARKING NEEDS			CARS				BIKES				MOTORBIKES			
			Proposed Rate		Parking Demand		Proposed Rate		Proposed Supply		Proposed Rate		Proposed Supply	
USE	UNIT	QTY	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
Town Centre Residential	Unit	196	1	0.2	196	39	0.3333	0.0833	65	16	0.0400	0.0080	8	2
Retail / Shop	GLFA (m2)	6904	0.01	0.04	69	276	0.0050	0.0013	35	9	0.0004	0.0016	3	11
Office / Commercial / Medical	GLFA (m2)	3576	0.01	0.04	36	143	0.0050	0.0013	18	5	0.0004	0.0016	1	6
Supermarket	GLFA (m2)	7680	0.01	0.06	77	461	0.0050	0.0010	38	8	0.0004	0.0024	3	18
Community Use	GLFA (m2)	2230	0.01	0.04	22	89	0.0050	0.0013	11	3	0.0004	0.0016	1	4
University	EFTL (Staff+Student)	10500	0.01	0.17	105	1750	0.0008	0.0500	9	525	0.0004	0.0067	4	70
Student Accomodation	Beds	3300	0.25	0.05	825	165	0.3333	0.0050	1100	17	0.0100	0.0020	33	7
				TOTAL	1330	2923			1276	582			53	117

Table 2.2 above shows a strong commitment to the provisioning of bicycle parking. SCU is currently considering the option of providing internal bike storage facilities within each student accommodation apartment rather than in a consolidated basement level. This will provide a premium storage facility to encourage bicycle use and will also the provisioning itemised in the above table from 1,100 private spaces to 3,300 private spaces for this component. Notwithstanding this, there is a commitment to provide in the order of 580 publicly available bicycle storage spaces across the town centre.

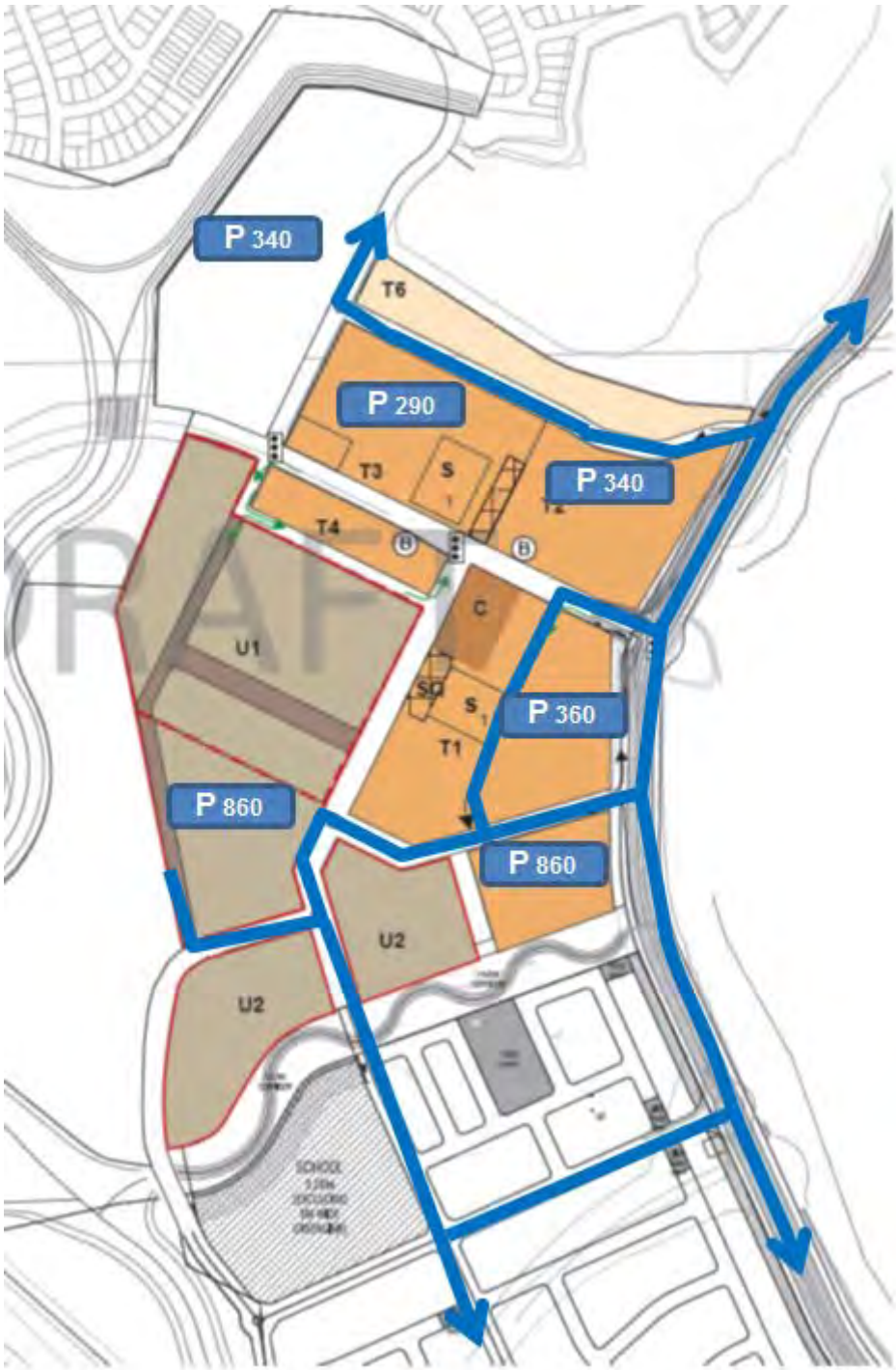
The support of motorcycle access and more efficient use of parking bay space are recognised from the above table with the provisioning of approximately 120 publicly available motorcycle bays.

Car parking provisions for the town centre will result in excess of 2,900 available car parking spaces. Figure 2.15 below shows the locations of the proposed car park locations. *The supermarket car parks will be provided at-grade, whilst all other car parks are currently proposed to be staged constructed as multi-storey car parks as the demand for parking requires such to occur.* It is hoped that through the implementation of a SCU led sustainable transport access strategy the need for multi-storey parking in all the nominated locations will not be required. SCU have recently completed a Travel Mode Share survey for the Bilinga and Lismore Campuses. Through the completion of these studies the university has an improved understanding of their students transport access needs and where improvements can be made to reduce the reliance on car use.

The parking provisioning shown in the figure below is required to support the visitors to the town centre. In addition to this parking provision, there will be basement parking required for residents and key staff associated within the town centre. This has been calculated to be demanded in the order of 1,330 car spaces. These spaces will be provided as the design and submission of development application for each land parcel occurs.

The car park access strategy has been designed to minimise conflict with pedestrian and cycle key desire lines. It has been designed to protect the amenity of the 'main street' whilst also promote walking along the 'main street' from the car park locations to the main retail / university activity areas.

Once bus services and pedestrian/cycle patterns are understood, and sufficient travel mode share survey is available, it is quite likely that the car park areas will include some level of 'pay parking'. In accordance with RMS guidelines, the implementation of 'pay parking' will only occur once a parking study of the existing town centre operations is undertaken. The main benefit of introducing 'pay parking' particularly for longer stay visits, is that it will encourage student / staff travel to the centre via non-car based modes of transport. This in turn will create an increase in demand for bus services and subsequently then allow for the provisioning of improved frequency and coverage of publicly available bus services.



SOURCE: Base Map (GMU Architects – 2015)

Figure 2.15: Car Parking Access Strategy

2.2.8 Traffic Impacts

Network Changes

The proposed Town Centre masterplan has altered the road configuration of Sandy Lane (within the Town Centre) and Cobaki Parkway.

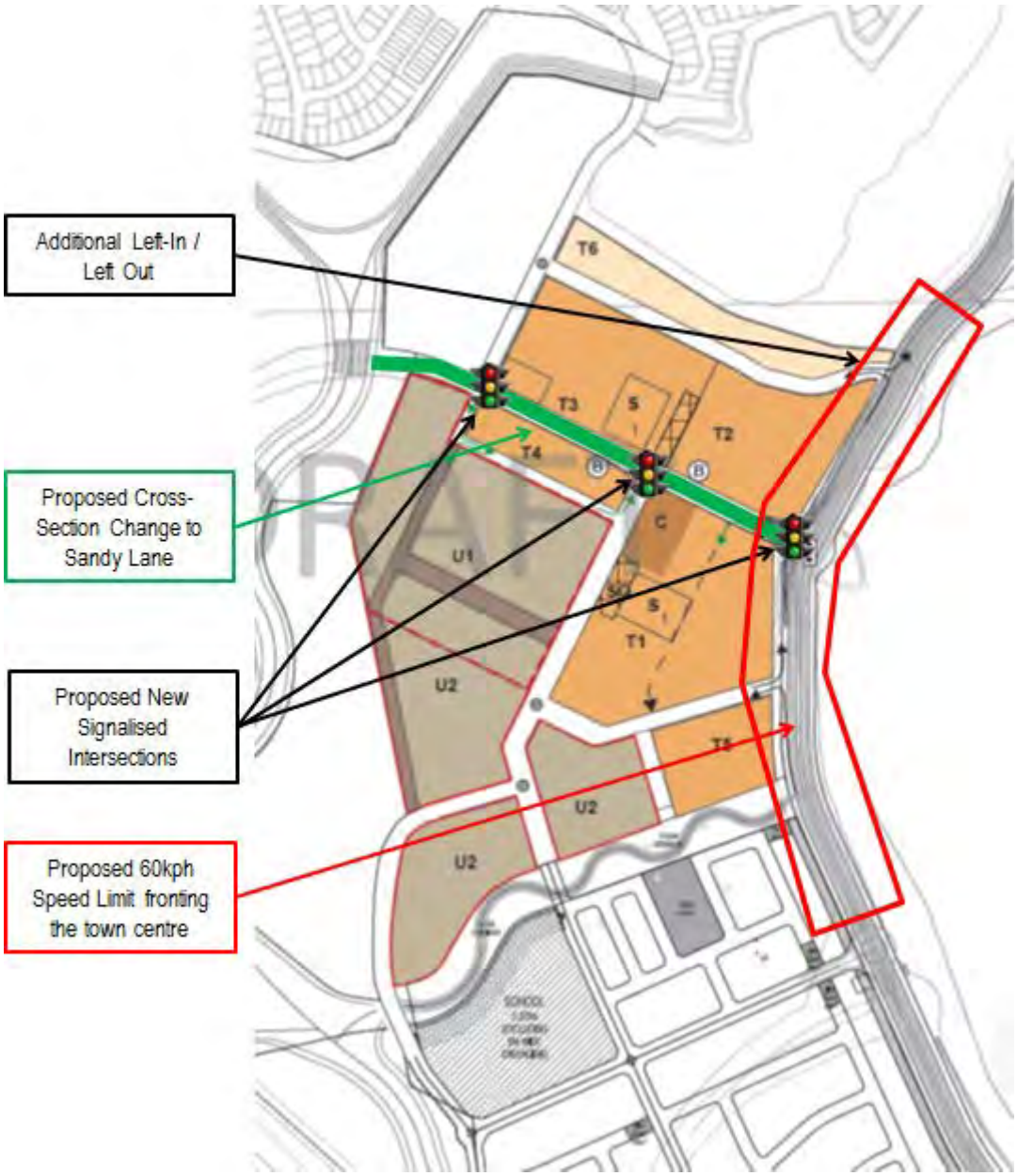
Sandy Lane is proposed to have an appearance of a traditional town centre road cross-section. With the proposed change of uses within the town centre to include student travel and as such, the promotion of alternative transport uses.

There are a series of signalised intersections proposed along Sandy Lane to facilitate safe pedestrian access across the main road. The proposed signalised intersection along Cobaki Parkway is provided in place of a previously suggested dual circulating lane roundabout.

The Concept Plan Approval currently only allows for a single left in-left out from Cobaki Parkway. With the change of uses within the town centre a second 'left in-left out' facility is proposed to accommodate improved heavy vehicle servicing access which will assist with protecting the pedestrian and cycle amenity within the Town Centre.

The proposed speed limit along Cobaki Parkway was 80kph. Given the change of land uses proposed within the town centre it is envisaged that it would be more appropriate for the section fronting the town centre on the approaches to the signalised intersection to contain a speed limit of 60kph.

Figure 2.16 below summarises the key changes to the current Concept Plan Approval.



SOURCE: Base Map (GMU Architects – 2015)

Figure 2.16: Internal Road Network Changes

Traffic Impact Assessment

Traffic Generation

The traffic generation was determined using RMS trip rates and trip generation information obtained from the SCU travel mode share survey report. A summary of the trip generation calculations is included in Table 2.3 below. The trip generation and distribution assumptions were cross-checked with the trip generation and trip distribution forecasts obtained from the Cross Border Study EMME Model (updated to include the additional modified uses).

Table 2.3: Traffic Generation Calculations

COBAKI / SCU TOWN CENTRE TRAFFIC GENERATION

Internal to Cobaki/SCU

Site	UNIT	Site Reference	QTY	Generation Rate AM	Generation Rate PM	Traffic Generation AM	Traffic Generation PM	% Internally Generated	Internally Generated AM	Internally Generated PM	Externally Generated AM	Externally Generated PM
T1	Beds	Student Bed	651	0.07	0.07	43	43	5%	2	2	41	41
	m2	Retail / Shop	2203	0.01	0.06	22	132	50%	11	66	11	66
	m2	Supermarket	3830	0.03	0.16	115	613	50%	57	306	57	306
	m2	Office / Commercial / Medical	1611	0.02	0.02	25	32	50%	12	16	12	16
	m2	Community	2230	0.02	0.02	45	45	50%	22	22	22	22
		TOTAL				250	865		105	413	144	452
T2	Beds	Student Bed	634	0.07	0.07	42	42	5%	2	2	40	40
	m2	Retail / Shop	1036	0.01	0.06	10	62	50%	5	31	5	31
	m2	Office / Commercial / Medical	163	0.02	0.02	3	3	50%	1	2	1	2
		TOTAL				55	108		9	35	47	73
T3	m2	Retail / Shop	1175	0.01	0.06	12	71	50%	6	35	6	35
	m2	Supermarket	3830	0.03	0.16	115	613	50%	57	306	57	306
	m2	Office / Commercial / Medical	1801	0.02	0.02	28	36	50%	14	18	14	18
		TOTAL				155	719		77	360	77	360
T4	Beds	Student Bed	313	0.07	0.07	21	21	5%	1	1	20	20
	m2	Retail / Shop	1387	0.01	0.06	14	83	50%	7	42	7	42
		TOTAL				35	104		8	43	27	61
T5	Unit	Apartment	86	0.40	0.40	35	35	5%	2	2	33	33
	Beds	Student Bed	1024	0.07	0.07	68	68	5%	3	3	65	65
		TOTAL				103	103		5	5	98	98
T6	Unit	Apartment	50	0.40	0.40	20	20	5%	1	1	19	19
		TOTAL				20	20		1	1	19	19
T7	Unit	Apartment	60	0.40	0.40	24	24	5%	1	1	23	23
		TOTAL				24	24		1	1	23	23
T8	Beds	Student Bed	308	0.07	0.07	21	21	5%	1	1	20	20
		TOTAL				21	21		1	1	20	20
T9	Beds	Student Bed	184	0.07	0.07	12	12	5%	1	1	12	12
		TOTAL				12	12		1	1	12	12
T10	Beds	Student Bed	196	0.07	0.07	13	13	5%	1	1	12	12
		TOTAL				13	13		1	1	12	12
UNI	EFTL (Staff+Student)	Uni	10500	0.13	0.07	1323	693	40%	529	277	794	416
	m2	Retail	1122	0.01	0.06	11	67	50%	6	34	6	34
		TOTAL				1334	760		535	311	799	449
Town Centre TOTAL						2021	2749		744	1171	1277	1578
Primary School	Students	School	800	0.5	0	400	0	90%	360	0	40	0
Cobaki Residential Surrounding	Dwellings	Houses	5304	0.65	0.65	3447.621	3447.621	35%	1207	1207	2241	2241
					TOTAL	5869	6197		2310	2377	3558	3819

Table 2.4 below provides a summary of the check on the level of external trips to extend onto the surrounding network as forecast by EMME and determined through the above 'first principles' calculations using RMS guidelines and contemporary practices.

Table 2.4: Cross Check with EMME of Traffic Generation Forecasts (Peak 1hr)

	EMME		TRAFF GEN	
EMME CHECK	AM	PM	AM	PM
TOTAL COBAKI	2691	3235	2759	3370
TOTAL UNI	331	443	799	449

EMME has under-estimated this figure

As can be seen from Table 2.4 the volume comparisons between the two sets of data are similar. It appears however that the AM peak traffic generation to the external network in EMME has under-estimated the trips generated from the site. For the purpose of this assessment, the higher value of 799 morning peak hour trips has been adopted. This trip rate is based on a recent travel mode share survey report conducted for the SCU Bilinga Campus and is considered to be the more accurate tool to use as a basis for determining the universities AM peak trip generation.

Traffic Network Performance of the Proposed Changes

A Paramics microsimulation model has been established for the town centre and the surrounding area. The outcomes from the Paramics microsimulation modelling will be discussed in detail later in this report where the impacts to the external road network are discussed.

The Paramics Model was validated to 2015 traffic count data and back of queue surveys. The AM and PM peak periods were 7AM-9AM and 4PM-6PM with a 30 minute warm-up and 30 minute cool down period as required by the RMS modelling guidelines. The base year models were validated to RMS modelling criteria. A base year model calibration/validation model report has been completed and attached to this report.

The 2031 model demands were created by increasing the background traffic by 2% per annum (compounding growth rate) and adding the development demands as outlined in Table 2.3.

Figure 2.17 below shows the modelled network and zoning structure for the Town Centre and Cobaki Development area. Each of the zone trip generation inclusions within the town centre were based on Table 2.3, whilst the trips from the surrounding residential area were based on the number of dwellings approved under the current Concept Plan Approval. The distribution of trips from the Town Centre to the internal zones was based on a weighted distribution, whilst the distributions to the external zones were based on the EMME forecasts of trip distribution to the external network (or zones).

Figure 2.17: Cobaki Area and Town Centre Network and Zone System

Within the Town Centre itself, a number of the streets will provide the function of internal town access streets. These streets will typically operate at speeds no greater than 20-30kph. The streets that have been coded as lower speed streets are shown in Figure 2.18 below.

Figure 2.18: Low Speed Streets (<30kph)

In responding to the performance of the proposed Town Centre operations, Figure 2.19 below provides snapshots of the Town Centre traffic operations during the AM and PM peak periods.

Figure 2.19: Model Snapshots (2031 AM/PM Peak)

Back of queue data has also been extracted for the AM and PM peak operating periods and is shown in Figure 2.20 below.

Figure 2.20: Town Centre Back of Queue Operations (2031 AM/PM Peak)

The resultant traffic volumes on the town centre street network during the AM and PM peak periods are shown in Figure 2.21 below.

Figure 2.21: Town Centre Traffic Volumes (2031 AM/PM Peak)

The above figures highlight that the proposed network treatment are expected to operate sufficiently to cater for the forecast demands. In addition, there appears to be sufficient additional capacity to cater for additional traffic growth should that be required in the future.

2.2.9 Sustainable Transport

Key measures to complement or facilitate the realisation of reducing the reliance of private motor vehicle travel include:

- Plan for higher density development around public transport nodes;
- Plan for higher density development within a walking catchment to the university;
- Plan for higher density development in locations where flat cycle access is provided to the university;
- Integrate retail / commercial uses with areas of higher residential and student uses;
- Locate retail / commercial uses to promote active streets for large periods of the day;
- Locate active and passive open space facilities in walking / cycling distance of higher density development areas;
- Locate parking stations for the university on the outer areas of the university to give priority to those that walk / cycle or use public transport;
- Locate parking stations in areas that will encourage the creation of active streets;
- Develop university marketing and education material promoting on-site accommodation, accommodation within the Cobaki area and accommodation in close proximity to major bus nodes as part of information material used to assist students to determine which university they wish to attend;
- Develop transport access guides and green travel plans that can be continually refined to support sustainable transport choices;
- Promote and incentivise the use of car-pooling through the improvement of SCU's current car-pool database / program;
- Encourage the introduction of car share schemes;
- Ensure appropriate 'end of trip' facilities are provided for staff/students;
- Consider the implementation of an 'App' based chartered bus service for staff/students (similar to Uber) where staff/students may be collected either 'door to door' or at a series of collection points;
- Consider the use of the revenue stream from any 'Pay Parking' strategy to directly fund improved chartered bus services;
- Facilitate improvement bus connections to existing key public transport services (ie express Bus Services to Broadbeach, services to Varsity Heavy Rail Station, services to Coolangatta / Tweed Centres);
- Promote the 'unbundling' of private parking as part of the sale of residential apartments;
- Undertaking of periodic travel mode share surveys to continually refine strategies and actions to promote non-car based modes of travel;
- Undertaking of periodic parking surveys / studies to continually refine the appropriate balance between parking access and sustainable transport access; and
- Conduct formal assessments of trials or initiatives that aim to encourage non-car based modes of travel.

2.3 SEAR 5B EXTERNAL ROAD NETWORK IMPACTS AND PROPOSED MODIFICATIONS

2.3.1 Overview

To assess the impacts to the external road network associated with the proposed additional uses two forms of assessment were undertaken.

In the first instance, strategic traffic modelling was undertaken to determine if there was any significant increase in traffic demand to the external road network, and if so where this was to occur.

Secondly, microsimulation modelling was undertaken to assessment the traffic network operations at a more detailed level to ensure that the existing infrastructure provisions under the Concept Plan Approval was still considered relevant. In particular, since the Concept Plan Approval, the Cross Border Study has been completed which has recommended the introduction of north facing ramps at the Boyd Street interchange, along with the inclusion of six laning of the M1 from Boyd Street to Stewart Road interchange. This however is on the basis that the M1 will be six lanes between Varsity Lakes and Tugun and eight lanes between Nerang and Varsity Lakes, which is now unlikely to occur prior to 2031.

It should also be noted that these recommendations are based on strategic-level modelling. The nature of strategic modelling is that is can be coarse in particular areas and is heavily dependent of the level of localised validation and zonal disaggregation (and placement). The intent of the Paramics Modelling is to provide further assurances to the required intersection upgrades to support the development.

2.3.2 2031 Strategic Traffic Modelling

Background

The CBTS was completed after the Cobaki Estate development application was approved. This was a study that was for Tweed Shire Council, Gold Coast City Council, the DTMR and the RMS. The CBTS introduced additional strategic transport recommendations that may now influence some of the previous conditions placed on the development.

The introduction of SCU within Cobaki Lakes has the potential to significantly alter trip patterns and in particular, increase the proportion of localised trips between the campus and surrounding residential areas. The SCU/Cobaki Lakes residential trip peak periods do not coincide as student / staff travel will be “inbound” whilst residential travel will be “outbound” in the morning peak and vice versa in the PM peak.

There is also data available from the SCU Travel Mode Share Survey (November 2013) which provides information relating to the propensity for staff and students to live in close proximity to the campus. These surveys suggest that proportion of local staff / students willing to reside within the Cobaki Lakes development area could be in the order of 30% of the total student demand. This will have a reducing effect on the overall impact of the Cobaki development as many of the commuter trips will subsequently remain internal to the Cobaki Lakes area.

The introduction of SCU into Cobaki Lakes changes the overall traffic access strategy to give greater consideration towards sustainable transport alternatives. In particular, the greater localisation of trips will lend itself to increased mode shares for pedestrian and cycle movements. The demand for student travel between the Cobaki Lakes campus and the Airport campus along with the desire for student travel to Coolangatta / Tweed City will bring forward the need to provide an efficient and affordable bus service to link these nodes.

To assist with gauging the effectiveness of the proposed transport strategy, the CBTS and its Strategic Traffic Models were revisited. The ‘Base Case’ CBTS traffic models were adopted as the initial base case for this assessment. These models were based on the GCSTM-MM V1.1.

Traffic Demands

The Base CBTS included the zone file details for the Cobaki area as shown in Table 2.5.

Table 2.5: CBTS Zone File Details for Cobaki

GC Zone	Population_2031	No of Household	Enrolment_2031			Employment_2031				Visitors_2031
			Pre, Primary	Secondary	Tertiary	Retail	Services	Professional	Industry	
660	12245	5000	255.6	131.4	95.4	740	400	0	363	28

To better reflect the current Concept Plan Approval, the zone file was updated as shown in Table 2.6.

Table 2.6: Updated Base Zone File for Cobaki

GC Zone	Population_2031	No of Household	Enrolment_2031			Employment_2031				Visitors_2031
			Pre, Primary	Secondary	Tertiary	Retail	Services	Professional	Industry	
660	13475	5500	800	0	0	740	400	0	363	28

The proposed modification to the Cobaki Development Approval is outlined in Section 2.2.1 of this report. An additional Zone 743 was created to cater for the SCU university uses. The full estimated 10,500EFTL Student and Staff numbers were used in the model. Whilst 3,300 students were forecast to live on-campus, these students / staff weren't removed from the model to maintain a conservative assessment. It is possible that these students would perform some level of trip generation to the external road network when not in session.

The modified land use adopted in the CBTS Model is shown in Table 2.7 below.

Table 2.7: Modified Cobaki / SCU Development Zone File

GC Zone	Population_2031	No of Household	Enrolment_2031			Employment_2031				Visitors_2031
			Pre, Primary	Secondary	Tertiary	Retail	Services	Professional	Industry	
660	13475	5500	800	0	0	1428	880	0	363	28
743	0	0	0	0	8750			1750		

As can be seen in Table 2.7, the retail/service jobs were increased as well as the university related uses to reflect the proposed increase in land uses for the Cobaki/SCU Concept Plan modification as previously shown in Table 2.1.

Road Network Options

Two road network options were considered as follows:

Base Option

- Boyd Street two lanes each way;
- No M1 interchange at Boyd Street; and
- M1 four lanes south of Stewart Road.

Revised Base Option

- North facing ramps at the M1/Boyd Street interchange;
- Boyd Street reduced to one lane each way; and
- M1 four lanes south of Stewart Road.

Options Tested

Considering the Demand and Road Network Scenarios listed above, the following options were tested:

- Concept Plan Approved Demands on the Base Network Option (Base);
- Concept Plan Approved Demands on the Revised Base Network Option (Revised Base);
- Modified Cobaki / SCU Demands on the Base Network Option (Option); and
- Modified Cobaki / SCU Demands on the Revised Base Network Option (Revised Option).

Traffic Generation

The combined traffic generation from the development under the above options is shown in Table 2.8 below.

Table 2.8: 2031 Daily Trip Generation

Base	Revised Base	Option	Revised Option
46,196	46,745	51,213	52,041

The above 2031 daily traffic volumes generated by the site show a relative increase of trips as a result of the additional SCU uses. The addition of north facing ramps at the Boyd Street interchange makes the university and employment land uses more accessible and hence increases the number of trips to/from the development site. Access to the university and associated town centre uses are important in making the town centre (and the university) successful.

Trip Distribution

The trip distribution of the Cobaki development was interrogated in detail across the various 2031 model scenarios tested. A summary of the trip distribution is shown in Figure 2.22 below.

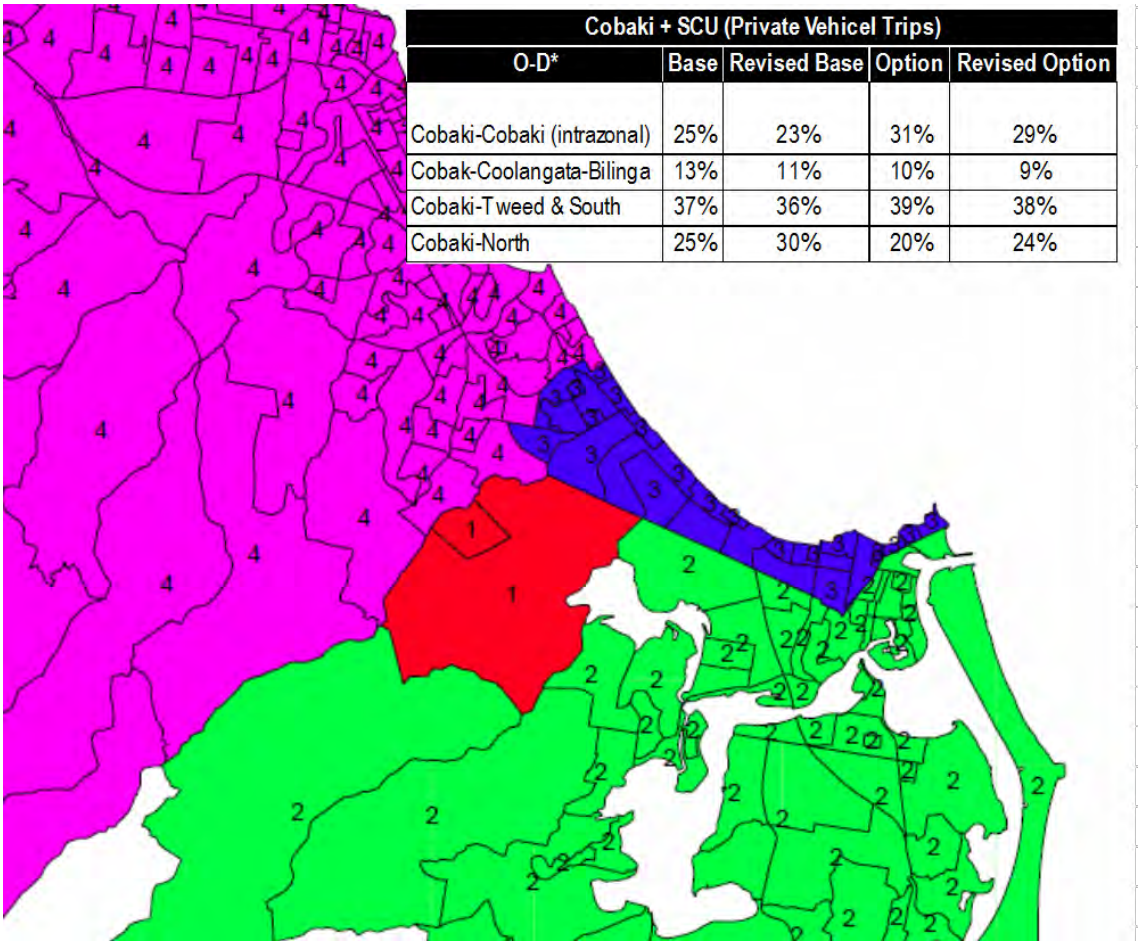


Figure 2.22: Trip Distribution across Various Options Tested

The trip distribution analysis highlighted that with the proposed development modification an additional 5% of trips naturally convert from external trips to internal trips.

From the remaining trips, approximately 20-30% wants to travel north towards the main Gold Coast area, whilst 40% are attracted towards the Tweed Heads south area. The increase of employment opportunities within the Cobaki and SCU zones has shown a significant swing towards the closer residential areas in the Cobaki area with the main noticeable conversion being a reduction in trips to the north, a slight reduction towards Coolangatta, and a slight increase towards Tweed Heads.

The trip distribution data from the EMME Model is telling us that with the additional uses in place, there is a greater level of internalisation of trips within the northern NSW area. The increase in local employment is resulting in local residential generated traffic having to drive shorter distances to employment and retail and employment land uses.

Modified Uses Forecast Travel Mode Share

The mode share assumptions / targets adopted for the Concept Plan Approval and Modified Cobaki / SCU development are as follows:

- Concept Plan Approval
  - Cobaki Zone 660
    - 15% Active Transport;
    - 15% Public Transport.
- Modified Cobaki/SCU
  - Cobaki Zone 660
    - 20% Active Transport;
    - 15% Public Transport.
  - SCU Zone 743
    - 25% Active Transport
    - 25% Public Transport.

Mode Share Targets

The City of Gold Coast's mode share targets for 2031 are 12% for active travel and 9% for public transport, however this takes into consideration all the residential sub-divisions across the Gold Coast area, which is not representative of the nature of the development that is being proposed. For instance, the 2011 Census Data shows that the surrounding areas (within 1-3km) of employment nodes such as Griffith University, Broadbeach, Southport, Burleigh, and Coolangatta all consistently show a current Car Mode Share of around 60-65% (in 2011). The future mode shares in 2031 can only be expected to reduce in these precincts and residential/employment densities increases, along with the commensurate improvement to public transport/active transport infrastructure.

By way of example, specific to a well-designed university, the University of Wollongong is not an integrated development however it has successfully managed to retro-fit sustainable transport principles and is now operating with a 58% car mode share, 28% public transport and 14% active transport. These figures exclude the number of on-site campus students which form approximately 30% of the total student intake. The take-up of non-car travel has been so successful that the university are planning to increase their student in-take by 50%, but will only increase parking by 20%, highlighting a 60% reduction on the provision of parking (or trips) compared to the current rate.

The integrated SCU/Cobaki development is proposing to take a similar approach by ensuring parking is appropriately managed and active/public transport is appropriately supported to ensure sustainable transport outcomes are achieved.

The proposed mode share targets specifically for the SCU and Cobaki land release areas are as follows:

The proposed mode share targets to be adopted for Cobaki Lakes are as follows:

- Car Transport : 65%
- Public Transport : 15%
- Active Transport : 20%

From a modelling perspective, the stated internalisation of trips between Cobaki and SCU are incorporated in the above values (i.e. the level of internalisation stated previously is reflected in the above mode share).

The proposed mode share targets to be adopted for SCU are as follows:

- Car Transport : 50%
- Public Transport : 25%
- Active Transport : 25%

Whilst the above mode share targets may seems over ambitious it should be highlighted that this is a long term target and they have been purposely set high to ensure the land release's individual development applications are designed with sustainable transport in the forefront. Based on 'current' experiences in other centres and university precincts many of these mode share targets are being experienced now. It is not considered unreasonable for a 'greenfield' university town centre precinct to achieve these mode share targets using latest contemporary sustainable transport / active transport planning principles.

2.3.3 Strategic Traffic Modelling Outputs

Overview

All of the Daily/AM/PM peak 2hr model results are included in Appendix B. The daily traffic volumes and associated impacts (appropriate for a strategic model) are discussed below along with the volume difference comparison when comparing the current Concept Plan Approval (Base) and the proposed Modified Cobaki/SCU uses (Project). A select link analysis was conducted on the Cobaki (Zone 660) and the SCU (Zone 743) model zones for each of the scenarios tested. This provides a detailed breakdown of the origin-destination movements under each of the scenarios tested to view the alteration in trip patterns as a result of the inclusion of the SCU land uses.

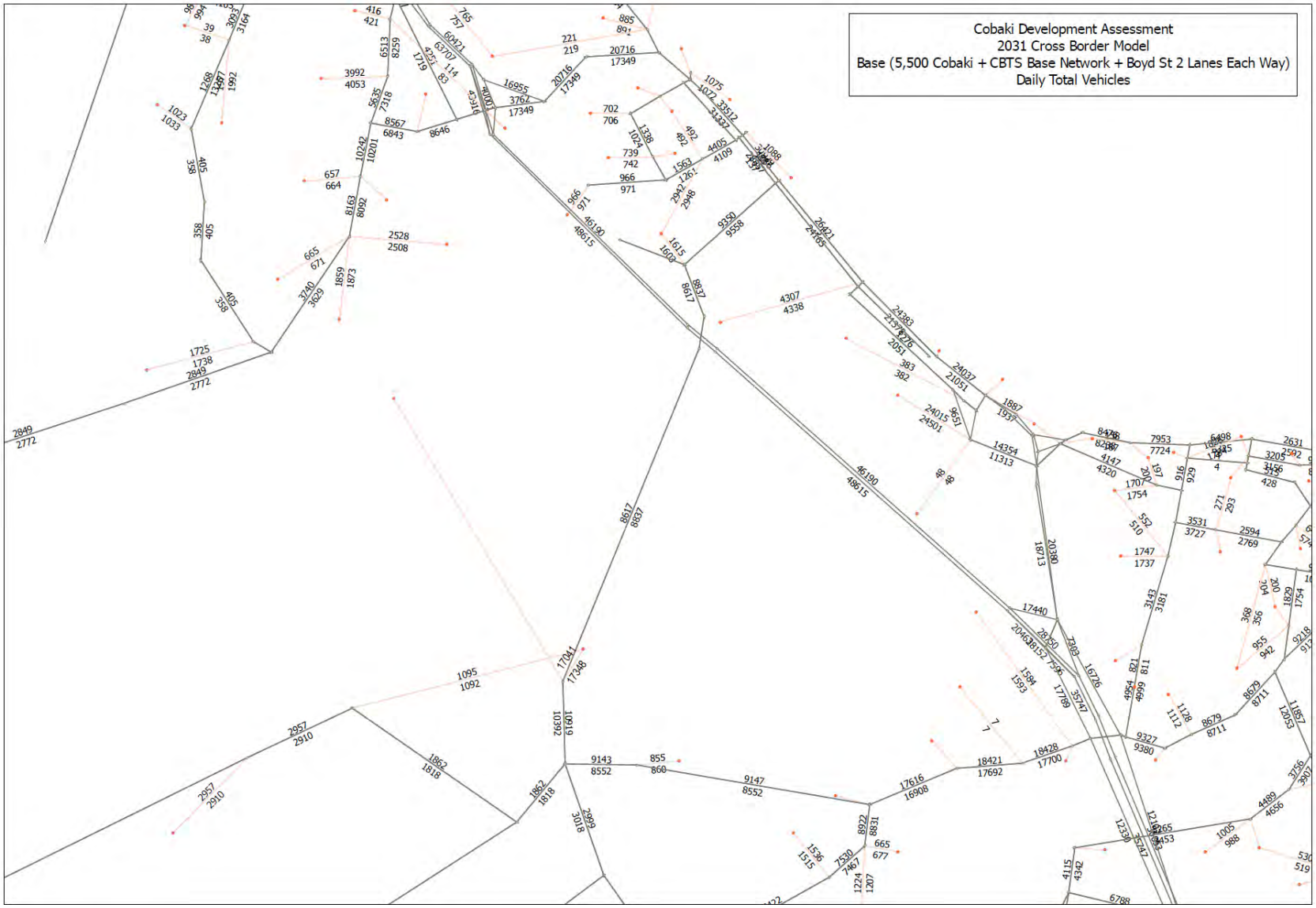


Figure 2.23: 2031 Daily Volumes – Concept Plan (Base)

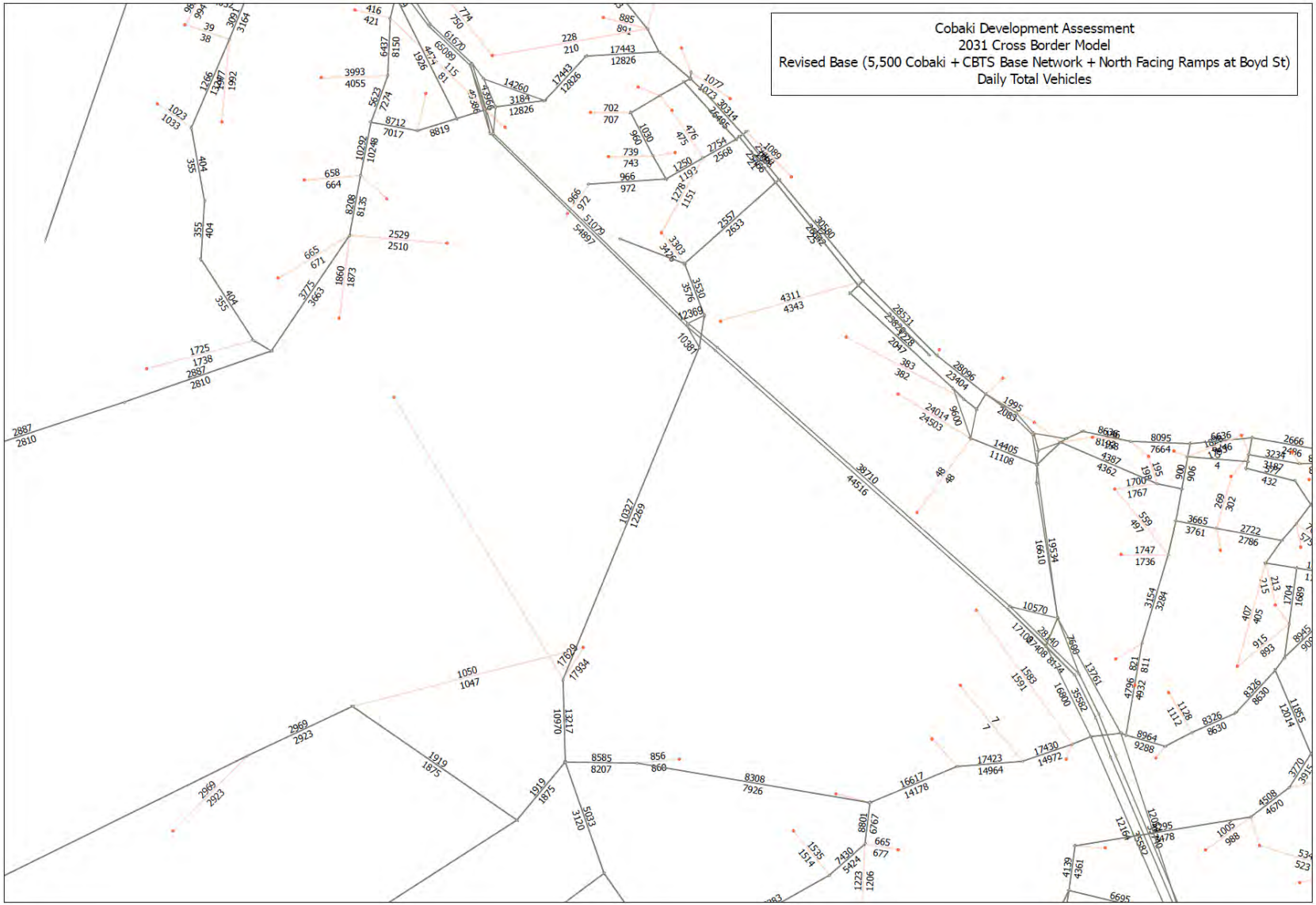


Figure 2.24: 2031 Daily Volumes – Concept Plan (Revised Base)

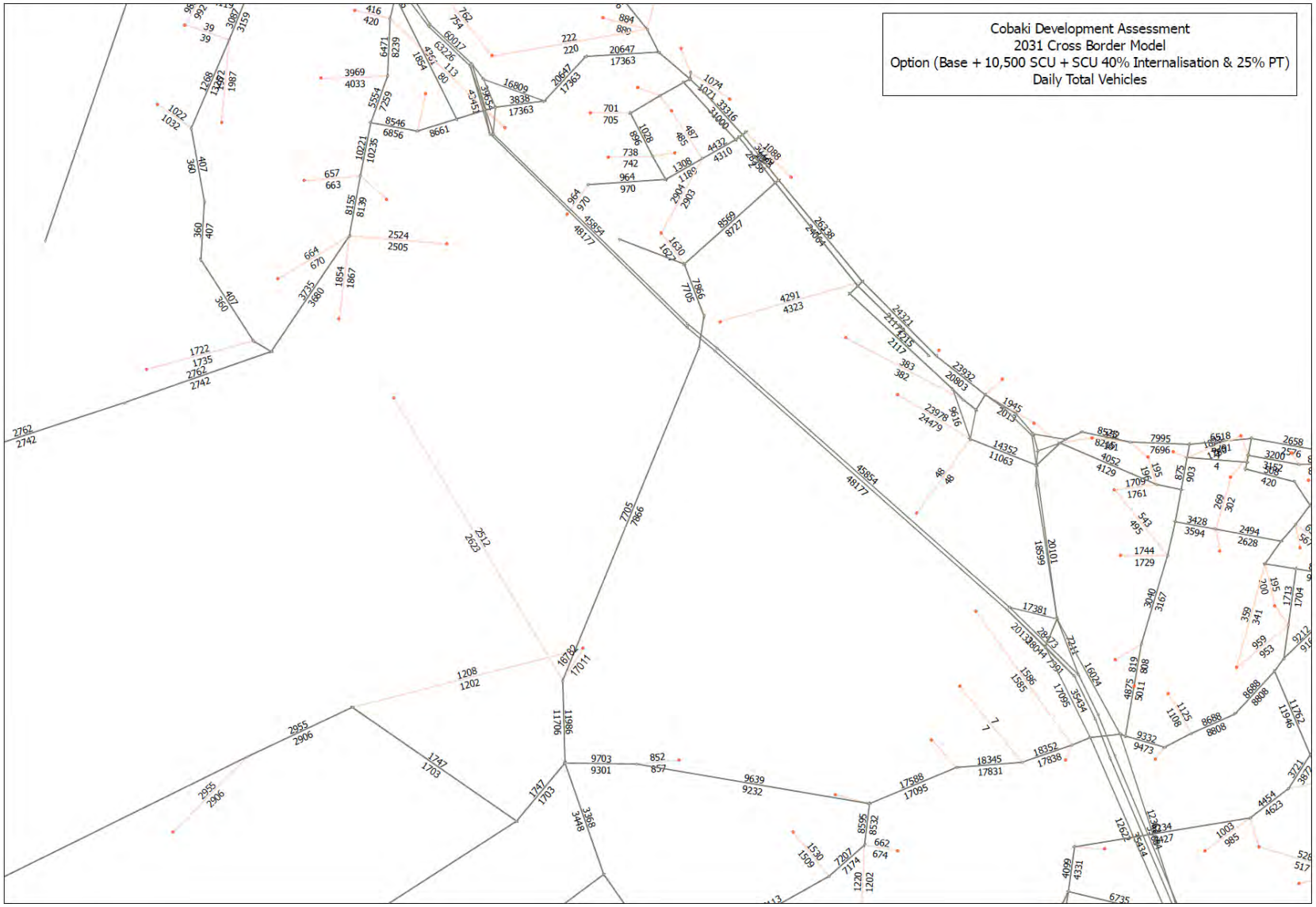


Figure 2.25: 2031 Daily Volumes – Modified Plan with Cobaki/SCU (Option)

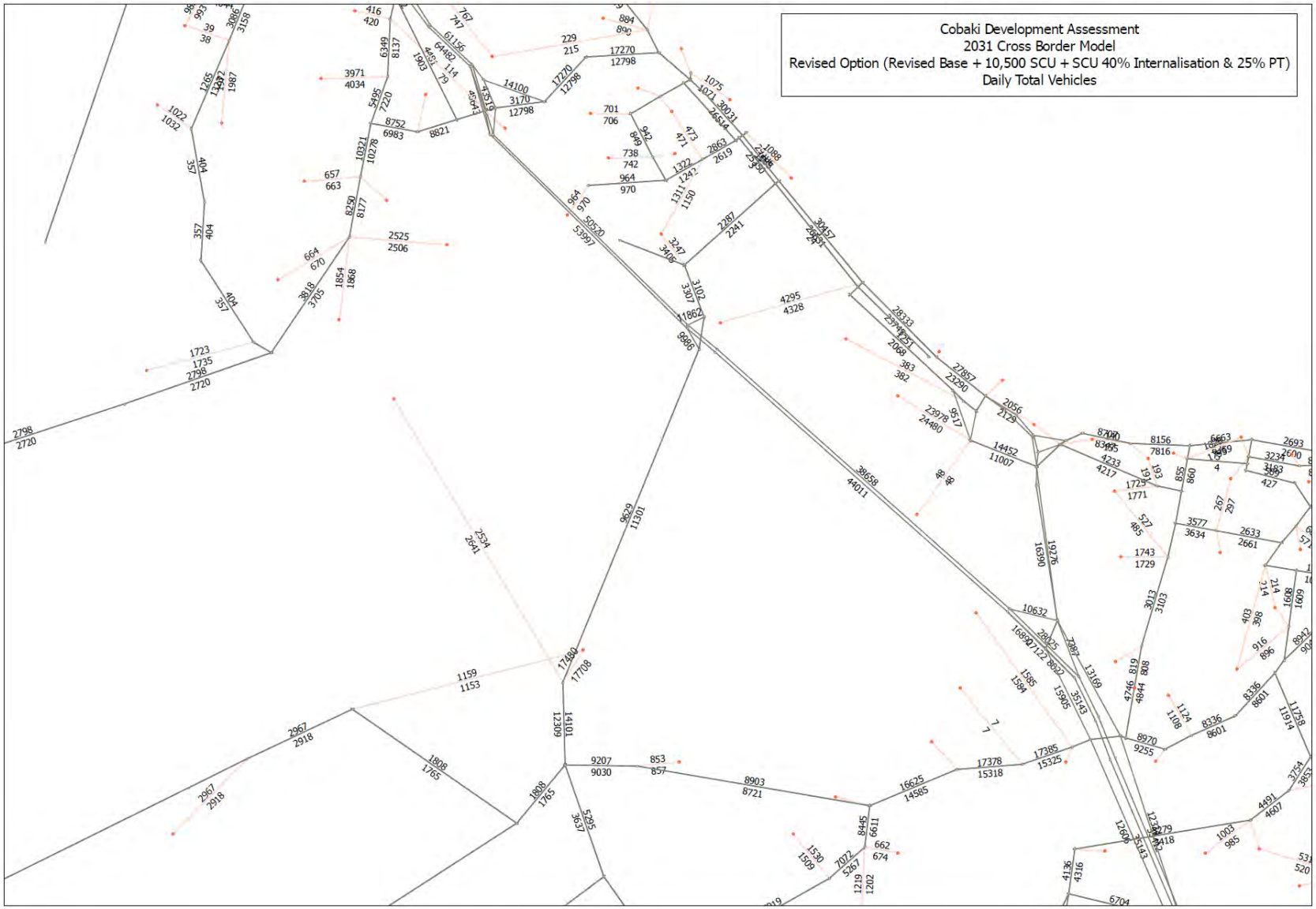


Figure 2.26: 2031 Daily Volumes – Modified Plan with Cobaki/SCU (Revised Option)

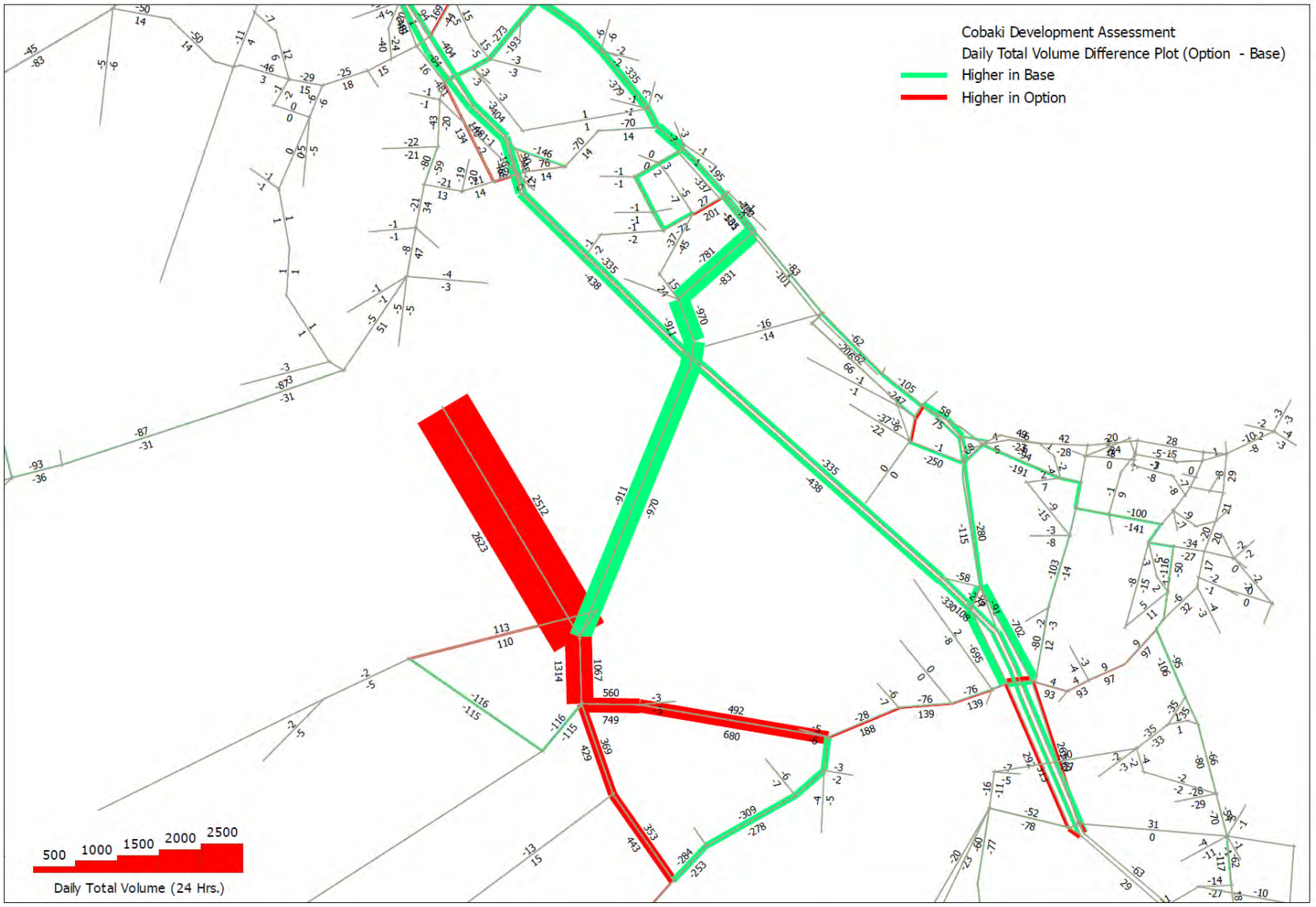


Figure 2.27: 2031 Difference Plot (Daily Volumes) – Concept Plan minus Modified Plan (Base Network)

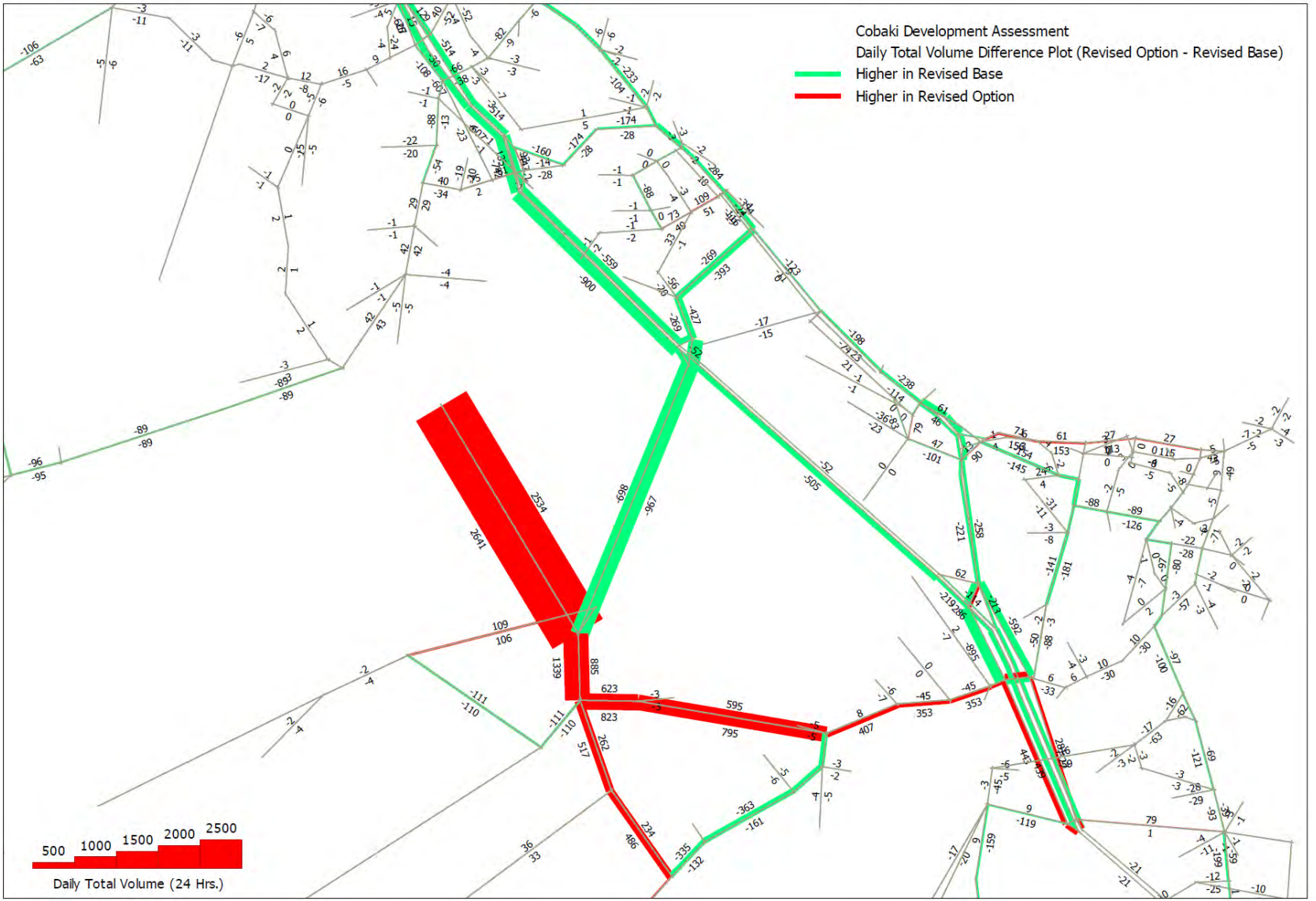


Figure 2.28: 2031 Difference Plot (Daily Volumes) – Concept Plan minus Modified Plan (Revised Base Network)

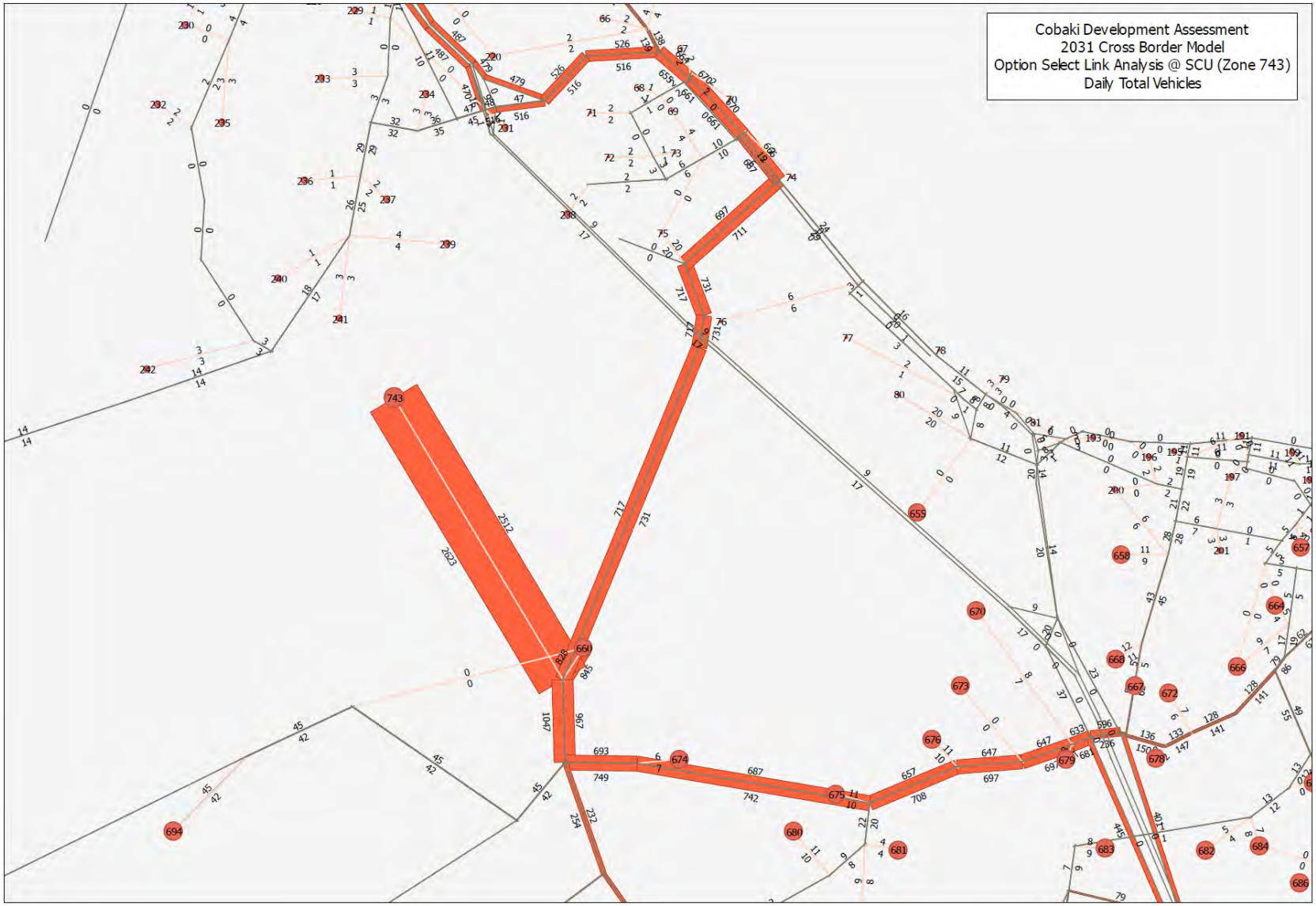


Figure 2.29: 2031 Select Link SCU (Daily Volumes) –Modified Plan (Base Network)

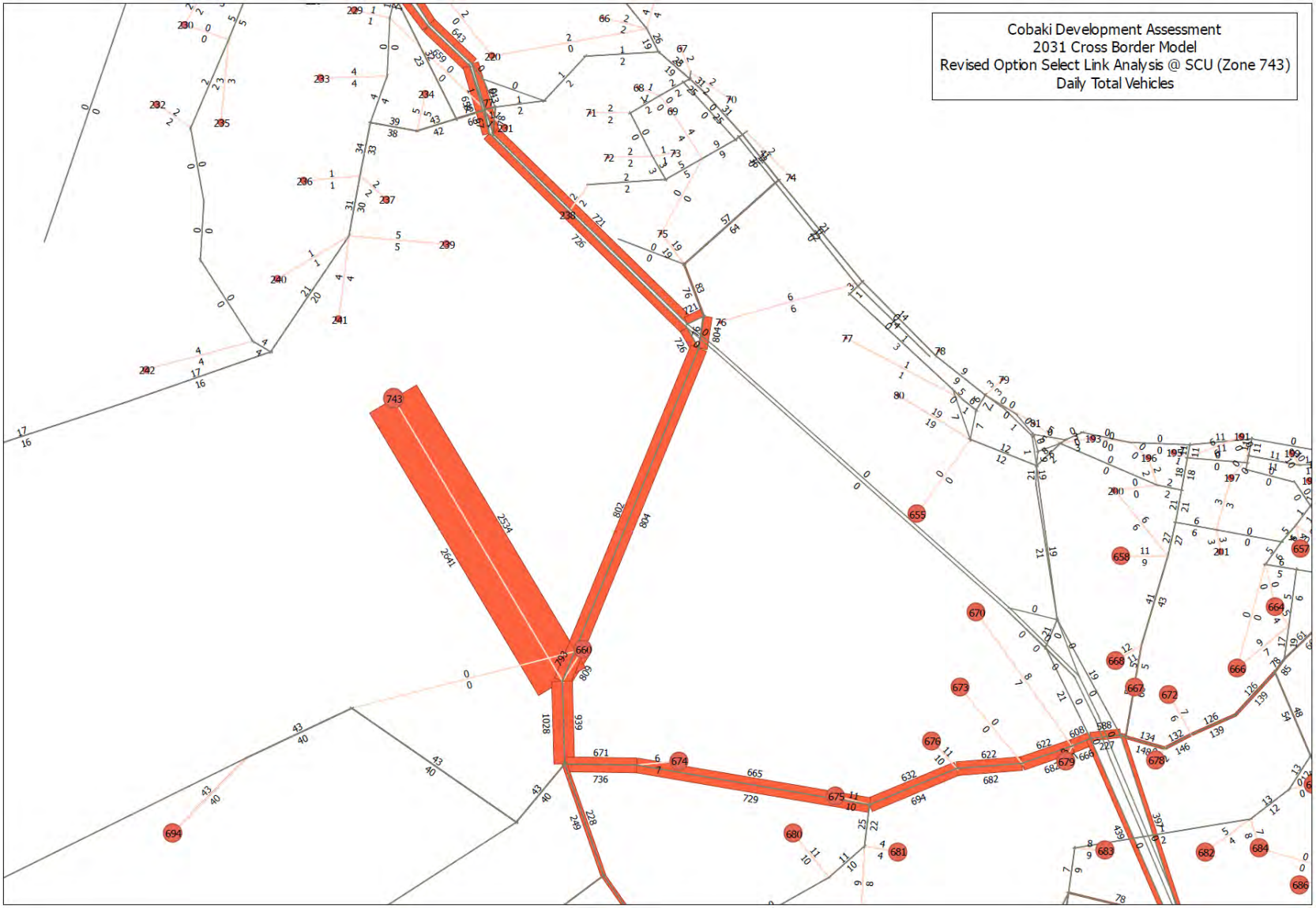


Figure 2.30: 2031 Select Link SCU (Daily Volumes) –Modified Plan (Revised Base Network)

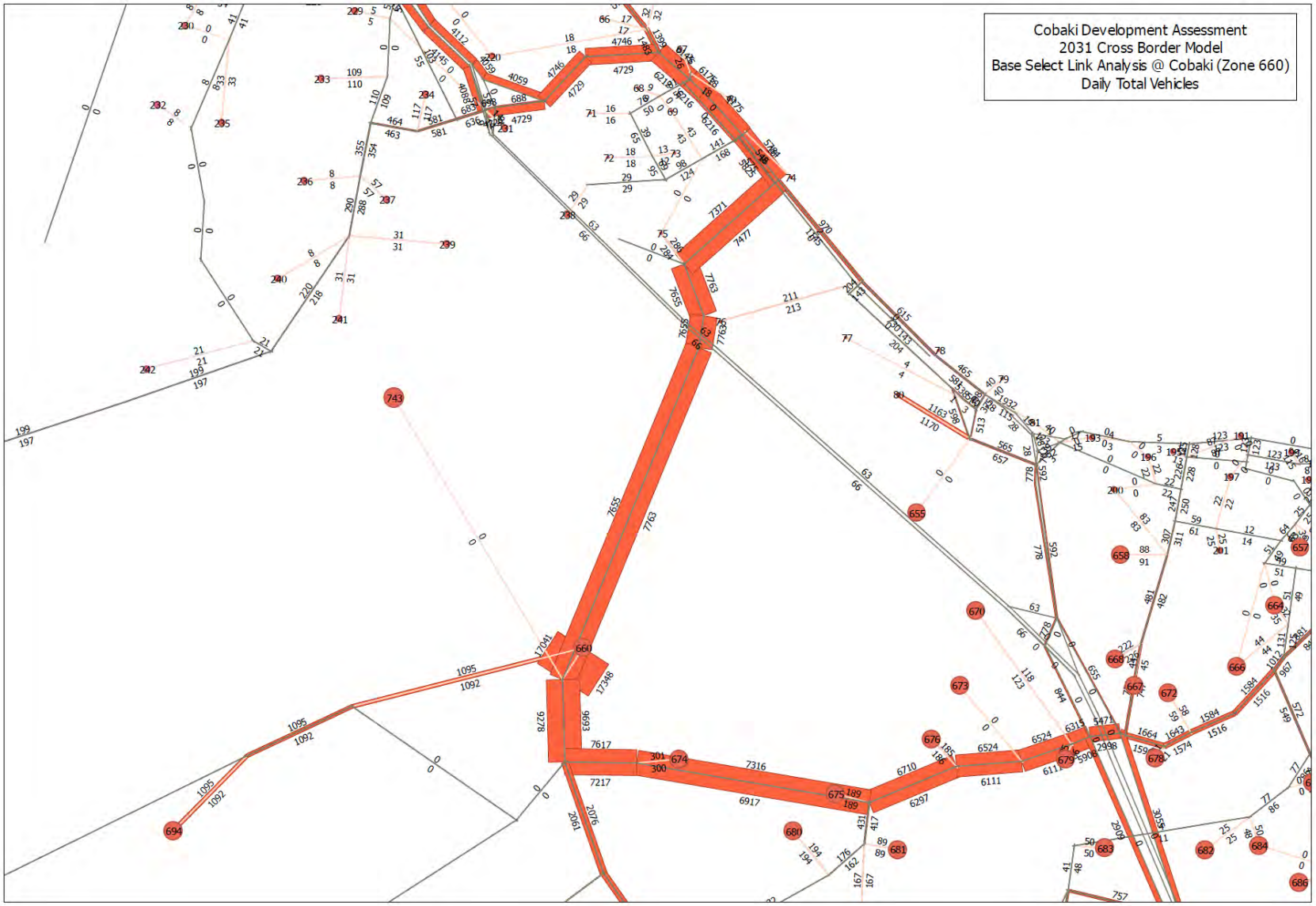


Figure 2.31: 2031 Select Link Cobaki (Daily Volumes) –Concept Plan (Base Network)

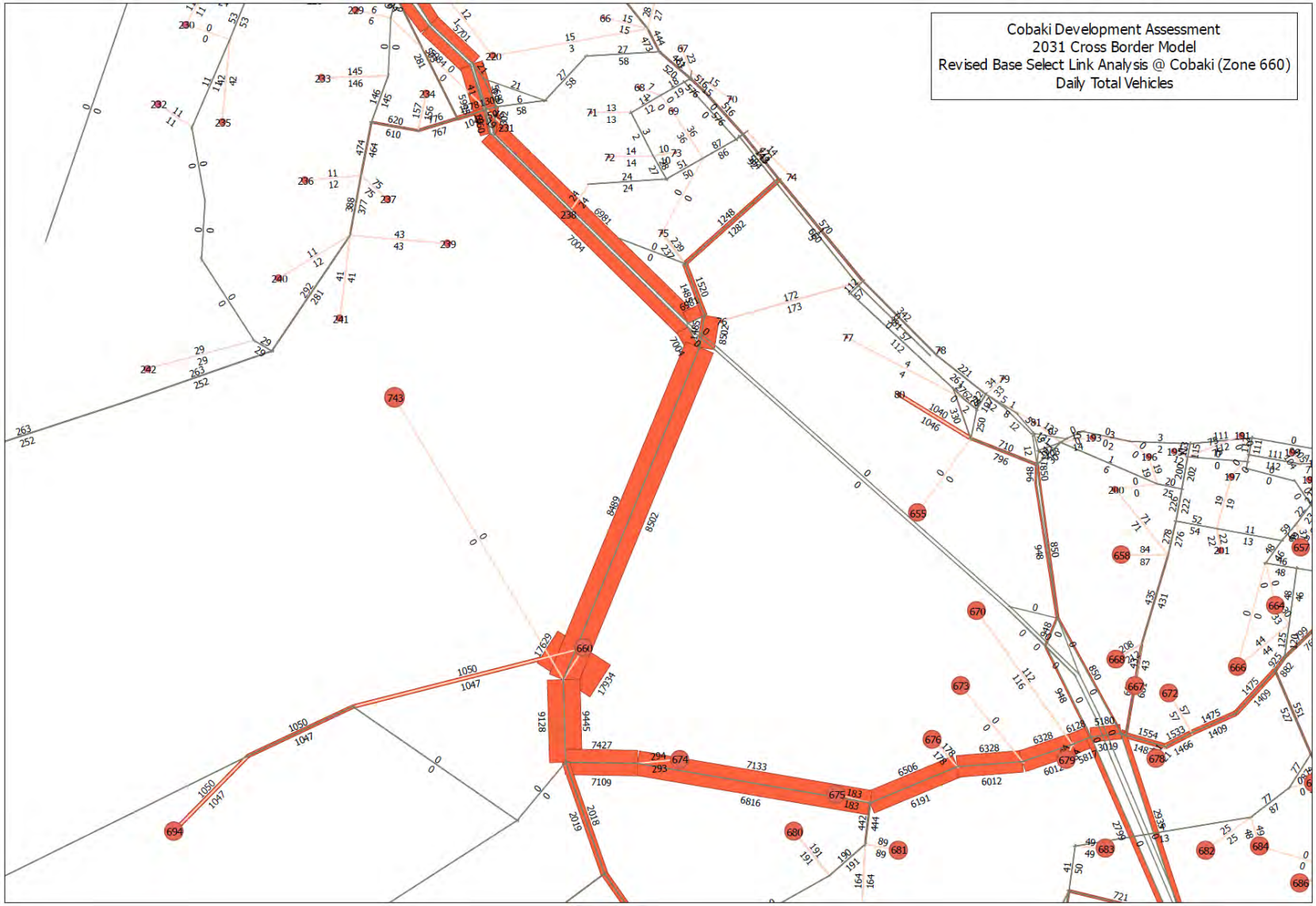


Figure 2.32: 2031 Select Link Cobaki (Daily Volumes) –Concept Plan (Revised Base Network)

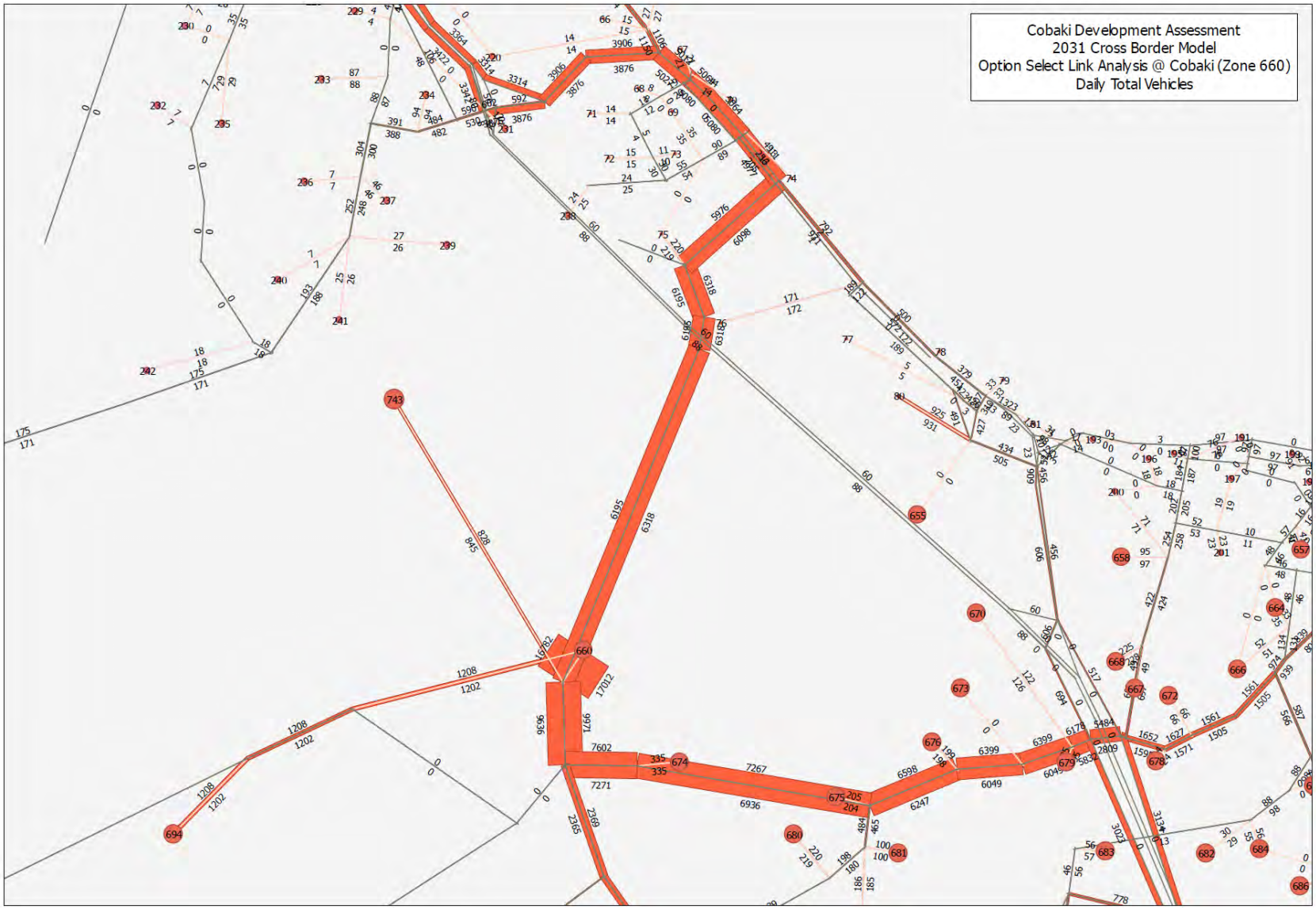


Figure 2.33: 2031 Select Link Cobaki (Daily Volumes) –Modified Plan (Base Network)

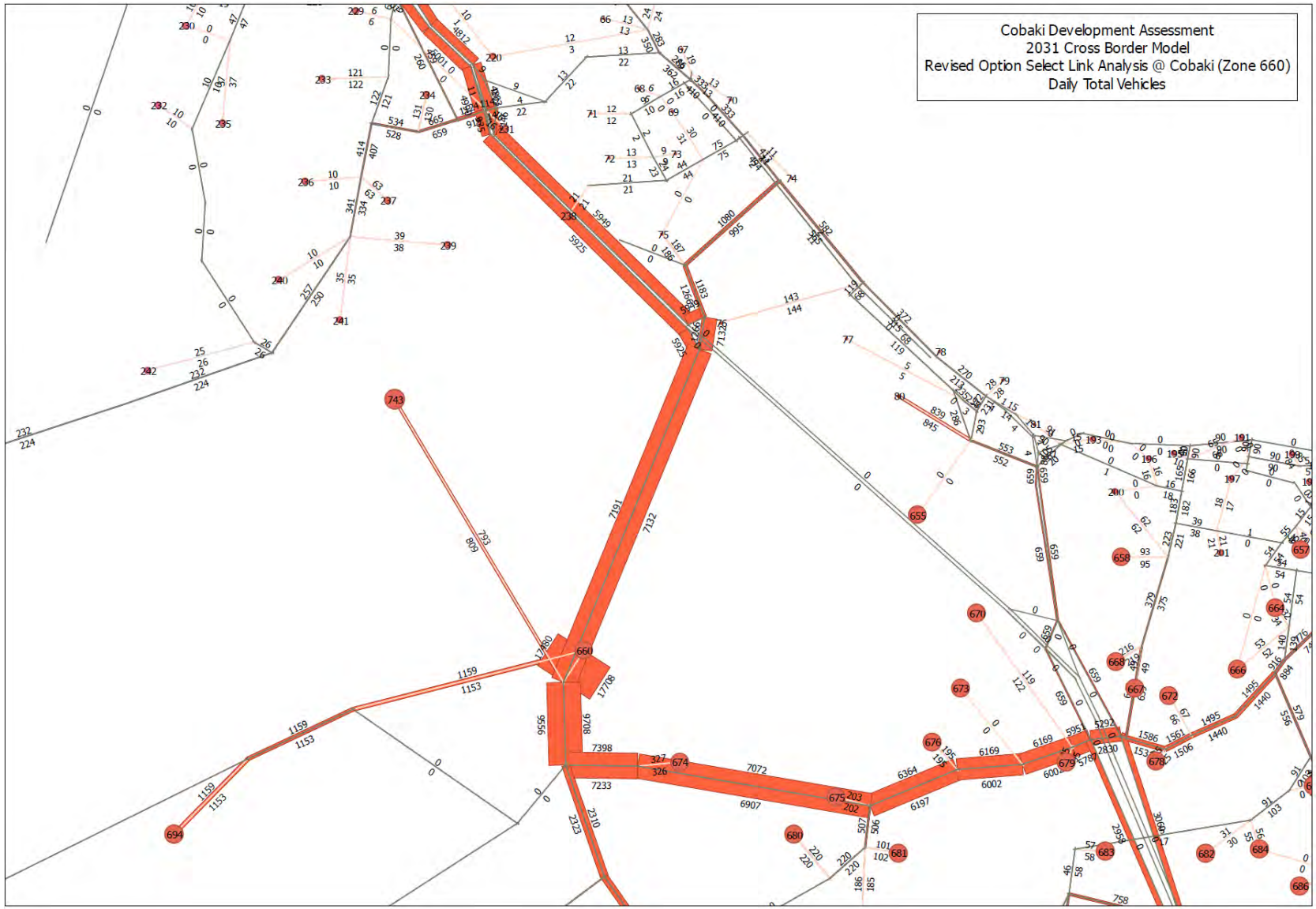


Figure 2.34: 2031 Select Link Cobaki (Daily Volumes) –Modified Plan (Revised Base Network)

Analysis of Results

The difference plot shown in Figure 2.27 reveals that without the M1 ramps in place there is a net benefit of around 500 -1000 daily trips in and around the M1 / Gold Coast Highway areas with the immediate local areas around Piggabeen increasing to a similar value. The plot shows that more local traffic is turned away from the M1 and inwards to the Cobaki/SCU zones and Piggabeen zones with the increased employment and retail land uses being offered.

The AM/PM peak difference plots are included in Appendix B. There are some localised areas where trips are seen to increase, however overall there is a nett overall benefit to the network from introducing the university uses to the town centre as it is seen to internalise trips within the local area.

The difference plot shown in Figure 2.28 compares the Concept Plan approved land use with the Modified Land Use under a revised road network to include north facing ramps at the Boyd Street interchange. The plot reveals a similar outcome, however the benefits are slightly reduced due to the background attractiveness of through traffic (and local traffic) using the north facing ramps. The north facing ramps at Boyd Street interchange increases the attractiveness (through improved network connectivity) to the north and hence attracts a slightly higher volume of traffic to (and through) the town centre over the day.

The select link analysis shown in Figure 2.31 to Figure 2.34 compares the Cobaki zone only under all four scenarios. It can be seen that the Modified Plan options have a lower trip generation to the external road network compared to the Concept Plan, which a much greater level of trip internalisation than what is generated externally by the SCU zone alone (this reconfirms the difference plot findings). Interestingly, when comparing the Base network options, with the Revised Base network options the trips to the external road network increases, re-iterating that by opening access to the M1 will induce trips to the town centre from areas to the north. Whilst the introduction of the ramps is attracting additional trips, the overall impact associated with the combined proposed uses is less that the Concept Plan situation (i.e. the trips generated by the Concept Plan Approval with No Ramps – Figure 2.31, is less than the combined Cobaki and SCU developments with the Ramps in place – Figure 2.30 + Figure 2.34). The important point is that this increased traffic will eventually end up on the M1 after travelling through the Gold Coast Highway and Stewart Road. The benefit of increasing the employment and retail uses within the town centre are very high, in terms of being able to reduce the amount of traffic travelling onto the surrounding network.

Tugun Bypass (M1), Boyd Street and Gold Coast Highway intersection Infrastructure Requirements

The key purpose of this report (assessment) is to analyse whether the introduction of additional university and town centre land uses will increase traffic impacts to the surrounding road network.

The EMME modelling conducted verifies that the introduction of the SCU/Additional Town Centre uses will not increase traffic impacts to the M1 / Tugun Bypass.

With the high volumes of traffic forecast to travel down Boyd Street towards the Gold Coast Highway to ultimately travel north with no ramps at the Boyd Street interchange in place, transport planning will subsequently be required to focus on four laning of Boyd Street and developing an infrastructure solution to provide sufficient capacity at the Gold Coast Highway intersection. However, the introduction of the north facing ramps at the Boyd Street interchange results in a heavily reduced level of traffic volume along Boyd Street, where it can remain as one lane in each direction. In addition, the level of upgrade at the Gold Coast Highway intersection could potentially be reduced and re-focussed on delivering bus priority-based solutions to support active transport.

The introduction of north facing ramps at Boyd Street is consistent with the findings of the Cross Border Study. The Cross Border Study however also recommended the need to upgrade the M1 to six lanes between Boyd Street interchange and Stewart Road interchange should the north facing ramps be installed.

Under the Modified Plan, comparing traffic volumes on the M1 north of Boyd Street under the 'with' and 'without' north-facing ramps on the M1, there is an increase in trips expected to use that panel as a direct result of the ramps being installed. Conversely, there is a distinct reduction in daily trips on the M1 panel to the south of the Boyd Street interchange. The daily traffic volumes rise from 94,000vpd to 104,000vpd

between Boyd Street and Stewart Road interchanges whilst the volume reduces from 94,000vpd to 83,000vpd which has clear capacity benefits to the RMS owned asset between Boyd Street interchange and Tugun Bypass.

With the north facing ramps in place, it will reduce the need to upgrade the section of Boyd Street between the M1 and the Gold Coast Highway. The inclusion of the north facing ramps will also allow for that section of road to more appropriately designed to support active transport. It should be noted that the addition of north facing ramps also offers substantial access benefits to the John Flynn Hospital.

From the EMME modelling, it is clear that the dis-benefit that is placed on the Queensland DTMR owned asset north of the Boyd Street interchange is somewhat offset by the benefit to the RMS owned asset to the south of the Boyd Street interchange. Cross border negotiations between the two State agencies should occur to discuss appropriate funding mechanisms for this 'cross-border' section of road in the longer term.

In the short term, to operationally manage the peak period operating conditions of the M1 it would be recommended to include ramp metering for the northbound entry ramp. Consideration should also be given to ramp metering influential ramps to the north (in the southbound direction) such as Bermuda Street interchange and Tallebudgera Drive interchange. There is currently a high volume of traffic exiting the M1 at Stewart Road interchange. Whilst some of that traffic will divert to the Boyd Street interchange, the majority will be retained along the Gold Coast Highway corridor, subsequently the upgrade to the Stewart Road to Boyd Street section of the M1 is unlikely to be required until six laning occurs between Robina and Stewart Road interchange.

The M1 between Nerang and Worongary was experiencing traffic volumes in excess of 100,000vpd when it was four lanes. The effects of peak hour spreading enabled those higher daily traffic volume thresholds to be achieved although those volumes did cause flow breakdown during peak periods.

For the Boyd Street northbound on ramp, ramp metering should be implemented to assist with better managing the available merge capacity. It should be noted that the need for ramp metering is not necessarily a direct reflection of impacts associated with the development proposed, but rather a tool to manage the combined development and background traffic in the area.

It should be noted that of the 104,000 trips forecast to be generated along the M1 in this area, only 12,000 trips are generated by the development. Likewise, the traffic volumes on the north facing entry ramps contains in the order of 50% background traffic and 50% development-generated traffic. These volume forecasts however contain limitations on their accuracy as discussed in the following section.

Limitations

The above traffic distribution outputs from EMME along with the development trip apportionments are based on a strategic (link-based) traffic assessment. It does not consider the trip re-distribution decision making that occurs as a response to localised congestion or 'pinchpoint removal' initiatives.

For instance, the introduction of ramp metering, plus the testing of the impacts of signalised intersection delays along the Kennedy Drive corridor (and subsequent pinchpoint removal) may alter the trip distribution pattern in the immediate area.

As seen in Figure 2.35, the 2hr peak hour traffic volumes extracted from the EMME models are showing bi-directional traffic volumes that are vastly different. These variations in traffic volumes are unlikely to occur in practice.

The EMME assessment within this report has subsequently focussed on the daily 'strategic' traffic volume assessment. The reason for the difference in bi-directional traffic volumes for the peak hour assessment mostly relates to the coarse zone structure, zone placement and the lack of sensitivity of nodal impacts on trip distribution. A substantial amount of work (zone splitting, local validation, etc) would be required to the EMME models to be able to use the peak hour volumes with a high degree of confidence at such a prescriptive level of detailed assessment that is required for this project; which is not appropriate for a model which covers the entire Gold Coast and northern NSW area in any event.

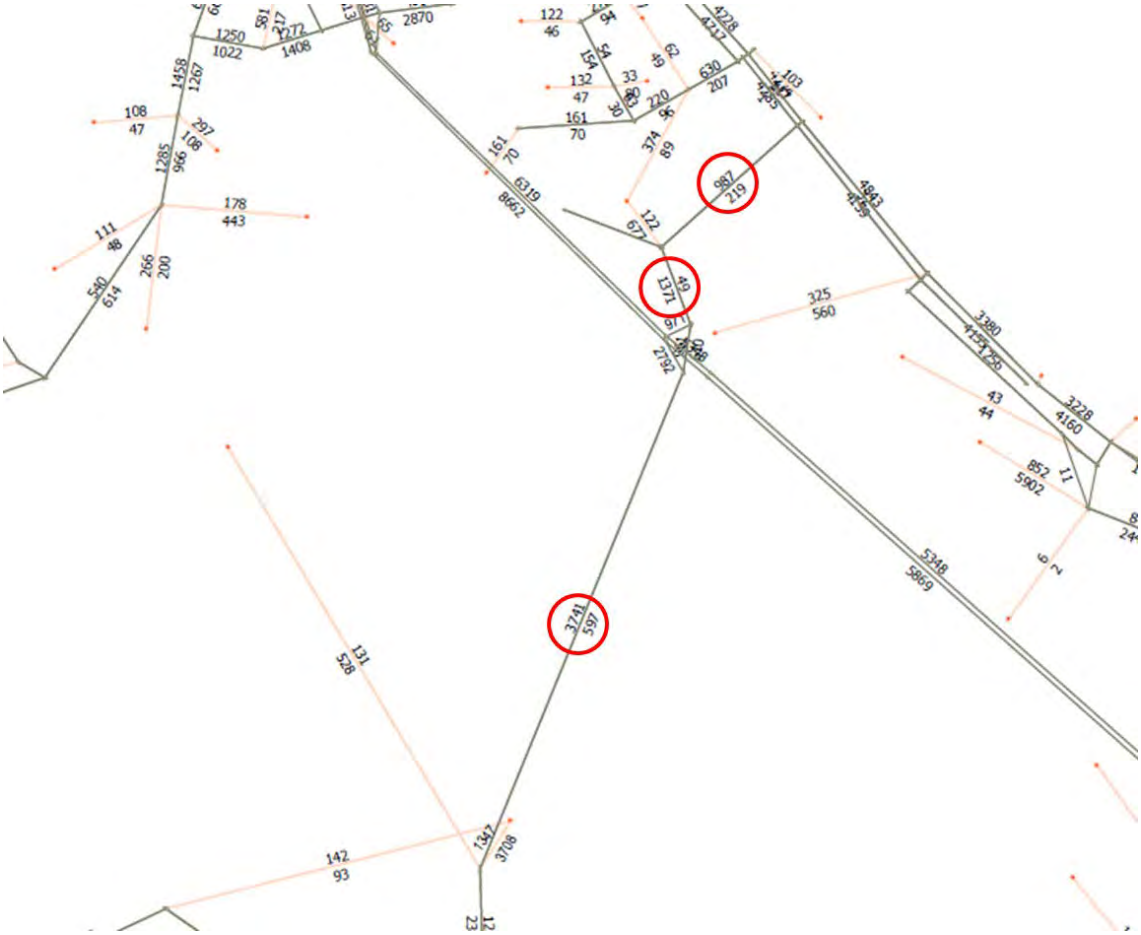


Figure 2.35: Modified Plan Revised Network 2hr AM Peak Traffic Volumes

A Paramics microsimulation model has been built for the area to assist with designing the intersection requirements. The Paramics model has a much more refined zone structure to that contained in the EMME model. It also allows for a more sensitive method of assessment of route choice between using the Kennedy Drive or Cobaki Parkway corridors to access the M1; influencing the forecast peak hour volumes on each of these corridor sections. The process of developing the Paramics microsimulation modelling and analysis of outputs is discussed in the following section.

2.3.4 2031 AM/PM Peak Microsimulation Traffic Modelling

Model Area

The model area is shown in Figure 2.36 below.

SOURCE: Streetview @ 2015 Google

Figure 2.36: Model Area

The Paramics model area extends from Stewart Road interchange to the north and Kennedy Drive interchange to the south. The model only contains route choice within the study for the choice between the new proposed Cobaki Parkway Extension and the M1. This was done to more accurately understand the route choice that is likely given the likely forecast traffic volumes, signalised intersection delay, roundabout delay and other real-time congestion-related factors that aren't accounted for in a strategic model. Extending the model to include Gold Coast Highway route choice options would increase the route choice complexity associated with the model. It would require a much larger area to be modelled, including the Airport, making it more difficult to validate whilst it would be expected to offer little additional value as development impacts are not forecast to expand that far afield.

Model Period

The model periods were as follows:

- AM Peak – 7AM-9AM; and
- PM Peak – 4PM-6PM.

A 30 minute warm-up and 30 minute cool down period was provided either side of the above-stated two hour peak periods.

Traffic Demands

The future year Paramics Model was development based on:

- 2% per annum growth on actual count data to 2031;
- Plus Cobaki/SCU (based on RMS Trip Rates);

- Cobaki/SCU trips distributed as per EMME distributions;
- Addition of Bilambil Heights demands;
- Additional Gold Coast Highway - 1,500 trips each way AM&PM (2hr);
- Additional M1 - 1,000 trips (southbound) & 1,500 (northbound) PM Only (2hr); and
- Additional 500 trips to/from Cobaki/Bilambil Heights to Hospital AM and return in PM (2hr).

The above trips were required to be added in addition to the generic adoption of 2% per annum adopted for traffic impact assessments in the region, which is based on recent trends in historical count data.

The above additional trips included in the Paramics models resulted in an overall growth rate of 4.5% per annum. This increase was required to validate the Paramics models relatively closely to the EMME model outputs. Notwithstanding these changes, there were still a couple of areas where validation wasn't able to be achieved.

In addition, it is noted that the Paramics model included a number of operational improvements to the Kennedy Drive corridor and with the inclusion of a ramp meter at the Boyd Street interchange, there were some differences in traffic volumes noted when comparing volumes in each of those directions. This was mainly due to local route choice options that differed between the Paramics Model and the EMME model.

Table 2.9 and Table 2.10 below shows the result of the EMME model / Paramics Model validation for the 2031 AM/PM 1 hour peak periods. As can be seen from the comparisons, the EMME model outputs are coarse in many areas, with bi-directional flows being severely unbalanced. The use of the microsimulation modelling has enabled the traffic volumes adopted to be more realistic and targeted as being an increase extrapolated off the existing 2015 traffic patterns. As mentioned above, localised amendments to the demand matrix were undertaken accounting for known development impacts that have been included in the EMME forecasts that are in addition to the forecast linear background growth.

Table 2.9: 2031 AM Peak 1hr Model Validation

Location	Emme Volumes	Paramics Volumes	GEH
Gold Coast Highway - North of Boyd Street(Northbound direction)	2401	2214	3.9
Gold Coast Highway - North of Boyd Street(Southbound direction)	2252	2293	0.9
Gold Coast Highway - South of Boyd Street(Northbound direction)	2242	2343	2.1
Gold Coast Highway - South of Boyd Street(Southbound direction)	2355	2313	0.9
Boyd Street approaching Gold Coast Highway (eastbound)	392	463	3.4
Boyd Street approaching Gold Coast Highway (westbound)	109	568	24.9
Boyd Street approaching Pacific Motorway (eastbound)	603	624	0.8
Boyd Street approaching Pacific Motorway (westbound)	33	301	20.8
Proposed Boyd Street Exit Ramp from Pacific Motorway	427	680	10.8
Proposed Boyd Street Entry Ramp) to Pacific Motorway	1419	981	12.6
Pacific Motorway - North of proposed Boyd Street Ramps(Northbound)	4453	3890	8.7
Pacific Motorway - North of proposed Boyd Street Ramps(Southbound)	2868	3406	9.6
Pacific Motorway - South of proposed Boyd Street Ramps(Northbound)	3035	2898	2.5
Pacific Motorway - South of proposed Boyd Street Ramps(Southbound)	2441	2735	5.8
Cobaki Parkway West of Proposed Boyd Street Ramps(Eastbound)	1792	1380	10.3
Cobaki Parkway West of Proposed Boyd Street Ramps(Westbound)	230	765	24.0
Cobaki Parkway north of proposed Cobaki Parkway/Piggabeen Road intersection(Northbound)	935	1045	3.5
Cobaki Parkway north of proposed Cobaki Parkway/Piggabeen Road intersection(Southbound)	929	1243	9.5
Cobaki Parkway south of proposed Cobaki Parkway/Piggabeen Road intersection(Northbound)	540	642	4.2
Cobaki Parkway south of proposed Cobaki Parkway/Piggabeen Road intersection(Southbound)	169	432	15.2
Piggabeen Road east of proposed Cobaki Parkway/Piggabeen Road intersection(eastbound)	875	941	2.2
Piggabeen Road east of proposed Cobaki Parkway/Piggabeen Road intersection(westbound)	293	511	10.9
Gollan Drive approaching Piggabeen Road/ Gollan Drive/ Kennedy Drive intersection(Northbound)	837	753	3.0
Gollan Drive approaching Piggabeen Road/ Gollan Drive/ Kennedy Drive intersection(Southbound)	183	372	11.4
Kennedy Drive east of Gray Street(Eastbound)	1815	1755	1.4
Kennedy Drive east of Gray Street(Westbound)	457	794	13.5
Kennedy Drive west of Ducat Street(Eastbound)	609	1623	30.3
Kennedy Drive west of Ducat Street(Westbound)	510	1090	20.5
Total	35198	39047	20.0

The above table shows that overall there are more trips allocated in the Paramics model compared to the EMME model. The only areas where Paramics understated the EMME model volumes related to the re-distribution of trips that occurred in the Paramics model as a result of improvement's to the Kennedy Drive corridor and delays associated with the ramp meter.

Table 2.10: 2031 PM Peak 1hr Model Validation

Location	Emme Volumes	Paramics Volumes	GEH
Gold Coast Highway - North of Boyd Street(Northbound direction)	2345	2448	2.1
Gold Coast Highway - North of Boyd Street(Southbound direction)	2218	2252	0.7
Gold Coast Highway - South of Boyd Street(Northbound direction)	2556	2643	1.7
Gold Coast Highway - South of Boyd Street(Southbound direction)	2548	2296	5.1
Boyd Street approaching Gold Coast Highway (eastbound)	155	500	19.1
Boyd Street approaching Gold Coast Highway (westbound)	458	537	3.5
Boyd Street approaching Pacific Motorway (eastbound)	54	220	14.2
Boyd Street approaching Pacific Motorway (westbound)	652	629	0.9
Proposed Boyd Street Exit Ramp from Pacific Motorway	652	629	0.9
Proposed Boyd Street (Entry Ramp) to Pacific Motorway	54	220	14.2
Pacific Motorway - North of proposed Boyd Street Ramps(Northbound)	4182	3897	4.5
Pacific Motorway - North of proposed Boyd Street Ramps(Southbound)	4754	4385	5.5
Pacific Motorway - South of proposed Boyd Street Ramps(Northbound)	3603	3143	7.9
Pacific Motorway - South of proposed Boyd Street Ramps(Southbound)	3401	3308	1.6
Cobaki Parkway West of Proposed Boyd Street Ramps(Eastbound)	395	779	15.8
Cobaki Parkway West of Proposed Boyd Street Ramps(Westbound)	1768	1554	5.3
Cobaki Parkway north of proposed Cobaki Parkway/Piggabeen Road intersection(Northbound)	1013	1263	7.4
Cobaki Parkway north of proposed Cobaki Parkway/Piggabeen Road intersection(Southbound)	1206	1043	4.9
Cobaki Parkway south of proposed Cobaki Parkway/Piggabeen Road intersection(Northbound)	191	340	9.1
Cobaki Parkway south of proposed Cobaki Parkway/Piggabeen Road intersection(Southbound)	629	618	0.4
Piggabeen Road east of proposed Cobaki Parkway/Piggabeen Road intersection(eastbound)	500	508	0.3
Piggabeen Road east of proposed Cobaki Parkway/Piggabeen Road intersection(westbound)	909	1052	4.6
Gollan Drive approaching Piggabeen Road/ Gollan Drive/ Kennedy Drive intersection(Northbound)	452	624	7.4
Gollan Drive approaching Piggabeen Road/ Gollan Drive/ Kennedy Drive intersection(Southbound)	860	881	0.7
Kennedy Drive east of Gray Street(Eastbound)	933	1124	6.0
Kennedy Drive east of Gray Street(Westbound)	1841	2050	4.7
Kennedy Drive west of Ducat Street(Eastbound)	719	1256	17.1
Kennedy Drive west of Ducat Street(Westbound)	849	1953	29.5
Total	39888	42145	11.1

2.3.5 Future Year Road Network

Through the modelling of the above demands on the current road network, and considering the current planning position associated with the Cross Border Study, the modelled traffic network was continually refined. This resulted in the following network changes from that assumed to be included under the Concept Plan Approval (it should be noted that many of the below changes are not as a direct result of the proposed development, but rather a change in state/local agency position as a result of the Cross Border Study or other planning initiatives, such as the upgrade to Kennedy Drive interchange):

- Upgrade to the Kennedy Drive interchange to include signalised intersections in place of the roundabout;

- North facing ramps at the Boyd Street interchange;
- A single traffic lane in each direction along Cobaki Parkway;
- A single traffic lane in each direction along Boyd Street;
- A reduced intersection arrangement at the Boyd Street / Gold Coast Highway intersection, also incorporating bus priority;
- Refinement of the intersection at the Piggabeen Road / Kennedy Drive intersection;
- Refinement of the Cobaki Parkway/ Piggabeen Road intersection to a single lane roundabout (in lieu of a channelized right turn intersection);
- Replacement of the roundabout at the Sandy Lane / Cobaki Parkway intersection with a signalised intersection;
- Introduction of an additional left in-left out along Cobaki Parkway into the Town Centre;
- Implementation of ramp metering on the northbound entry ramp to the M1 at Boyd Street Interchange to delay the need to upgrade the M1 to six lanes;
- Installation of traffic signals at the two intersections either side of the Boyd Street interchange (ie exit ramp and entry ramp intersections).

The overall modelled network and model zone structure is shown in Figure 2.37below.

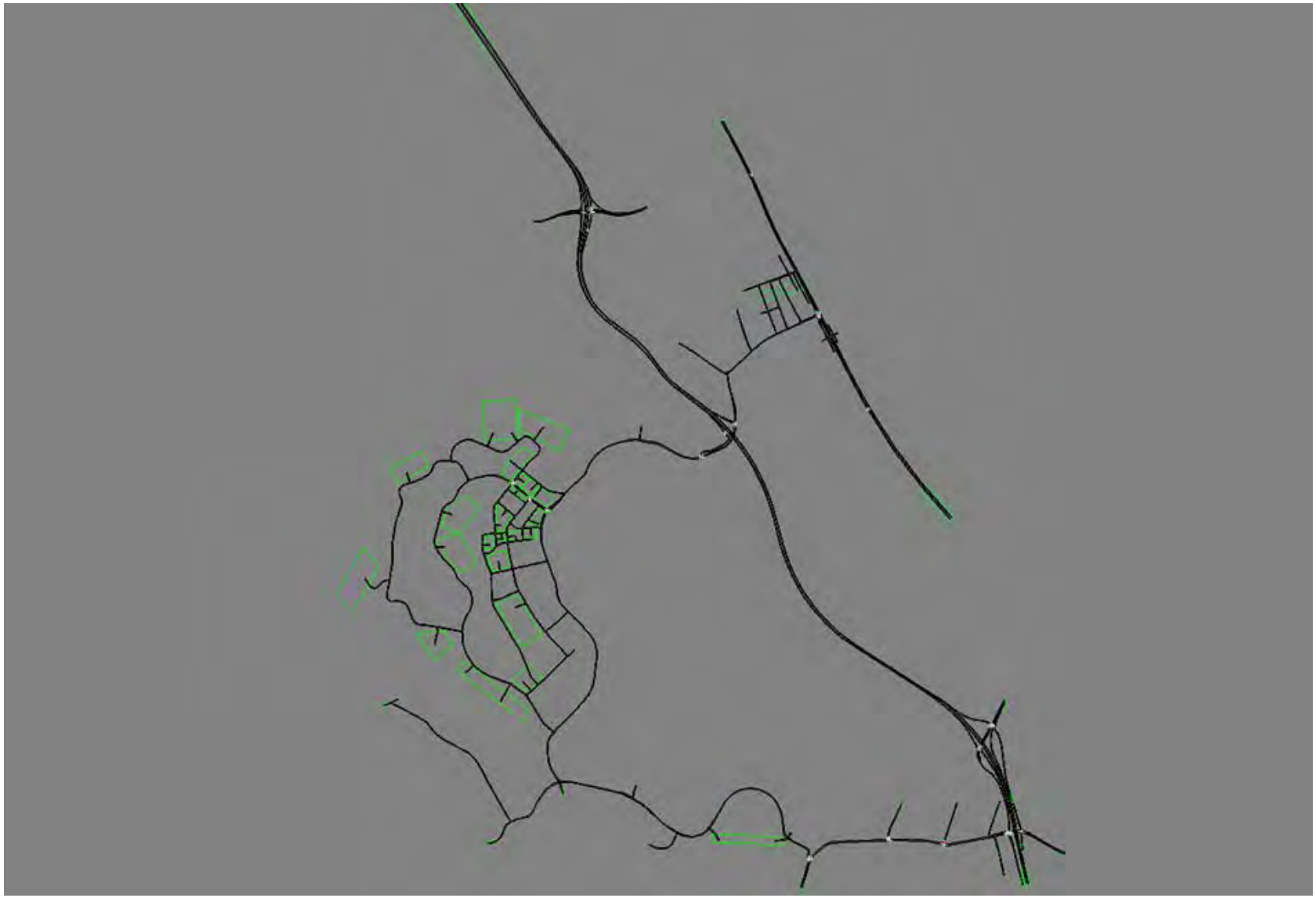


Figure 2.37: Modelled Network and Model Zone Structure

The specific design details of the improvements are shown in Figure 2.38 to Figure 2.46 below.

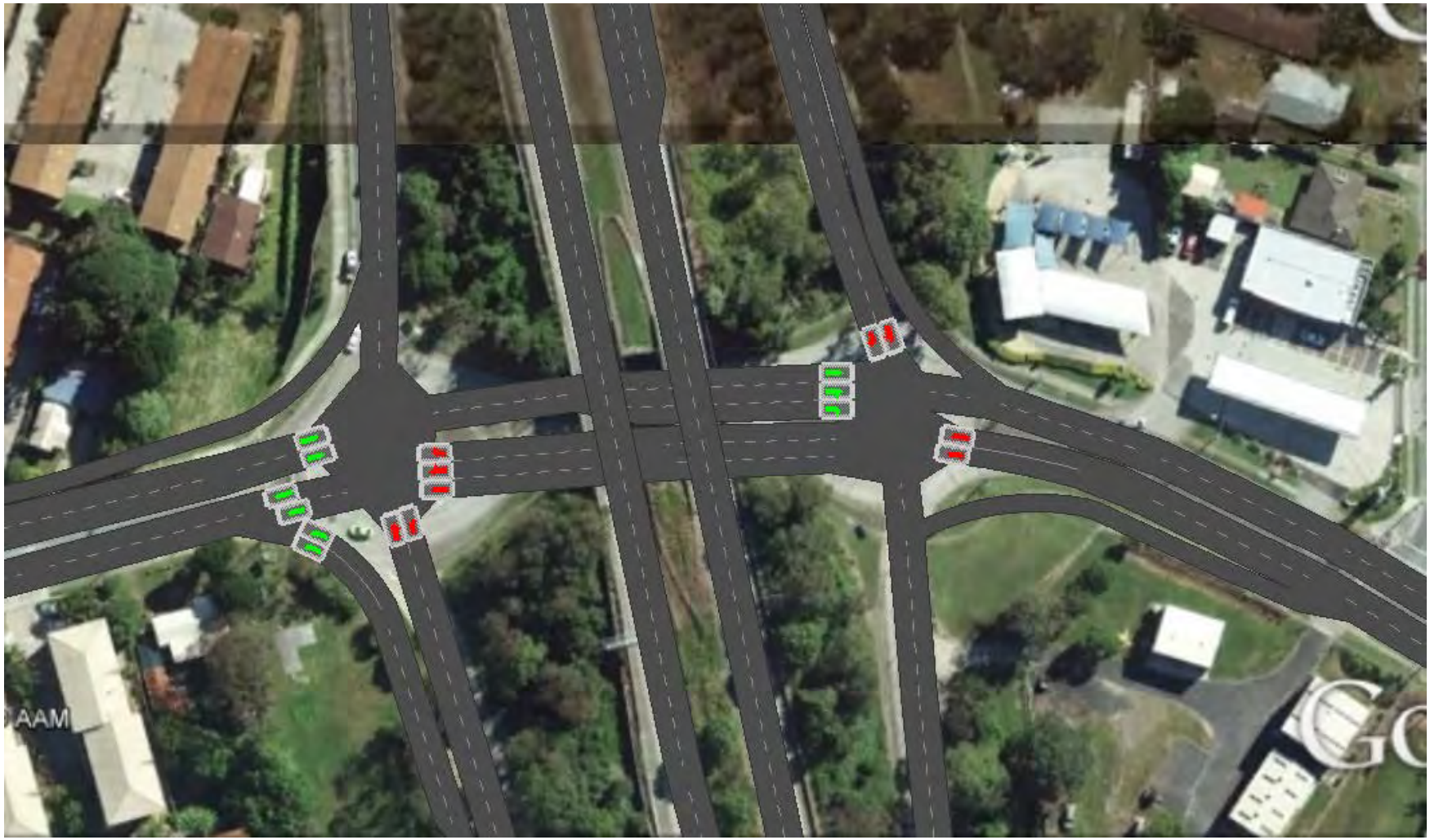


Figure 2.38: Kennedy Drive interchange

Figure 2.39: Gold Coast Highway / Boyd Street Intersection

Figure 2.40: Piggabeen Road / Kennedy Drive intersection

Figure 2.41: Cobaki Parkway/ Piggabeen Road intersection

Figure 2.42: Sandy Lane / Cobaki Parkway (south) intersection

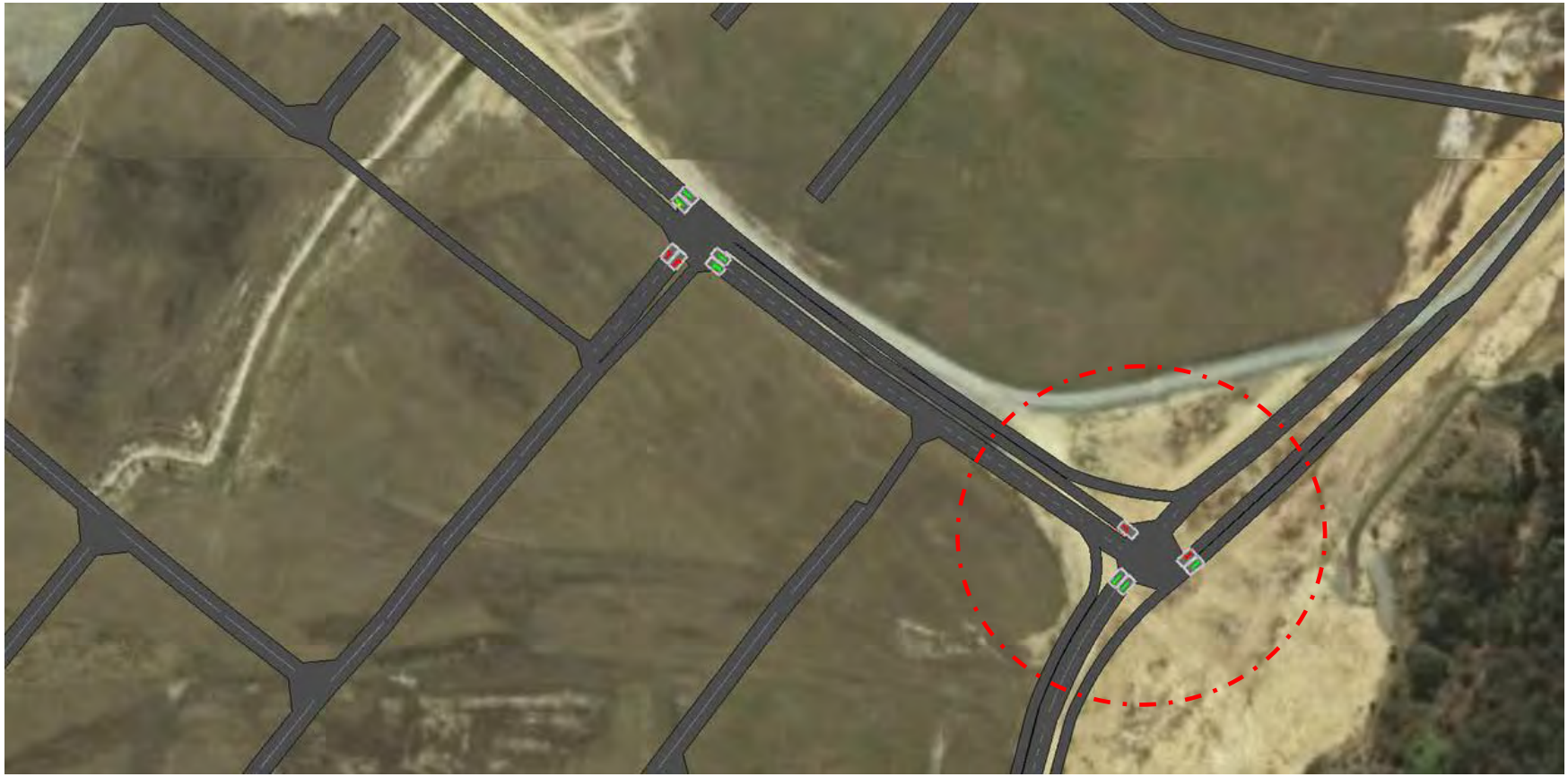


Figure 2.43: Sandy Lane / Cobaki Parkway (Town Centre) intersection

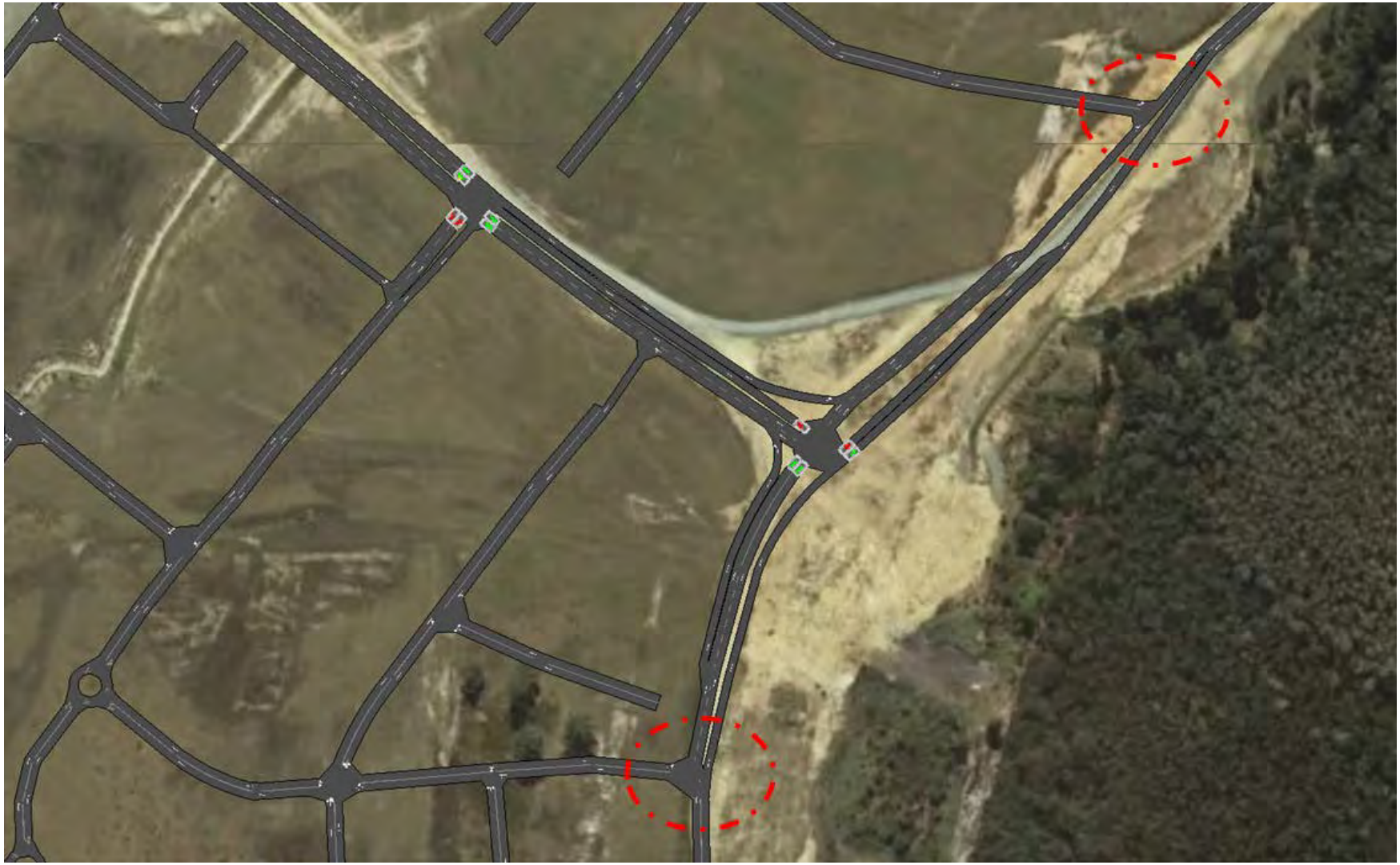


Figure 2.44: Left in-left out's along Cobaki Parkway into the Town Centre

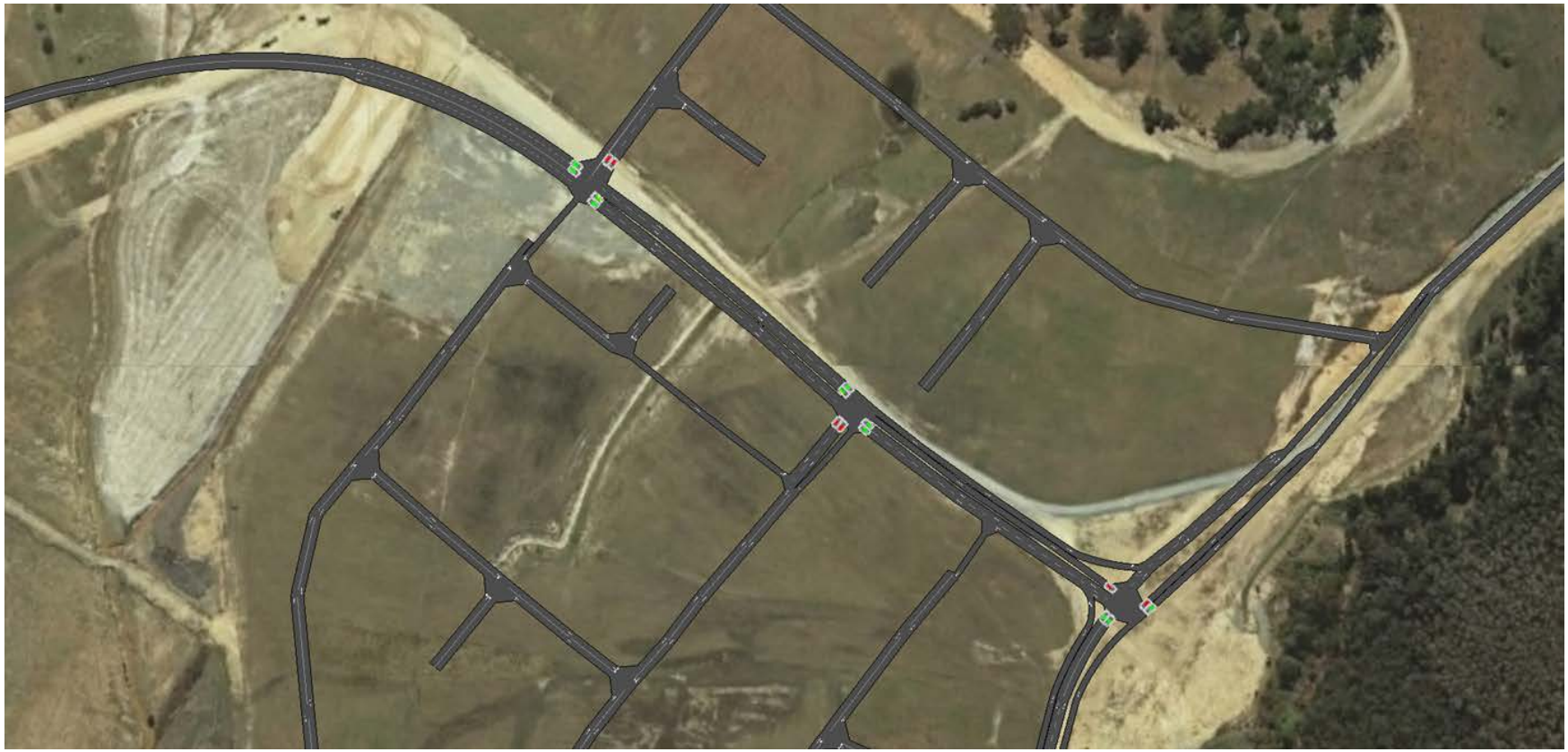


Figure 2.45: Sandy Lane Intersections

Figure 2.46: Boyd Street interchange (with ramp meter)

2.3.6 Ramp Meter Design

A ramp meter has been included within the Boyd Street interchange design to assist with offsetting the need to upgrade the M1 to six lanes.

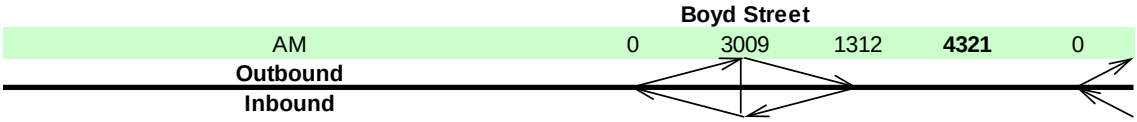
A ramp metering assessment spreadsheet was obtained from DTMR Engineering & Technology Division and is the basis for the initial design of the Boyd Street northbound on-ramp design. The initial assessment using EMME forecast volumes resulted in the adoption of a three lane storage facility with over 370m in pavement for each lane. This amount of storage is surplus to the requirements however provides a longer term guarantee of managing queues back to Cobaki Parkway.

The design of the ramp is encouraged to be designed such that the right and left hand shoulders of the ramps are used during peak periods whilst the ramp meter is in use. In off-peak periods they perform the role of breakdown lanes. Side mounted lane-use management signs may be used to assist with efficiently and safely managing this road space.

The 2031 AM/PM peak assessments are shown in Figure 2.49 and Figure 2.50 below.

M1 (Boyd Street i/c) - 2031 AM Peak

Volumes



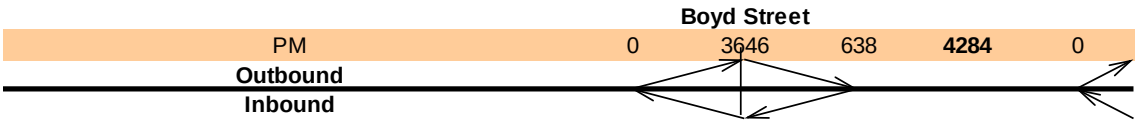
Direction		Outbound		
Max Peak		AM		
Max Entry Flow		1312		
Ramp Layout				
Freeway Lanes (No.)		2		
Entry Ramp Metered Lanes at S.L. (No.)		3		
Bypass Lane?		No		
No. Vehicles / Lane / Green		1		
Ramp Configuration		Add Lane		
Lane Storages on ramp				
Lane 1		370		
Lane 2		370		
Lane 3		370		
Lane 4		0		
Total Storage Available (m)		**1110**		
AM Peak Analysis				
Capacity Analysis				
Mainline Capacity at Merge (veh/h)		4200		
Max. Permitted Ramp Flow (veh/h)		**1191**		
Mainline Capacity at merge (veh/h/l)		2161		
Speed Limit based on Mainline Capacity at Merge (km/h)		**70**		
Bypass Flow		0		
Permitted Ramp Flow (veh/h)		**1191**		
(Satisfied / Unsatisfied)				
Demand Not Satisfied (veh/h)		**121**		
Average Metering Cycle Time (s)		**8.2**		
Storage Analysis				
Storage for Max. Wait Queue (m)		743		
Storage available relative to Max. Wait Queue (Spare / Additional Required) - (m)		**367**		
Vehicles in Mean Queue (per arterial signal cycle)		18.2		
Vehicles in 95% queue		25.6		
Storage for 95% Queue (m)		217		
Storage available relative to 95% Queue (Spare / Additional Required) - (m)		**893**		

Common Data	
Max. wait per vehicle (minutes):	4
Storage per vehicle (m):	8.5
Metering Cycle Time - Minimum (s):	7.5
Metering Cycle Time - Maximum (s):	20
Arterial road cycle time - vehicle arrival (s)	50
Bypass vehicles: Trucks or 2 or more people	20%
Mainline Lane Capacity (veh/ln/h):	2100
Ramp Capacity for Added Lane (veh/ln/h)	1800

Figure 2.47: Ramp Meter Assessment (using EMME volumes) – 2031 AM Peak

M1 (Boyd Street) - 2031 PM Peak

Volumes



Direction			Outbound		
Max Peak			PM		
Max Entry Flow			638		
Ramp Layout					
Freeway Lanes (No.)			2		
Entry Ramp Metered Lanes at S.L. (No.)			3		
Bypass Lane?			No		
No. Vehicles / Lane / Green			1		
Ramp Configuration			Add Lane		
Lane Storages on ramp					
Lane 1			370		
Lane 2			370		
Lane 3			370		
Lane 4					
Total Storage Available (m)			**1110**		

PM Peak Analysis					
Capacity Analysis					
Mainline Capacity at Merge (veh/h)			4200		
Max. Permitted Ramp Flow (veh/h)			**554**		
Mainline Capacity at merge (veh/h/l)			2142		
Speed Limit based on Mainline Capacity at Merge (km/h)			**70**		
Bypass Flow			0		
Permitted Ramp Flow (veh/h)			**554**		
(Satisfied / Unsatisfied)					
Demand Not Satisfied (veh/h)			**84**		
Average Metering Cycle Time (s)			**16.9**		
Storage Analysis					
Storage for Max. Wait Queue (m)			362		
Storage available relative to Max. Wait Queue (Spare / Additional Required) - (m)			**748**		
Vehicles in Mean Queue (per arterial signal cycle)			8.9		
Vehicles in 95% queue			14.0		
Storage for 95% Queue (m)			119		
Storage available relative to 95% Queue (Spare / Additional Required) - (m)			**991**		

Common Data	
Max. wait per vehicle (minutes):	4
Storage per vehicle (m):	8.5
Metering Cycle Time - Minimum (s):	7.5
Metering Cycle Time - Maximum (s):	16
Arterial road cycle time - vehicle arrival (s)	50
Bypass vehicles: Trucks or 2 or more people	20%
Mainline Lane Capacity (veh/ln/h):	2100
Ramp Capacity for Added Lane (veh/ln/h)	1800

Figure 2.48: Ramp Meter Assessment (using EMME volumes) – 2031 PM Peak

2.3.7 Network Performance of the Proposed Changes

Model Performance Snapshots (2031 AM Peak)

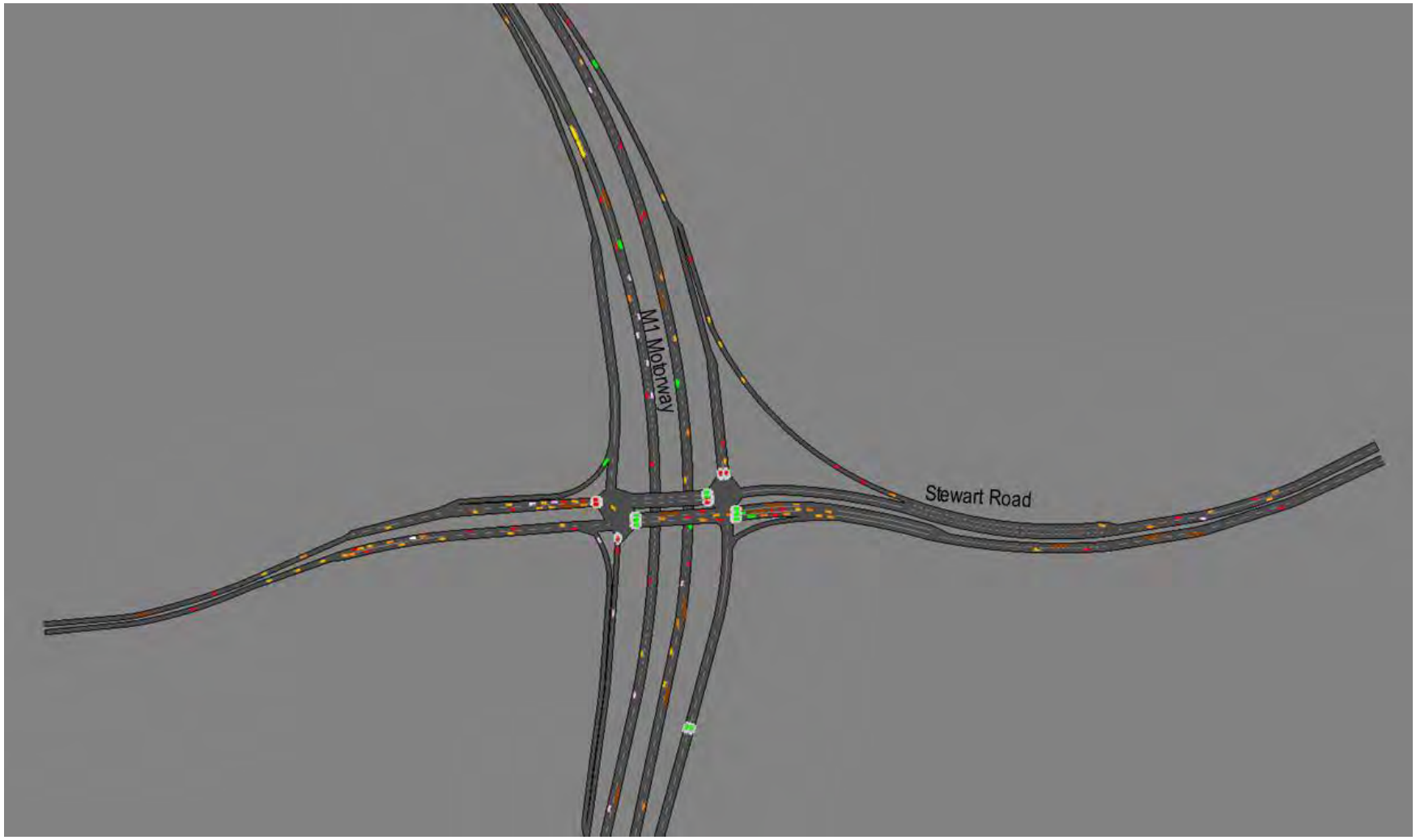


Figure 2.49: Stewart Road Interchange – Model Performance – 2031AM PEAK

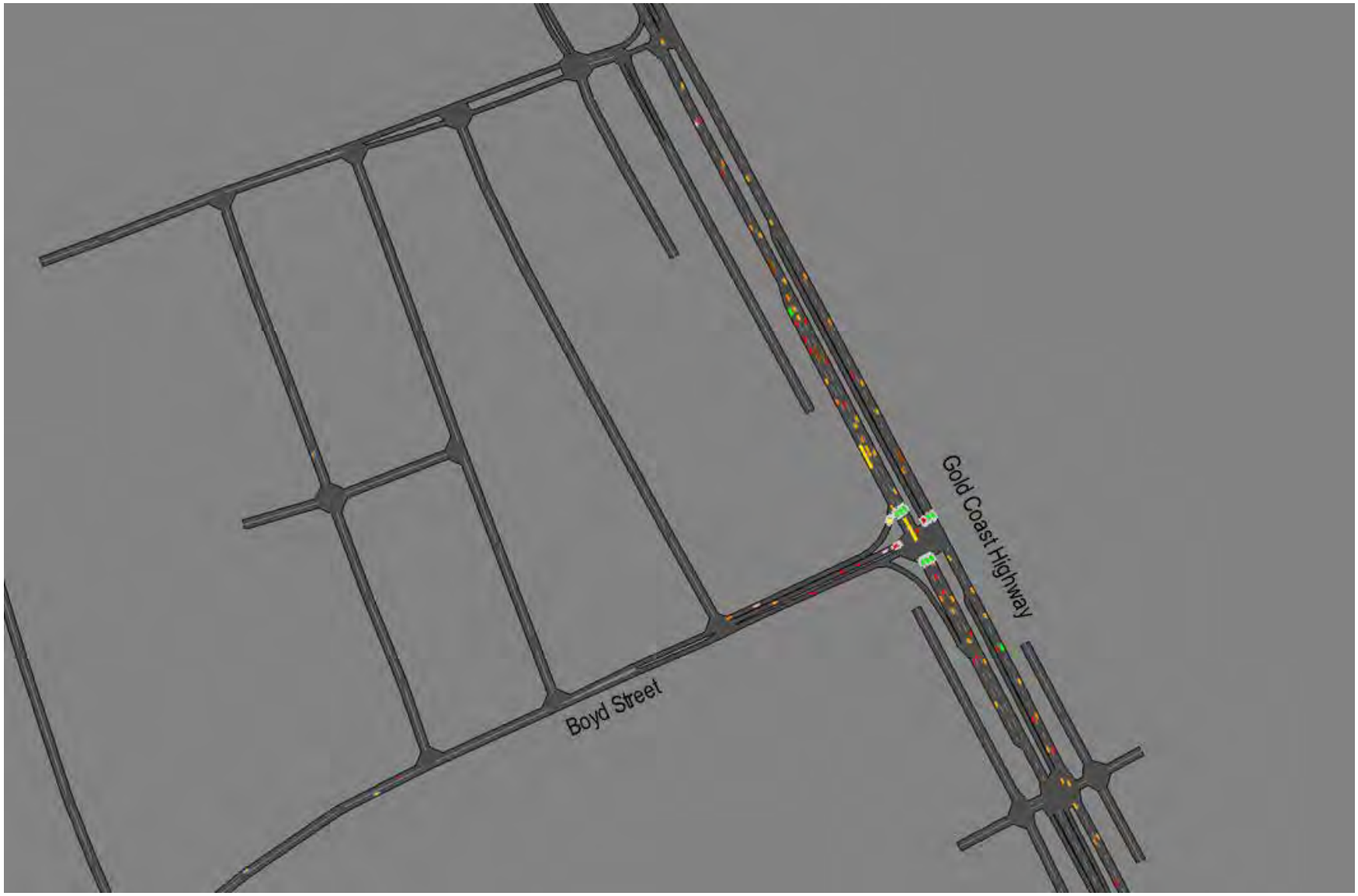


Figure 2.50: Gold Coast Highway / Boyd Street Intersection – Model Performance – 2031AM PEAK

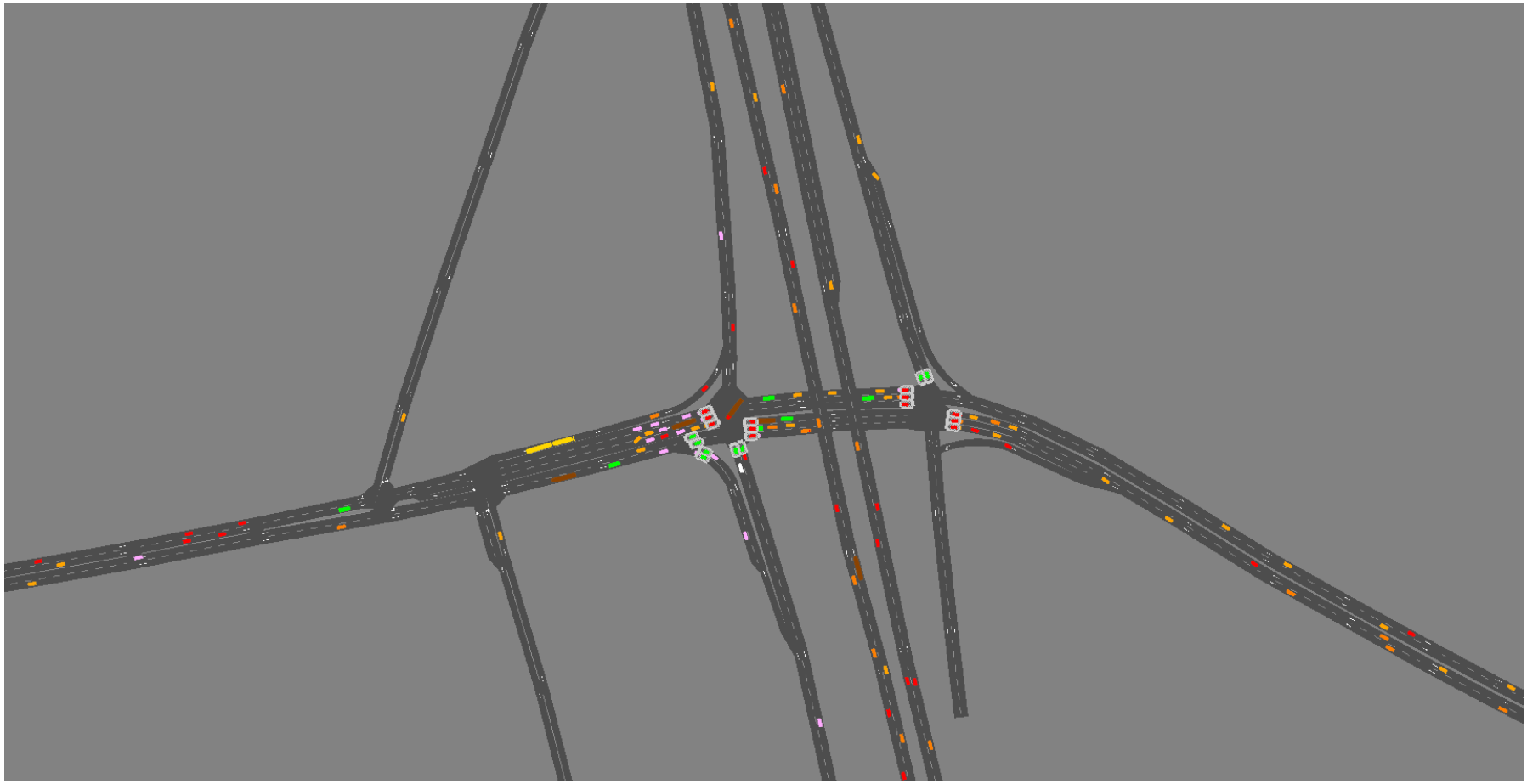


Figure 2.51: Kennedy Drive Interchange – Model Performance – 2031AM PEAK

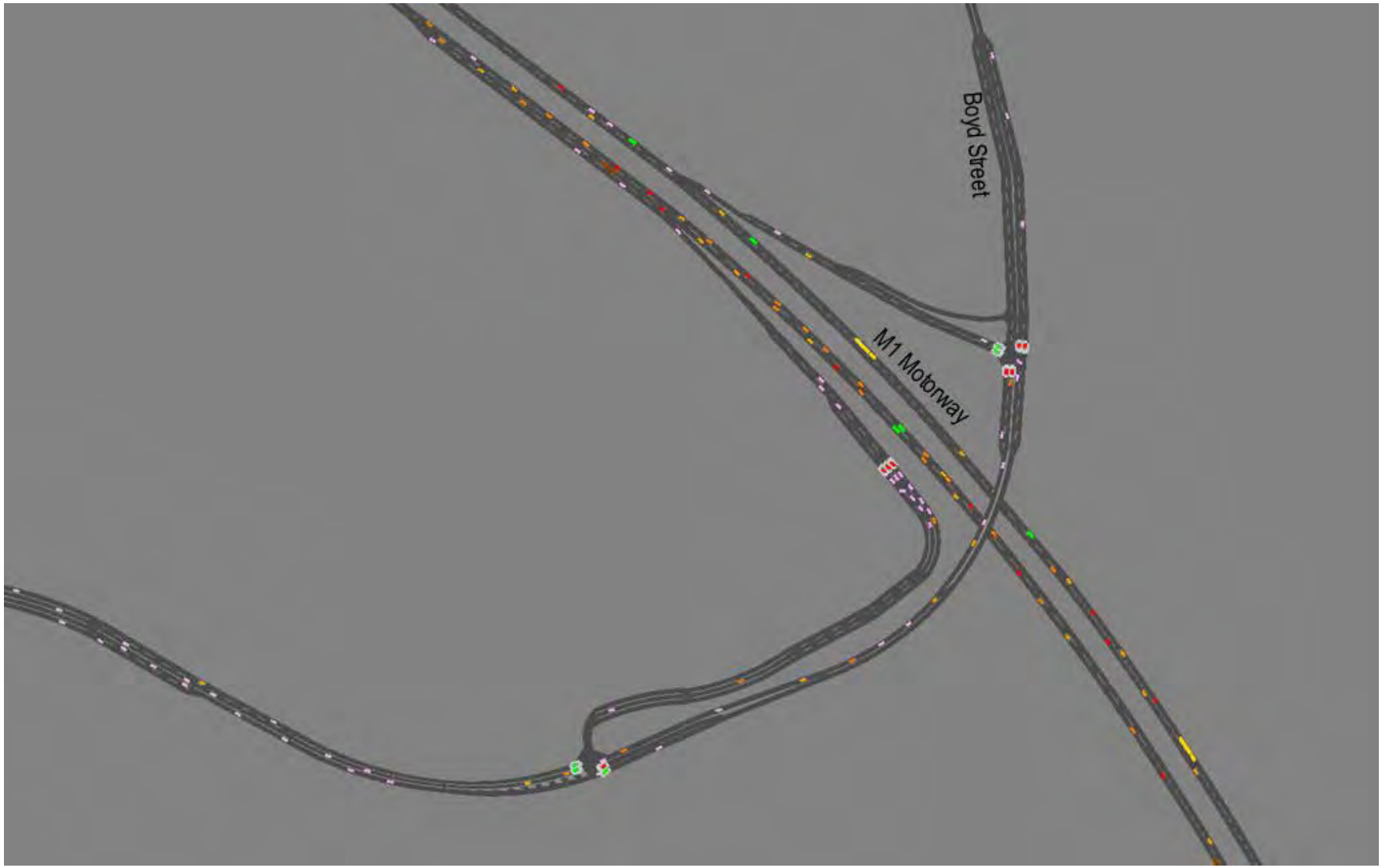


Figure 2.52: Boyd Street Interchange – Model Performance – 2031AM PEAK

Figure 2.53: Cobaki Town Centre – Model Performance – 2031AM PEAK

Figure 2.54: Piggabeen Road / Kennedy Drive Intersection – Model Performance – 2031AM PEAK

2.3.8 Model Performance Snapshots (2031 PM Peak)

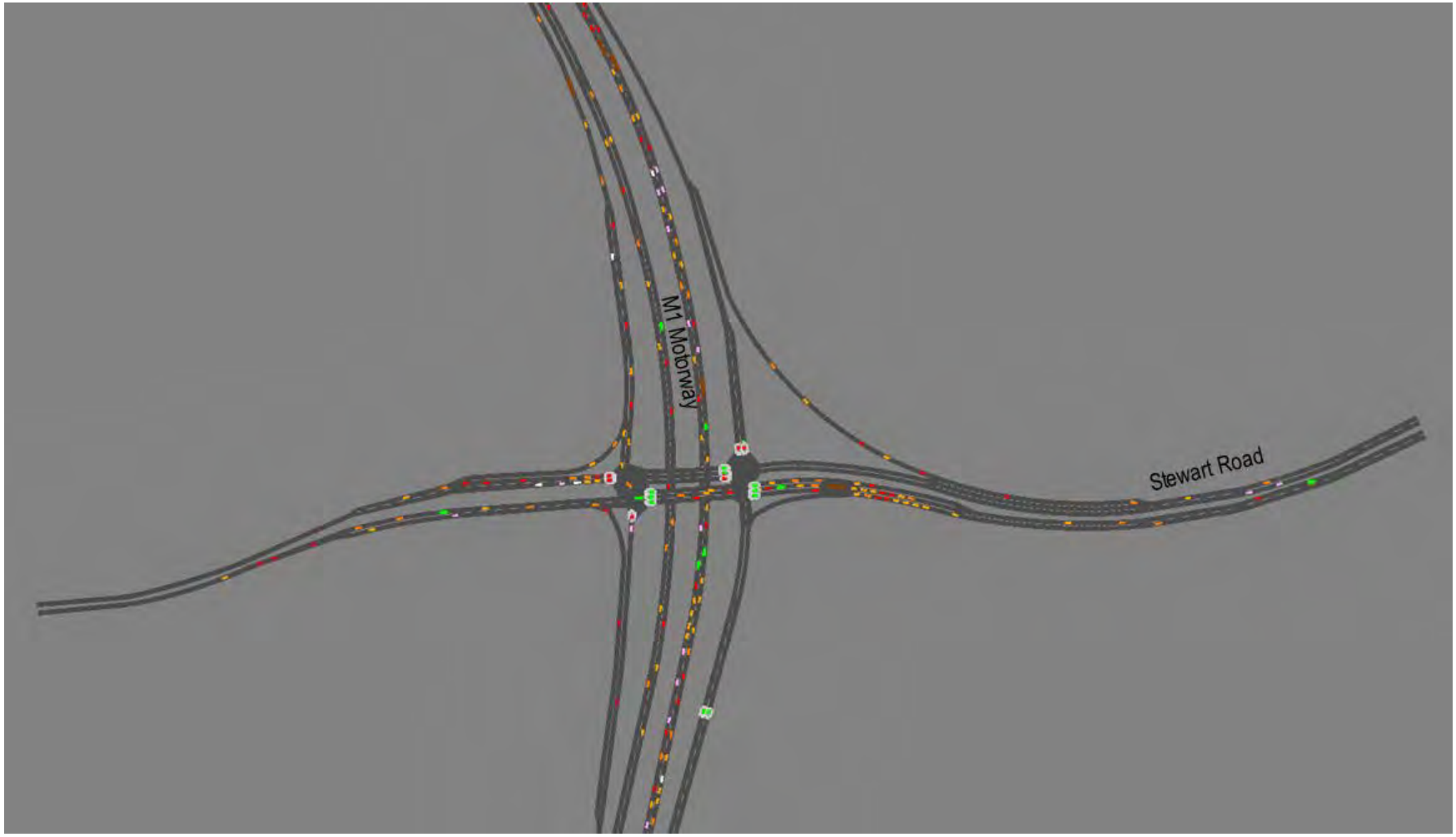


Figure 2.55: Stewart Road Interchange – Model Performance – 2031PM PEAK

Figure 2.56: Gold Coast Highway / Boyd Street Intersection – Model Performance – 2031PM PEAK

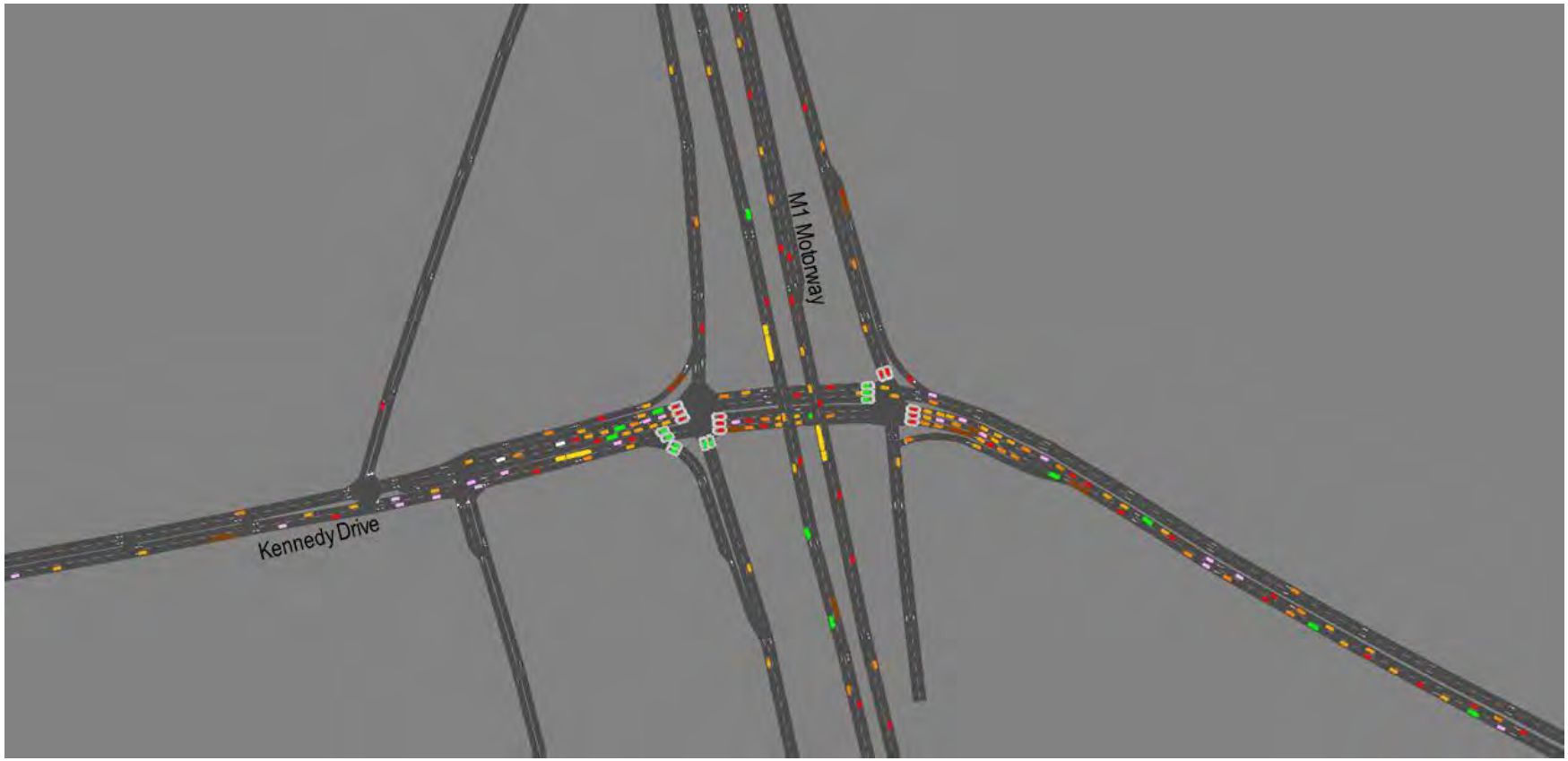


Figure 2.57: Kennedy Drive Interchange – Model Performance – 2031PM PEAK

Figure 2.58: Cobaki Town Centre – Model Performance – 2031PM PEAK

Figure 2.59: Piggabeen Road / Kennedy Drive Intersection – Model Performance – 2031PM PEAK

2.3.9 Back of Queue Plots (2031 AM Peak)

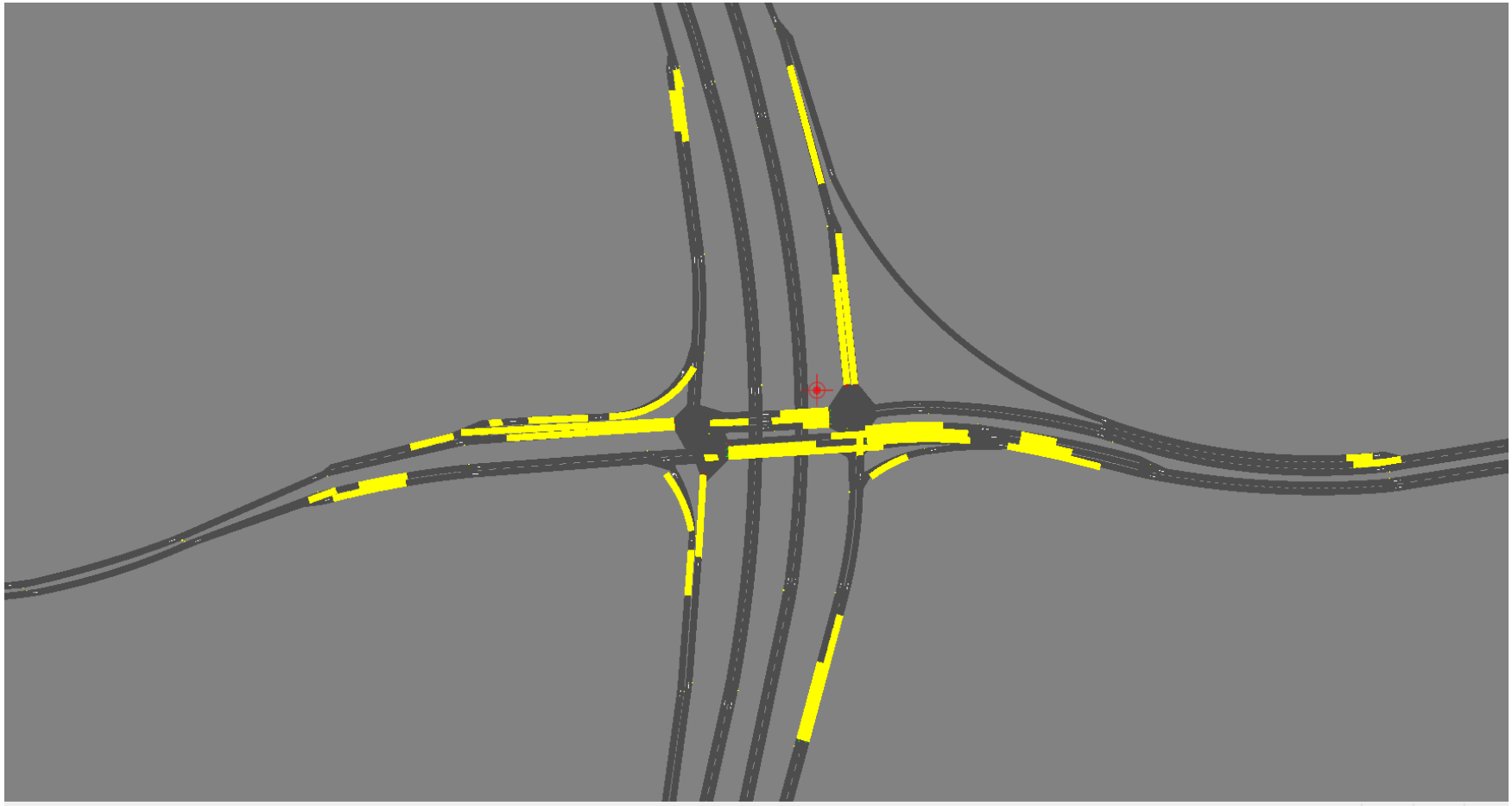


Figure 2.60: Stewart Road Interchange – Back of Queue (Max) – 2031AM PEAK

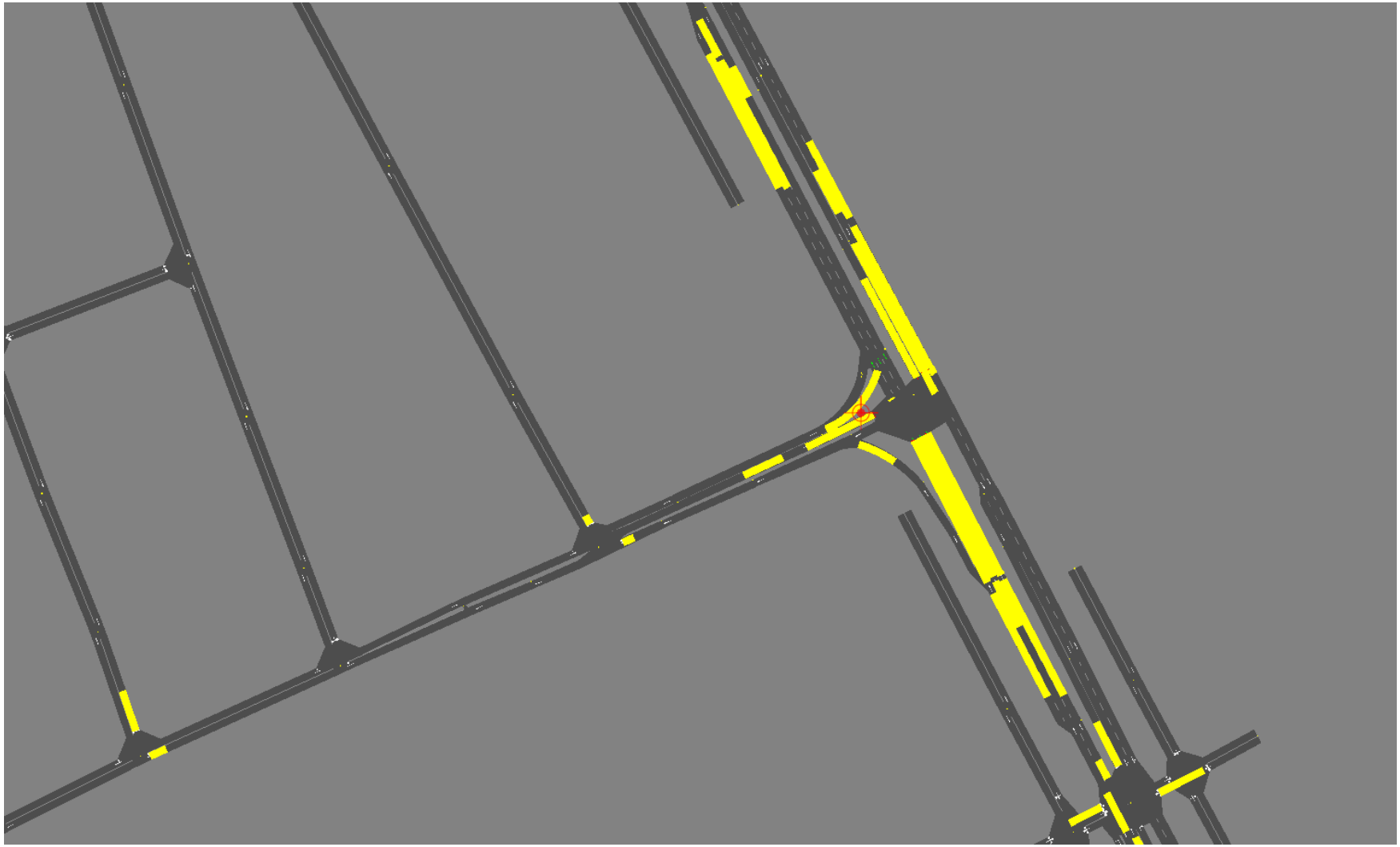


Figure 2.61: Gold Coast Highway / Boyd Street Intersection – Back of Queue (Max) – 2031AM PEAK

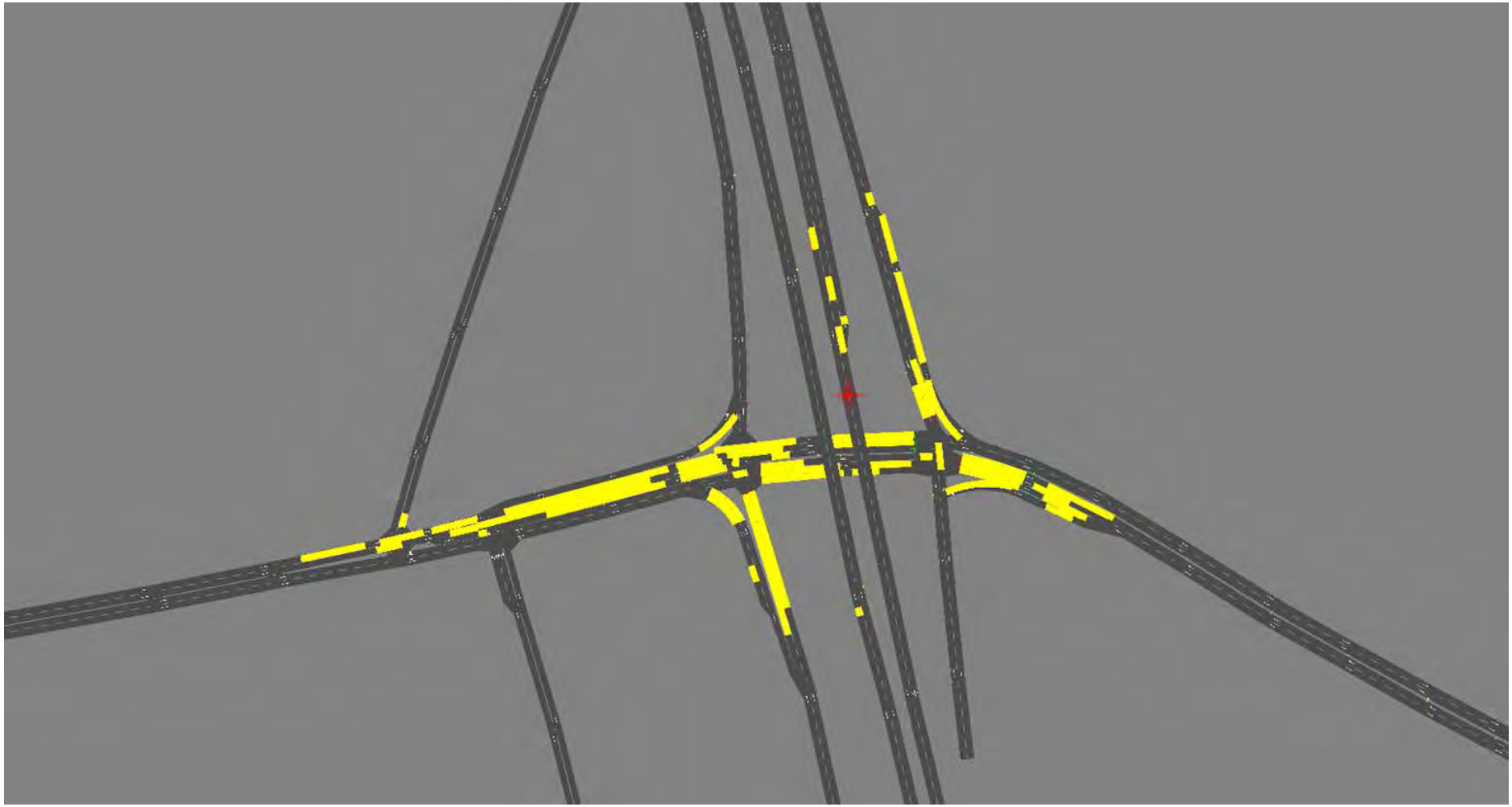


Figure 2.62: Kennedy Drive Interchange – Back of Queue (Max) – 2031AM PEAK

Figure 2.63: Cobaki Town Centre – Back of Queue (Max) – 2031AM PEAK

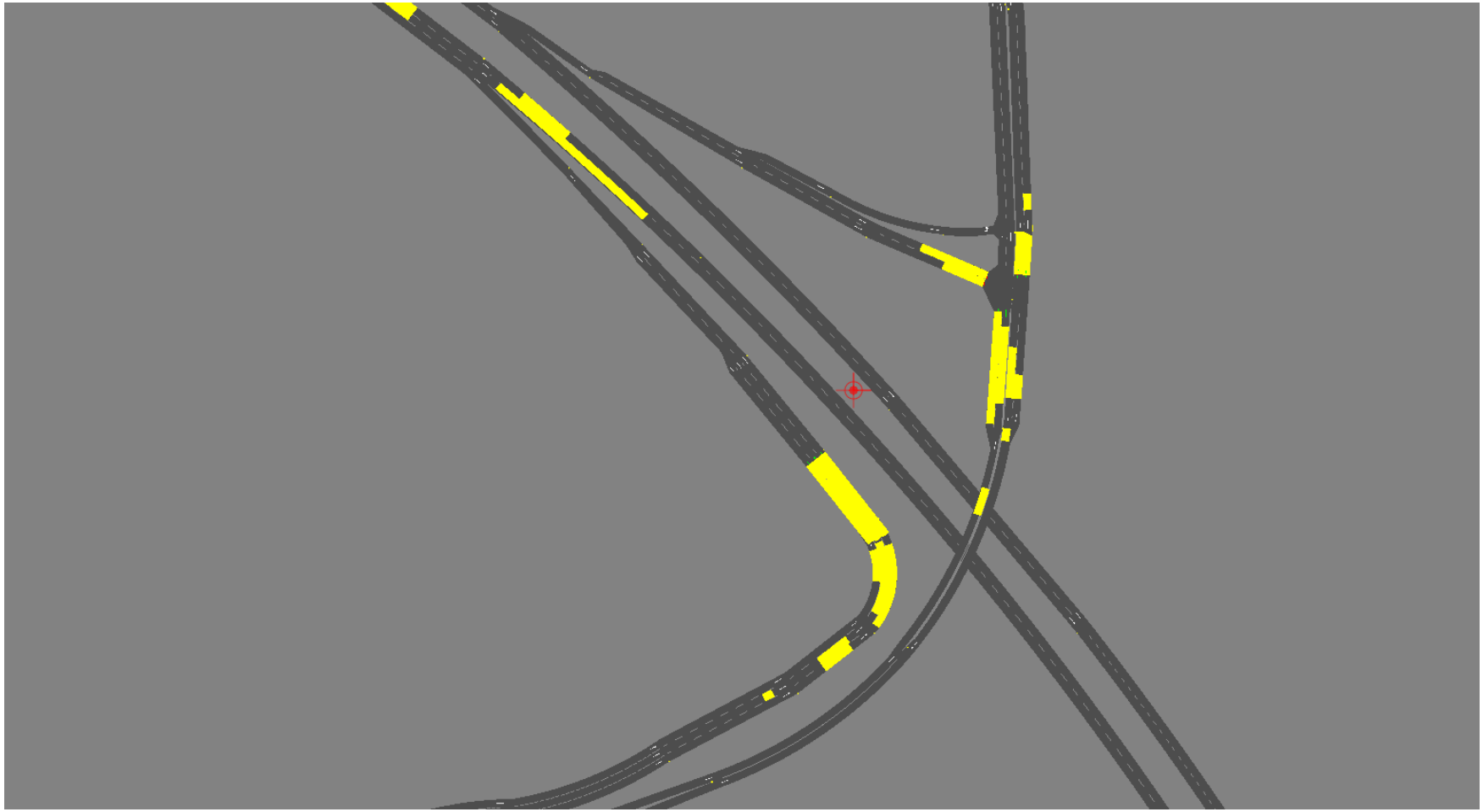


Figure 2.64: Boyd Street Interchange – Back of Queue (Max) – 2031AM PEAK

2.3.10 Back of Queue Plots (2031 PM Peak)

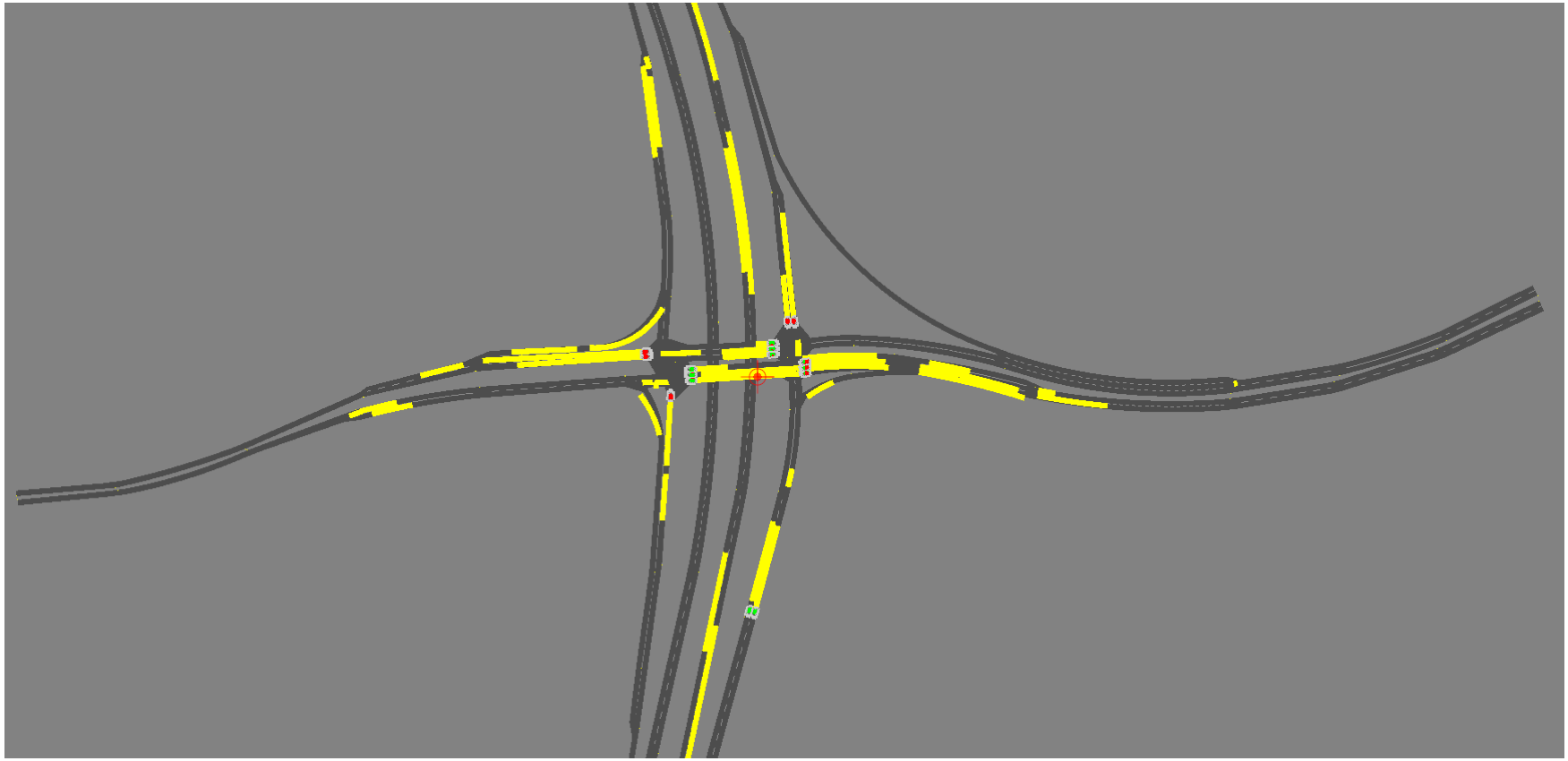


Figure 2.65: Stewart Road Interchange – Back of Queue (Max) – 2031PM PEAK

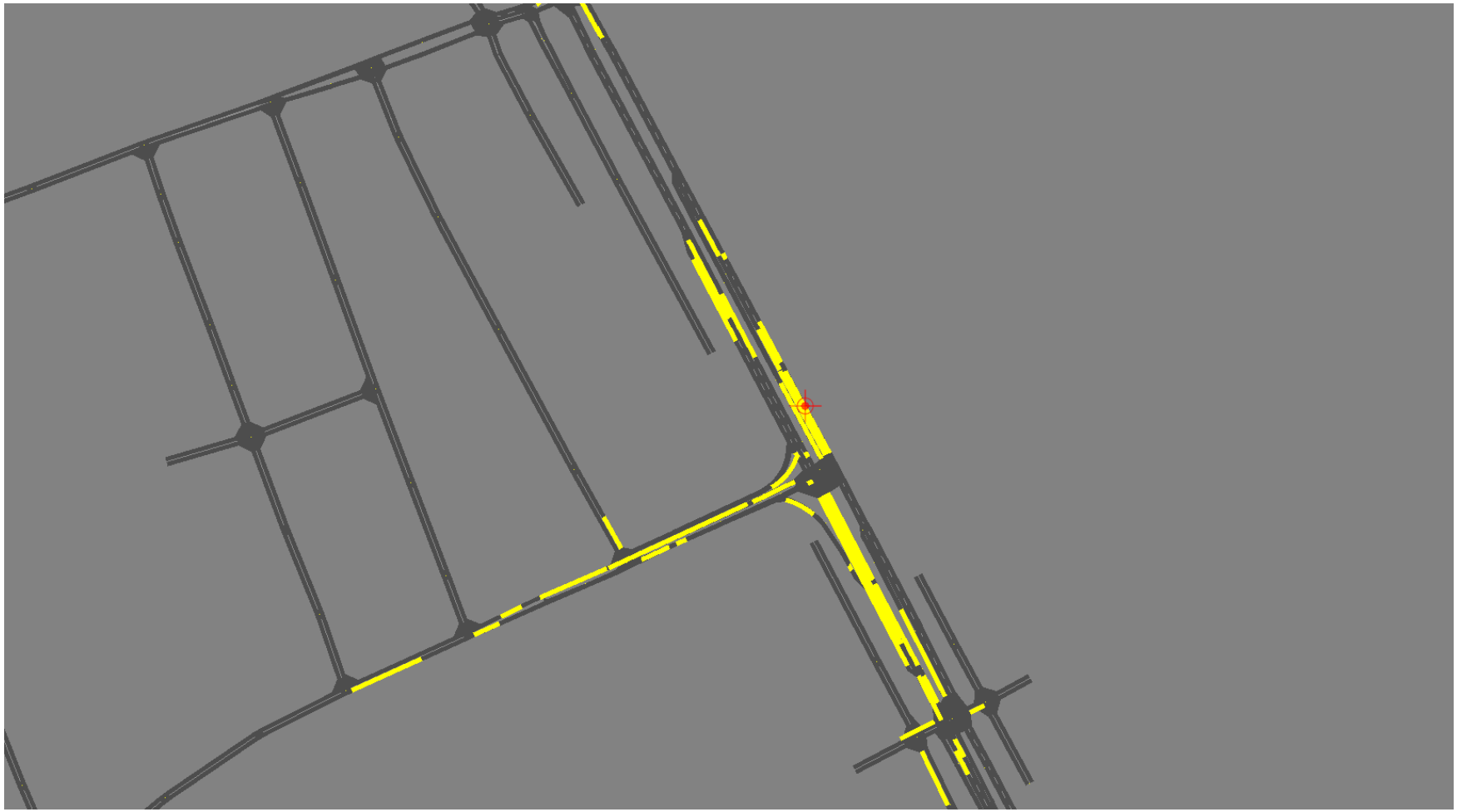


Figure 2.66: Gold Coast Highway / Boyd Street Intersection – Back of Queue (Max) – 2031PM PEAK

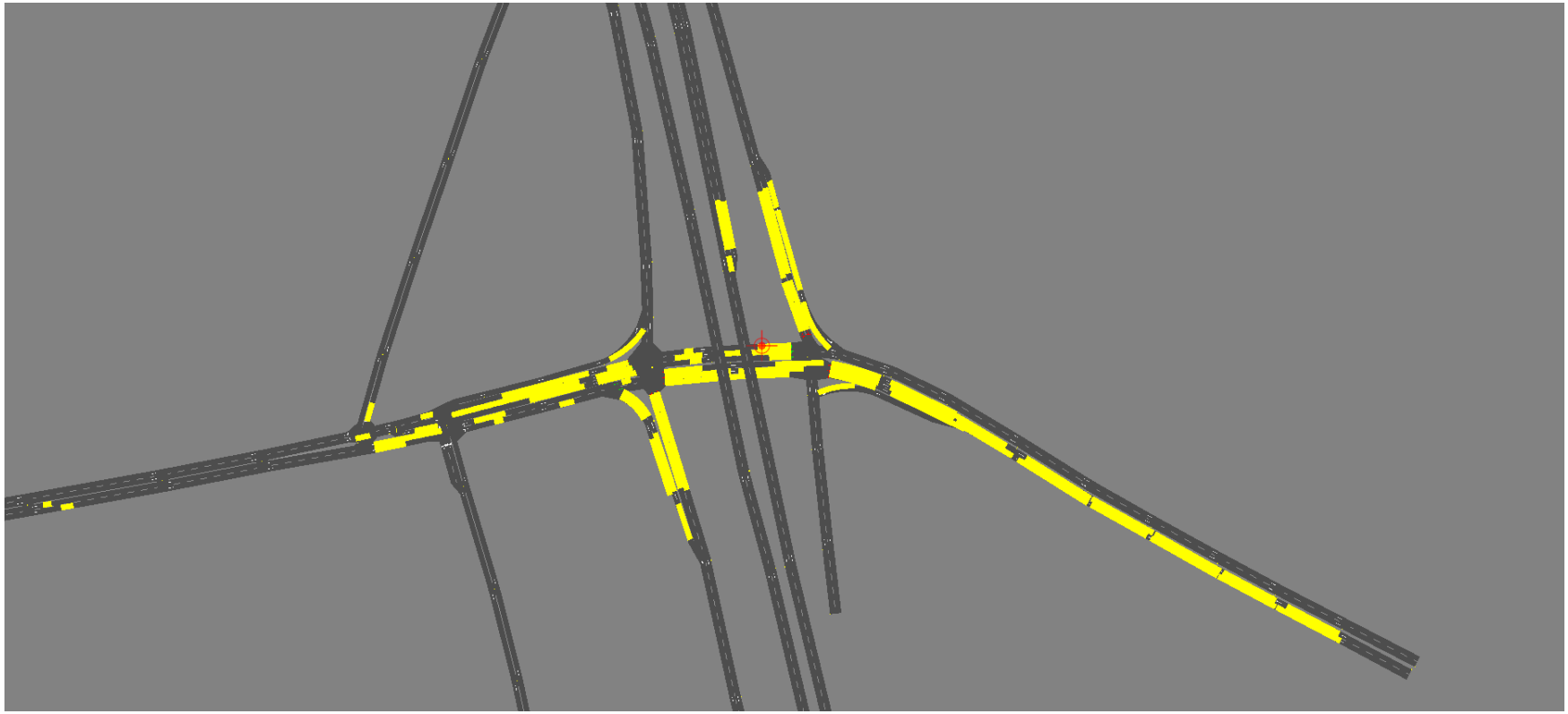


Figure 2.67: Kennedy Drive Interchange – Back of Queue (Max) – 2031PM PEAK

Figure 2.68: Cobaki Town Centre – Back of Queue (Max) – 2031PM PEAK

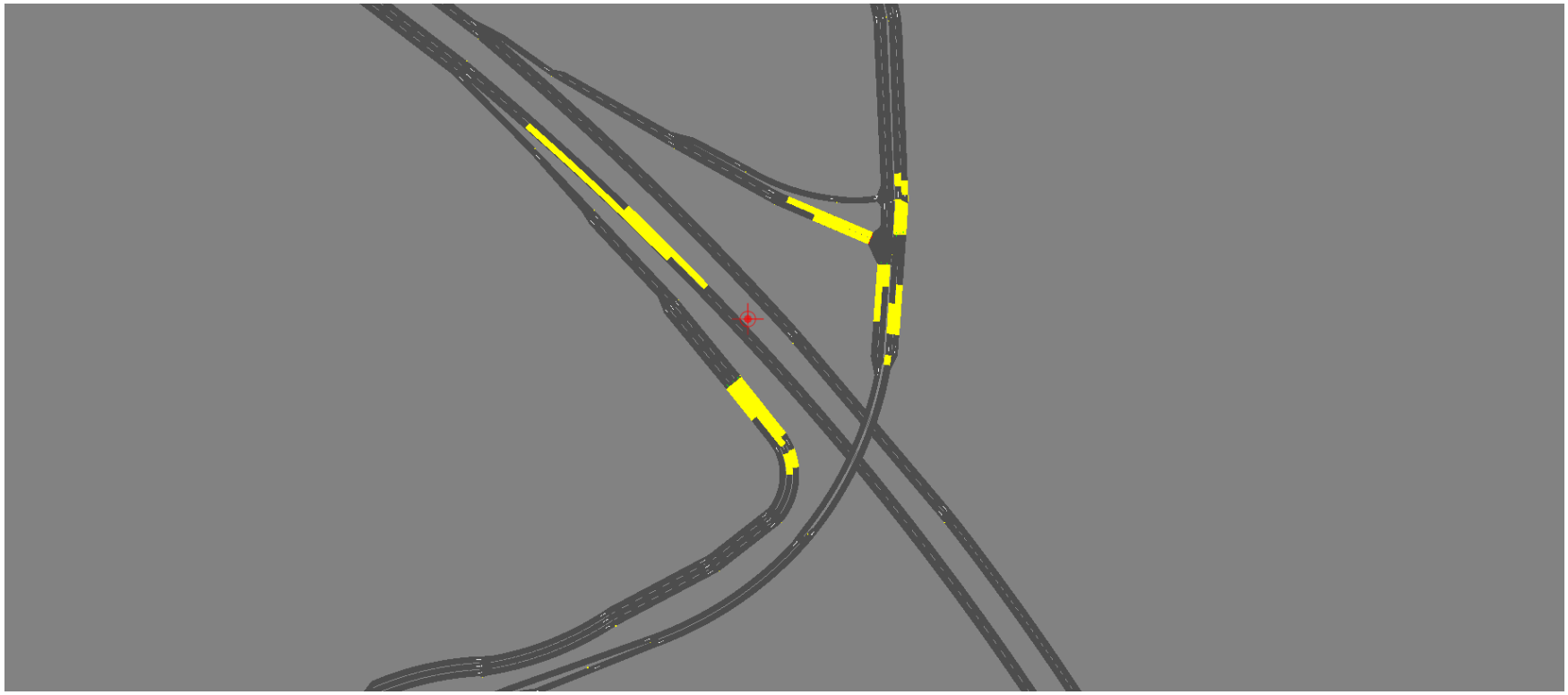


Figure 2.69: Boyd Street Interchange – Back of Queue (Max) – 2031PM PEAK

The above figures highlight that the proposed network treatments are expected to operate sufficiently to cater for the forecast demands. In addition, there appears to be sufficient additional capacity to cater for additional traffic growth should that be required in the future.

2.4 SIDRA MODELS - INTERSECTION PERFORMANCE COMPARISON

2.4.1 Purpose and Methodology

The purpose of this intersection analysis is to determine the upgraded/newly formed intersection configurations adopted in the Paramics models operated satisfactorily with the inclusion of the development generated traffic and to refine geometrical configurations.

The following intersections were assessed in the study area as follows:

- Boyd Street/ Gold Coast Highway Upgraded Intersection Configuration;
- Proposed Boyd Street/Pacific Motorway Southbound Exit Ramp;
- Proposed Boyd Street/ Pacific Motorway Northbound Entry Ramp;
- Cobaki Parkway/ Sandy Lane Intersection;
- Sandy Lane/ Town Centre Intersection;
- Sandy Lane/ Town Centre West Intersection; and
- Kennedy Drive/ Piggabeen Road Intersection.

The methodology adopted for the SIDRA intersection assessment is as follows:

- obtained turning movement volumes for the subject intersections from the year 2031 micro-simulation models;
- adopted the same configurations as coded in the Paramics models; and
- the trigger for intersection failure was deemed to be when the intersection degree of saturation (DOS) exceeded the maximum practical operating capacity for a signalised intersection of 0.90.

2.4.2 Boyd Street/ Gold Coast Highway Upgraded Intersection Configuration

The intersection configurations adopted for the Boyd Street/ Gold Coast Highway intersection is shown in Figure 2.70 and the Sidra model performance outputs are shown in Table 2.9.

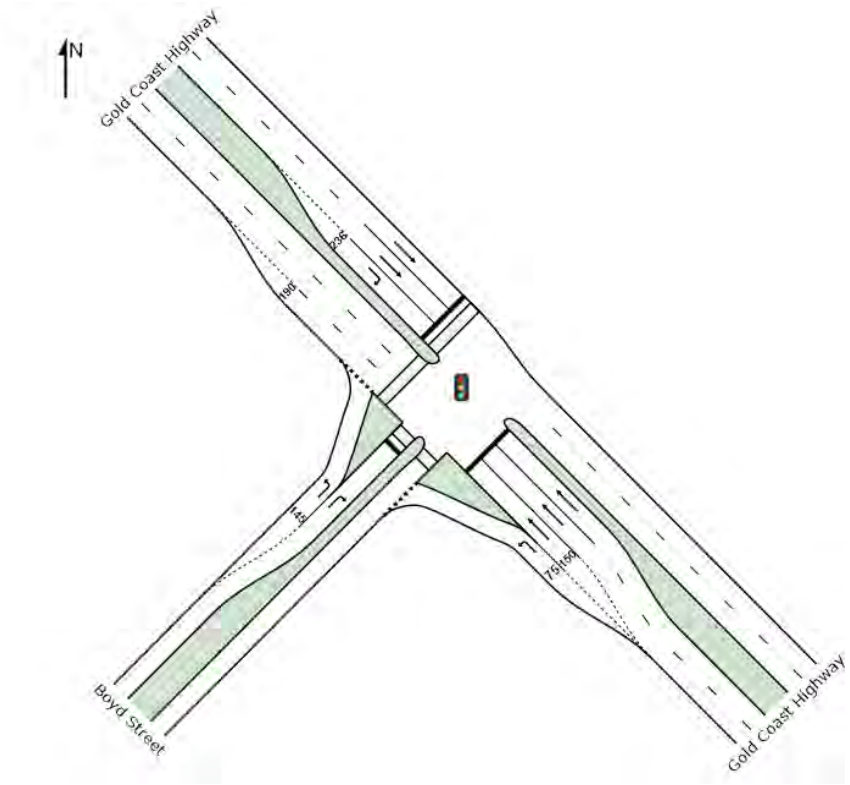


Figure 2.70: Boyd Street/ Gold Coast Highway Intersection Configuration

Table 2.11: Boyd Street/ Gold Coast Highway Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.89	27	C	408
	PM	0.91	27	C	354

As shown in Table 2.9 above the intersection operates at capacity in year 2031 during the critical PM peak. The average delay is 27sec during both the AM and PM peaks with a maximum queue of 408m along Gold Coast Highway in the northbound direction.

2.4.3 Proposed Boyd Street/ Pacific Motorway Exit Ramp

The proposed Pacific Motorway Exit Ramp/ Boyd Street intersection configuration is shown in Figure 2.71 and the intersection performance outputs are shown in Table 2.10.

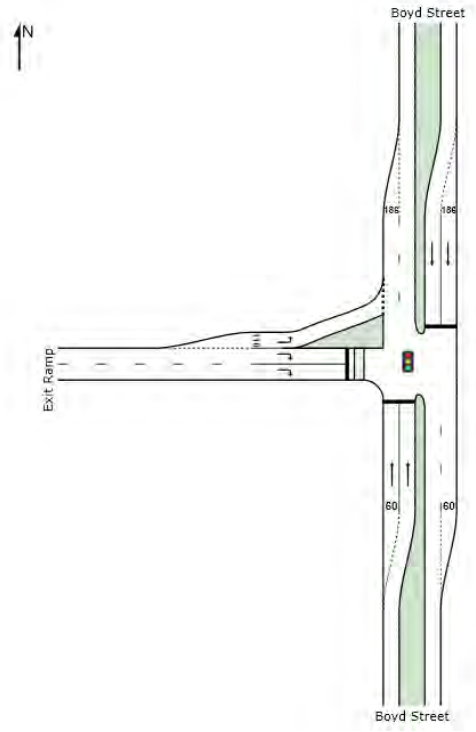


Figure 2.71: Pacific Motorway/ Boyd Street Exit Ramp Intersection Configuration

Table 2.12: Pacific Motorway/ Boyd Street Exit Ramp Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.557	13.4	B	48
	PM	0.864	21.7	C	142

The intersection will operate below the maximum practical operating capacity for a signal controlled intersection (i.e. DOS < 0.90) in year 2031 during both the AM and PM peak hours as shown by the model results in Table 2.10 above.

2.4.4 Proposed Boyd Street/ Pacific Motorway Entry Ramp Intersection

The proposed Boyd Street/ Pacific Motorway Entry Ramp intersection configuration is shown in Figure 2.72 and the intersection performance outputs are shown in Table 2.11.

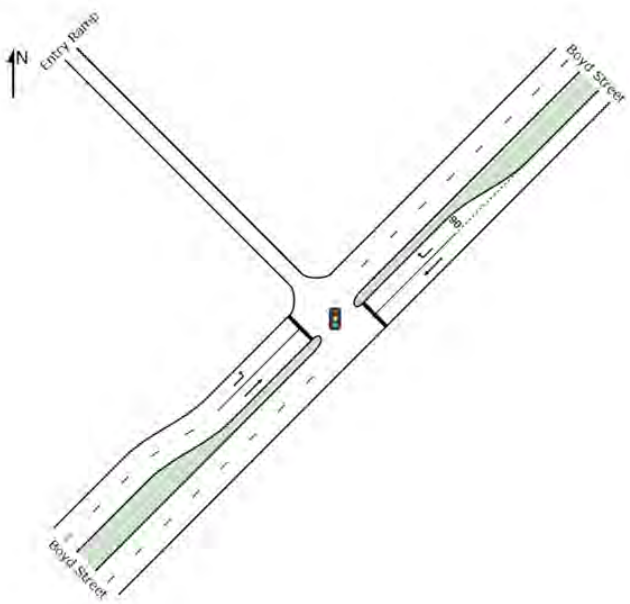


Figure 2.72: Boyd Street/ Pacific Motorway Entry Ramp Intersection Configuration

Table 2.13: Boyd Street/ Pacific Motorway Entry Ramp Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.698	6.5	A	151
	PM	0.890	13.8	B	186

The intersection will operate below the maximum practical operating capacity for a signal controlled intersection (i.e. DOS < 0.90) in year 2031 during both the AM and PM peak hours as shown by the model results in Table 2.11 above.

2.4.5 Cobaki Parkway/ Sandy Lane Intersection

The proposed Cobaki Parkway/ Sandy Lane intersection configuration is shown in Figure 2.73 and the intersection performance outputs are shown in Table 2.12.

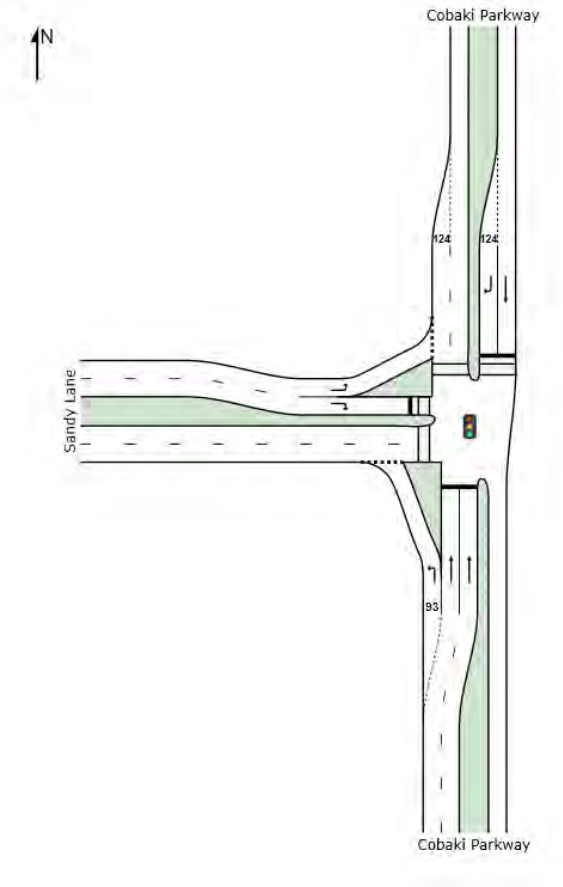


Figure 2.73: Cobaki Parkway/ Sandy Lane Intersection Configuration

Table 2.14: Cobaki Parkway/ Sandy Lane Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.882	34.1	C	258
	PM	0.853	26.4	C	283

The intersection will operate below the maximum practical operating capacity for a signal controlled intersection (i.e. DOS < 0.90) in year 2031 during both the AM and PM peak hours as shown by the model results in Table 2.12 above.

2.4.6 Sandy Lane/ Town Centre Intersection

The proposed Sandy Lane/ Town Centre intersection configuration is shown in Figure 2.74 and the intersection performance outputs are shown in Table 2.13.

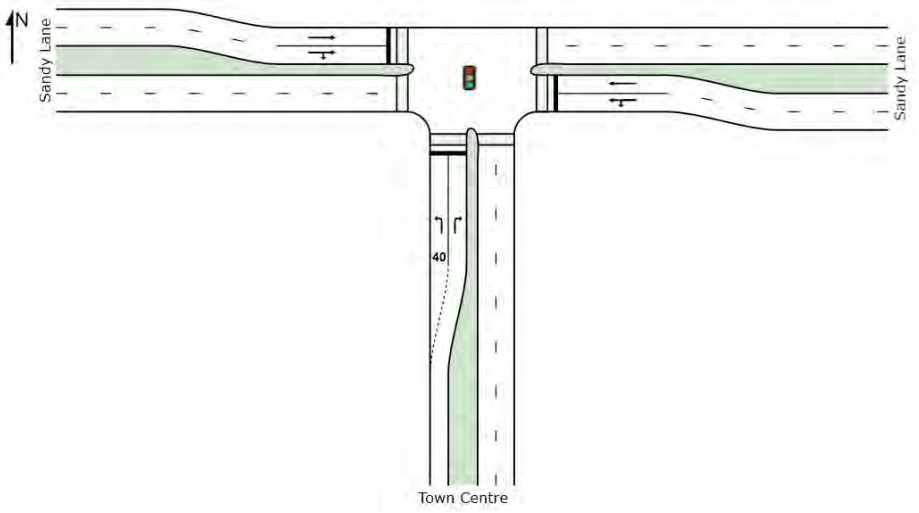


Figure 2.74: Sandy Lane/ Town Centre Intersection Configuration

Table 2.15: Sandy Lane/ Town Centre Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.776	38.9	D	95.1
	PM	0.811	38.3	D	149

The intersection will operate below the maximum practical operating capacity for a signal controlled intersection (i.e. DOS < 0.90) in year 2031 during both the AM and PM peak hours as shown by the model results in Table 2.13 above.

2.4.7 Sandy Lane/ Town Centre West Intersection

The proposed Sandy Lane/ Town Centre west intersection configuration is shown in Figure 2.75 and the intersection performance outputs are shown in Table 2.14.

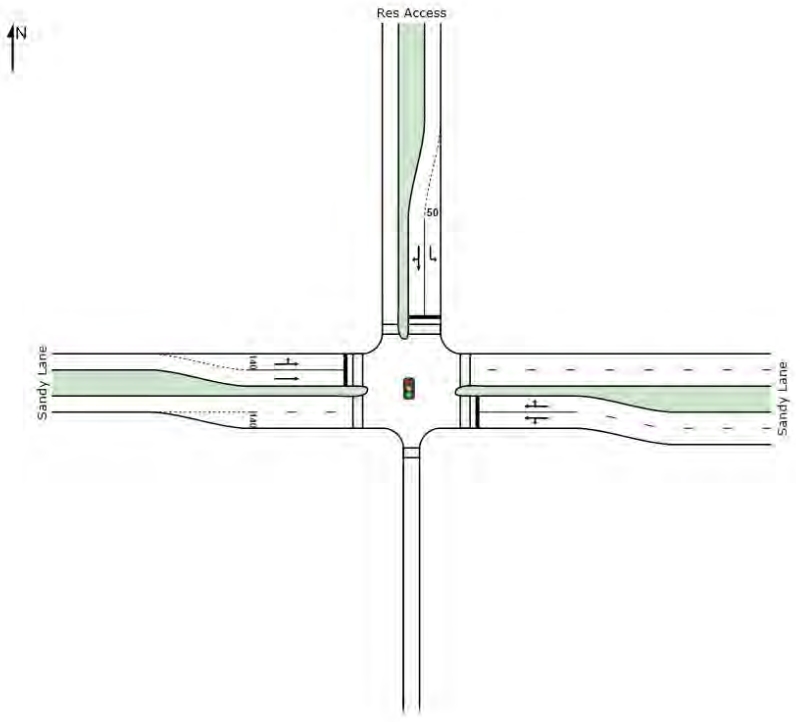


Figure 2.75: Sandy Lane/ Town Centre West Intersection Configuration

Table 2.16: Sandy Lane/ Town Centre West Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.848	37.1	D	118
	PM	0.795	30.0	C	136

The intersection will operate below the maximum practical operating capacity for a signal controlled intersection (i.e. DOS < 0.90) in year 2031 during both the AM and PM peak hours as shown by the model results in Table 2.14 above.

2.4.8 Kennedy Drive/ Piggabeen Road Intersection

The proposed Kennedy Drive/ Piggabbeen Road intersection configuration is shown in Figure 2.76 and the intersection performance outputs are shown in Table 2.15.

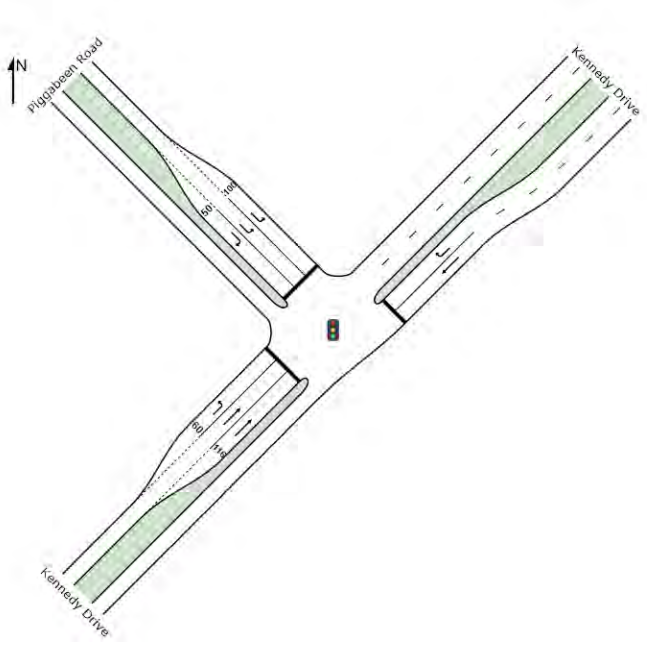


Figure 2.76: Kennedy Drive/ Piggabeen Road Intersection Configuration

Table 2.17: Kennedy Drive/ Piggabeen Road Intersection Performance Results

Year	Time Period	Degree of Saturation (Volume/Capacity Ratio)	Average Delay (s)	LOS	Queue Distance(m)
2031	AM	0.735	18.4	B	82.1
	PM	0.980	42.6	D	745

As shown above in Table 2.14 the intersection operates over capacity and fails during the critical PM peak in year 2031. This is as a result of extensive queuing on Kennedy Drive in the westbound direction. The westbound approach adopted in both Paramics and Sidra models included a single right turn lane from Kennedy Drive turning into Piggabeen Road.

Visual observations of the Paramics models also confirm extensive queuing along Kennedy Drive during the critical PM Peak but do not extend back to Limosa Road/ Kennedy Drive intersection (intersection downstream) as indicated in Sidra assessment. The primary benefit of the Paramics micro-simulation modelling is the ability to review the interactions between intersections within the network as opposed to "in isolation" under a conventional Sidra model.

2.5 SEAR 5C PUBLIC TRANSPORT IMPACT ASSESSMENT

As discussed in Section 2.2.4 the bus servicing strategy within the town centre is proposed to be established such that Queensland based services will stop/pick-up on side of Sandy Lane whilst the NSW based services will stop/pick-up on the other side of Sandy Lane.

Figure 2.77 below shows the bus servicing strategy as approved under the Concept Plan Approval.

As can be seen by the below figure, the information contained on the plan lack sufficient detail to understand where the proposed services are expected to traverse and to what frequency.

Figure 2.78 provides further detail as to the suggested bus services that are likely to exist in the ultimate year to provide bus access between the Cobaki residential areas, Cobaki Town Centre and key surrounding attractions.

The proposed servicing frequencies are based on the forecast student number requiring to utilise public transport to/from the university. During normal session, under a 10,500 EFTL Staff/Student loading there is expected to be approximately 6,000 staff and students on-site for a typical Monday to Thursday (Friday's are historically quieter than the start of the week).

30% of this demand is forecast to come from students based on-campus. The remaining 70% is targeted to contain a 25% mode share bus. This equates to a total student bus demand of approximately 1,000 students requiring the use of a bus to access the university grounds throughout the day. Public transport demand for town centre residents will be able to use outbound services (buses that have come to campus to drop students off). The creation of these bi-directional demands will assist with the feasibility and viability of operating bus services to the Cobaki Campus.

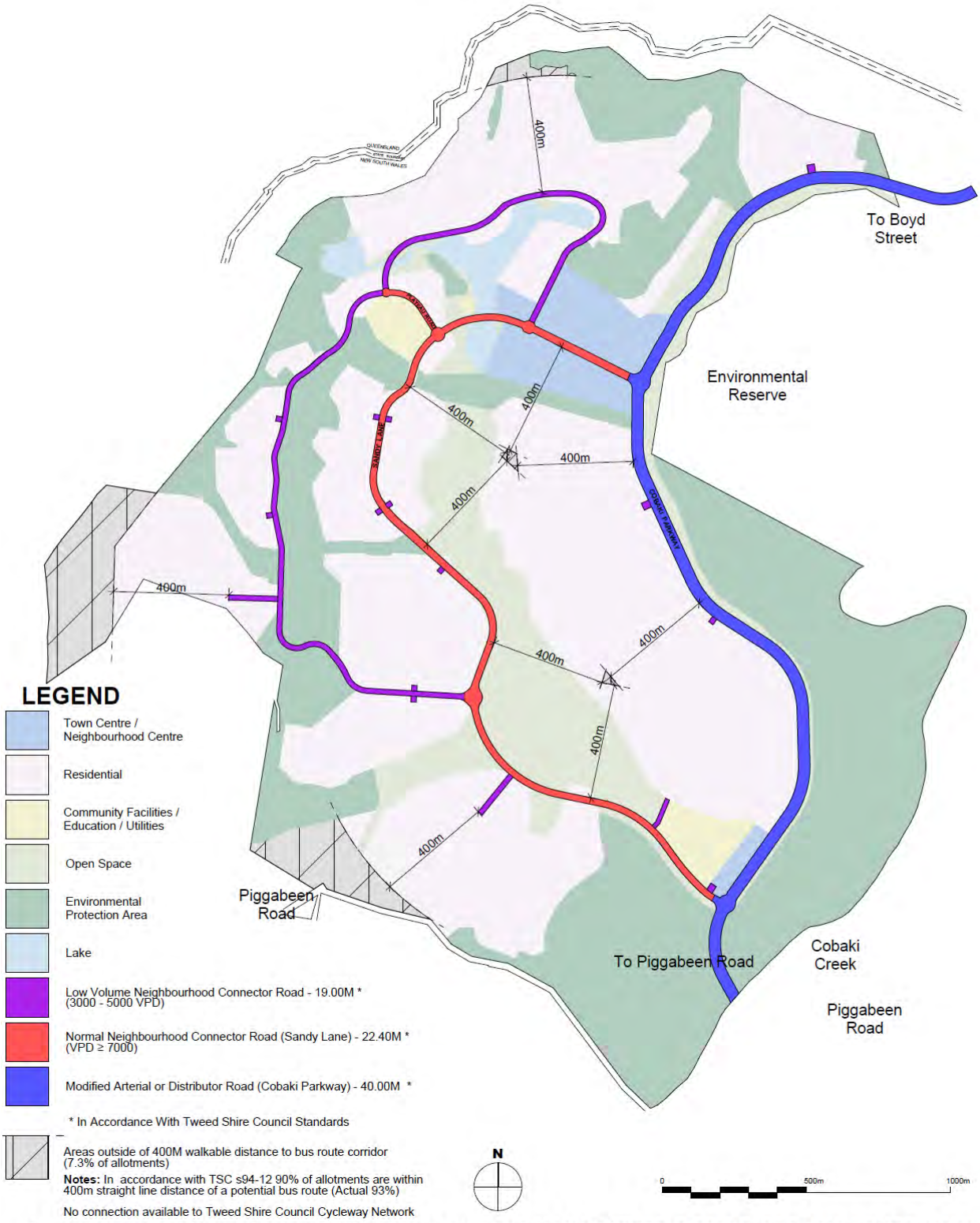
Based on the maximum demand of 1,000 staff/students over an average 3 hour morning arrival period, it is believed that the frequency of services shown in Figure 2.78 will be sufficient to accommodate the forecast demands.

Figure 2.79 shows the existing Translink services that operate in Queensland. There is an opportunity to leverage off the existing '768' services that travels to the John Flynn Hospital to service the Cobaki Town Centre. As discussed in Section 2.2.4 however, there are contractual and legislative issues that are understood to be required to be resolved for this to occur. The main issue is understood to surround the ability for Queensland services to operate in NSW. Notwithstanding this constraint, in the interim it is recommended to operate an 'on demand' chartered bus service funded by SCU until public bus services can cater for the demands.

The chartered bus service should aim to pick up / drop off patrons at key destinations such as the bus stop at the Boyd Street / Golden Four Drive intersection, and the Gold Coast Airport Bus Stop. These bus stops will provide patrons with direct access to all the necessary high frequency and express bus services on the Translink network such as connections to Varsity Rail Station, Broadbeach Transit Interchange, Pacific Pines Shopping Centre, Coolangatta and Tweed Heads town centres.

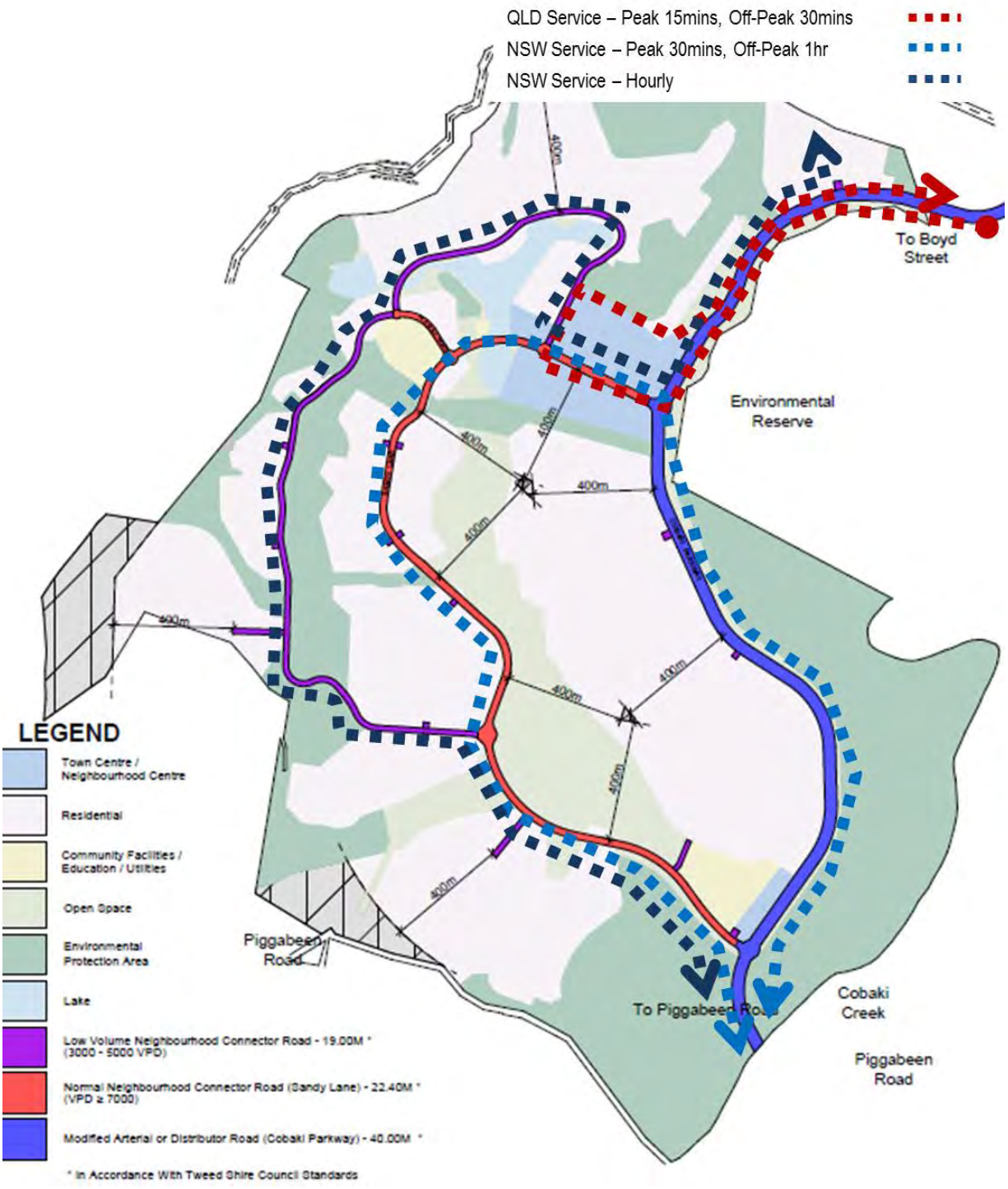
To facilitate ease of access to the Boyd Street / Golden Four Drive bus stop, bus priority is proposed to be incorporated into the proposed future Gold Coast Highway / Boyd Street intersection. A description of the proposed priority is shown in Figure 2.80. Running the bus services down Golden Four Drive enhances the opportunities to also pickup students that choose to live in the medium-high density apartments that exist along the beachfront within that corridor.

The current NSW bus services that operate in northern NSW are shown in Figure 2.81. It also demonstrates how proposed services may be able to integrate into the existing NSW based services. It would appear to be the easiest to simply extend the existing '601' service up to Cobaki for both the 'Light Blue' and 'Dark Blue' services proposed in Figure 2.82.



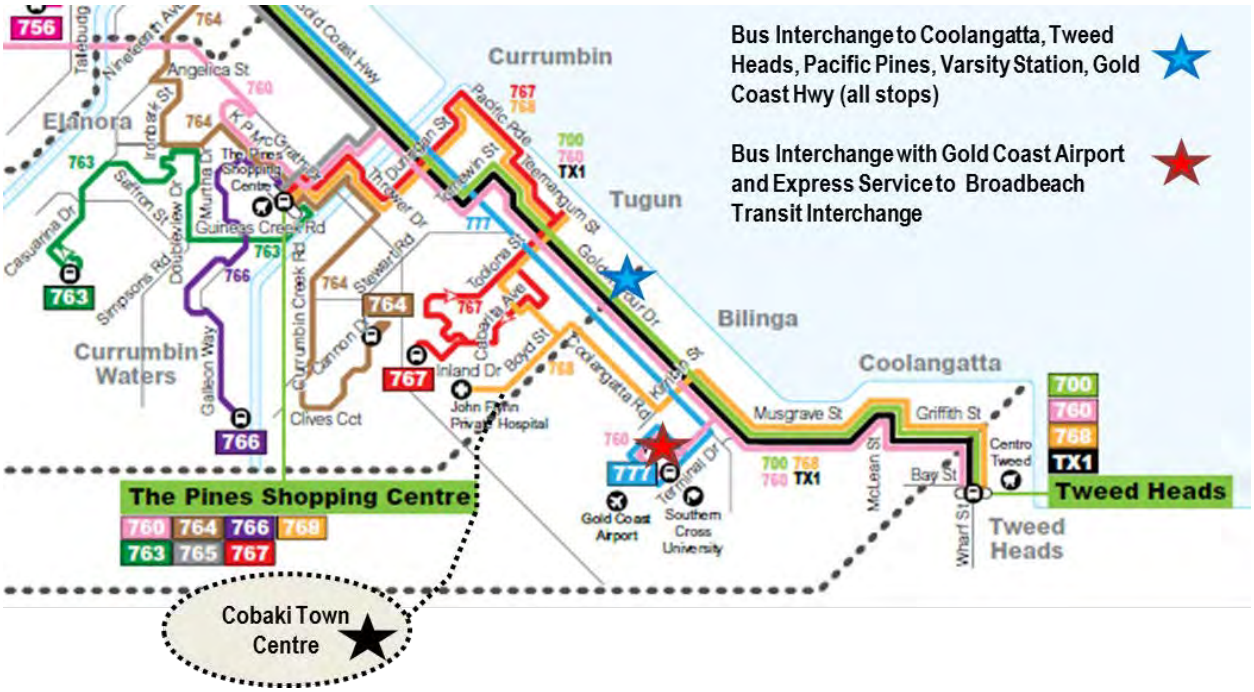
SOURCE: DFa (August 2008)

Figure 2.77: Bus Servicing Strategy Concept Plan Approval



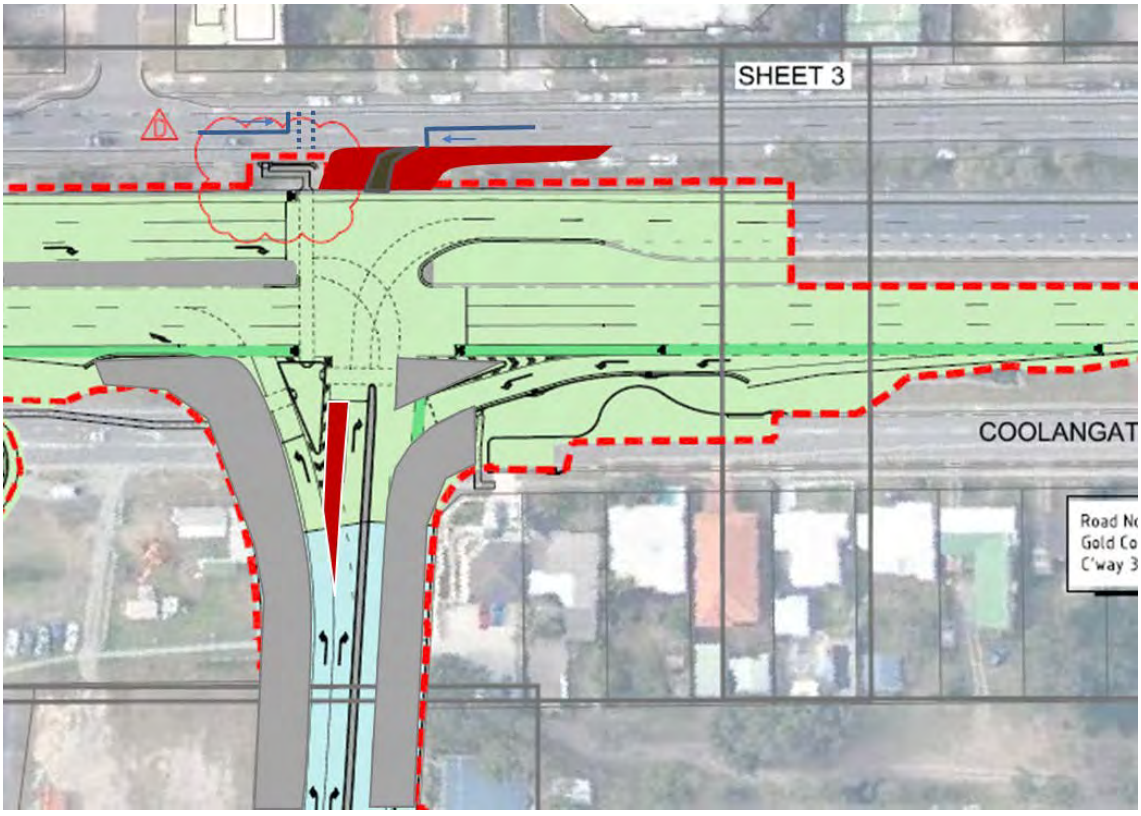
SOURCE: DFa (August 2008)

Figure 2.78: Proposed Bus Servicing Strategy Cobaki / Cobaki Town Centre



SOURCE: Surfside Bus Maps (2015)

Figure 2.79: Integration with Translink Services

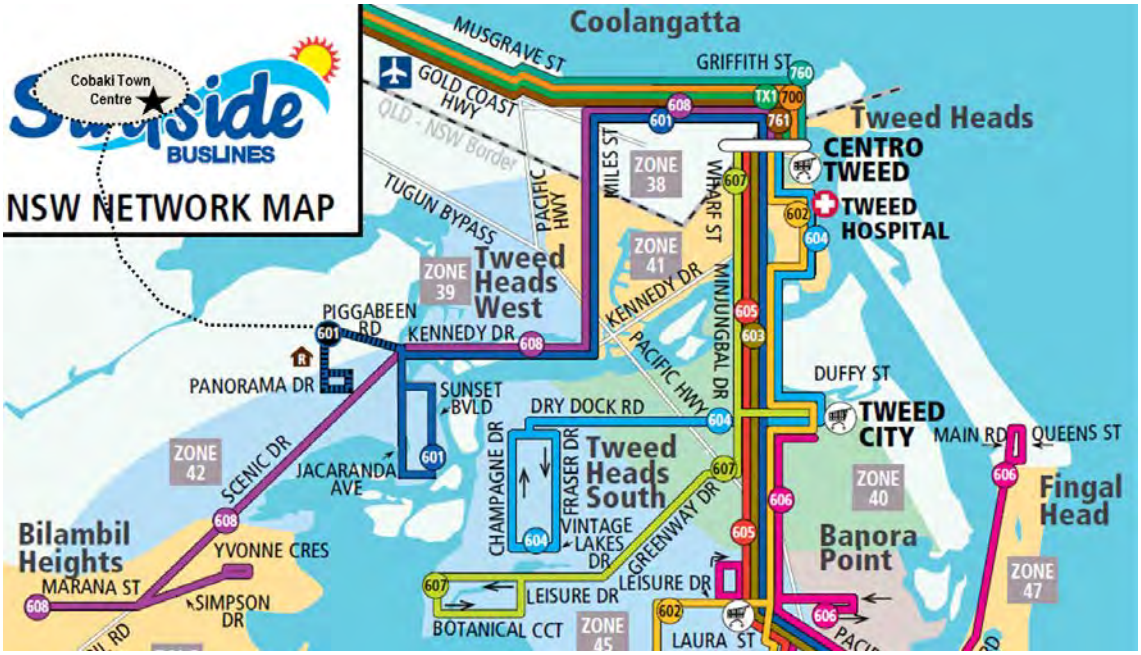


SOURCE: Concept Plan Layout

Figure 2.80: Proposed Bus Priority at Gold Coast Highway / Boyd Street

SOURCE: Google Streetview (2015)

Figure 2.81: Existing Golden Four Drive Bus Stops



SOURCE: Surfside Bus Maps (2015)

Figure 2.82: Integration with NSW Bus Services

3. CLUB / CHILD CARE CENTRE

3.1 BACKGROUND

The proposed development includes a Tavern/Function Centre and a Child Care Centre is located at the intersection of Sandy Lane and Cobaki Parkway intersection. The existing Paramics model developed (discussed in sections above) for the Cobaki master plan was used to assess the impacts of the proposed tavern and child care centre generated traffic during peak periods. The location of the proposed developments is shown in Figure 3.1 below.

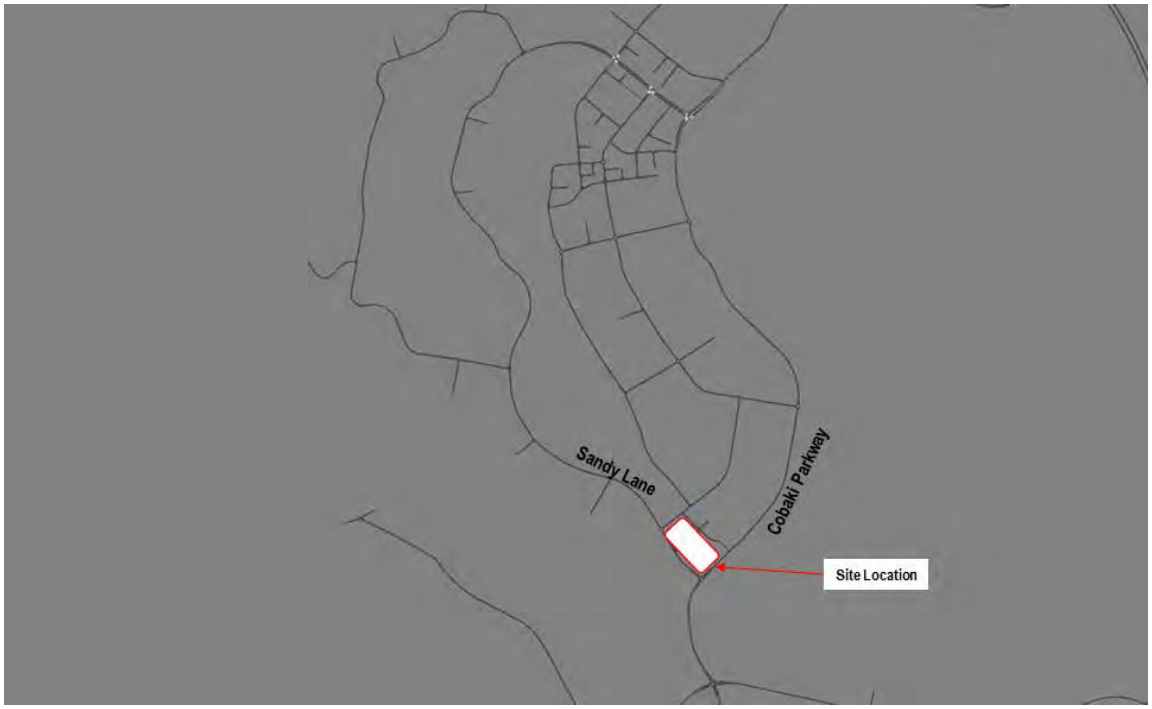


Figure 3.1: Site Location

3.2 SCOPE

The scope of this traffic impact assessment includes the following:

- estimating the development's traffic generation and distribution to the external road network;
- assessing the site's access locations and form;
- assessing the development's car park and servicing in accordance with Tweed Shire Council's Planning Scheme and Australian Standard requirements; and
- assess the impacts of the proposed developments on the surrounding road network by utilising the existing Cobaki masterplan microsimulation model with the inclusion of the proposed development traffic.

3.3 PROPOSED DEVELOPMENT DETAILS

The proposed Child Care Centre and Tavern/Function Centre includes the following:

- total Tavern GFA of 4246m^2; and
- Child Care Centre with 80 enrolments and 14 staff.

The proposed land uses are complimentary of each other, with peak demands for traffic and parking not coinciding. The facility has been designed to cater for Cobaki / Piggabeen locals and is not expected to cater for events that would attract patrons from outside of the local catchment

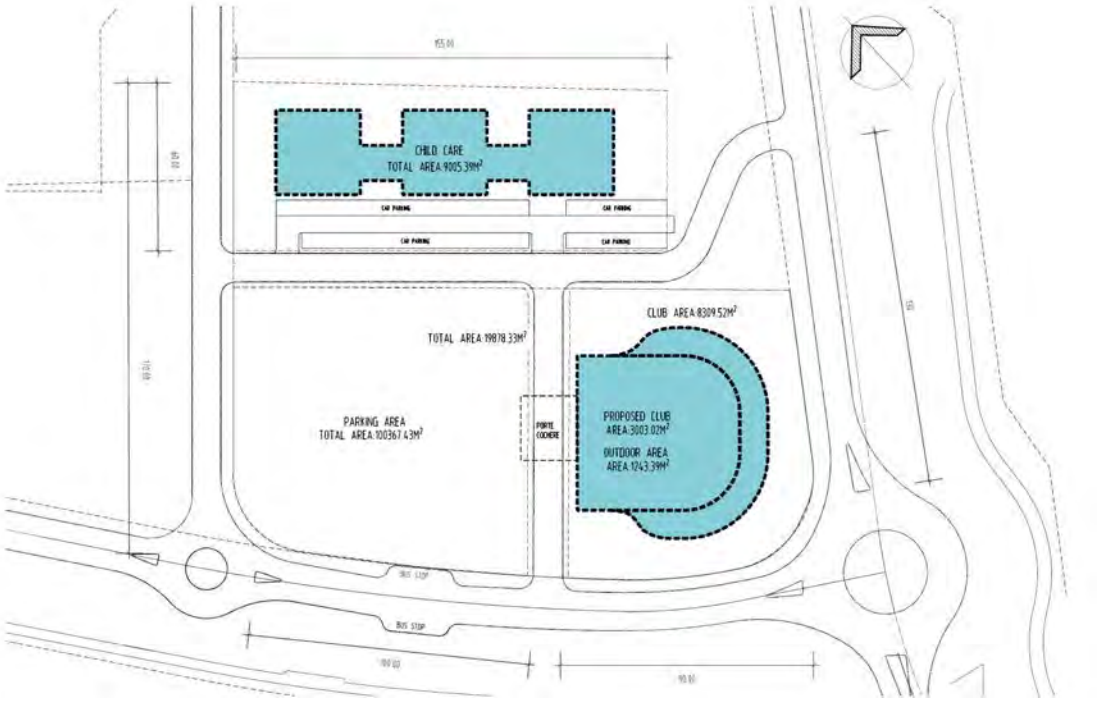


Figure 3.2: Proposed Child Care and Tavern Layout

3.4 TRAFFIC ASSESSMENT

3.4.1 Development-Generated Traffic

The traffic generation for the Child Care Centre and Tavern was calculated using the Roads and Maritime Services (RMS) *Guide to Traffic Generating Developments (2002).* The development's peak hour traffic generation is shown in Table 3.1.

Table 3.1: Development Traffic Generation

Land Use	Peak Period	Traffic Generation Rate	Students / Dwellings	Vehicle Trips (per hour)
Child Care Centre	AM	0.8 Trips per Student	80	64
Child Care Centre	PM	0.7 Trips per Student	80	56
Function Centre/Restaurant	PM	5 per 100m^2	4246m^2	212

Key assumptions made for the purpose of this analysis were:

- a 50/50 trip distribution was adopted for vehicles entering/exiting the proposed developments during the AM and PM peak periods; and
- the peak one hour vehicle trips generated by the development as shown in Table 3.1 above were multiplied by a factor of two to obtain the peak two hour volumes to be included into the Paramics models.

3.5 PARAMICS MODELLING

3.5.1 Paramics Modelling Zones

The 2031 Paramics models used for the Cobaki Town Centre / SCU modification were modified to include two additional zones (Zone 52 and Zone 53) to accommodate the proposed development generated traffic as show in Figure 3.3.

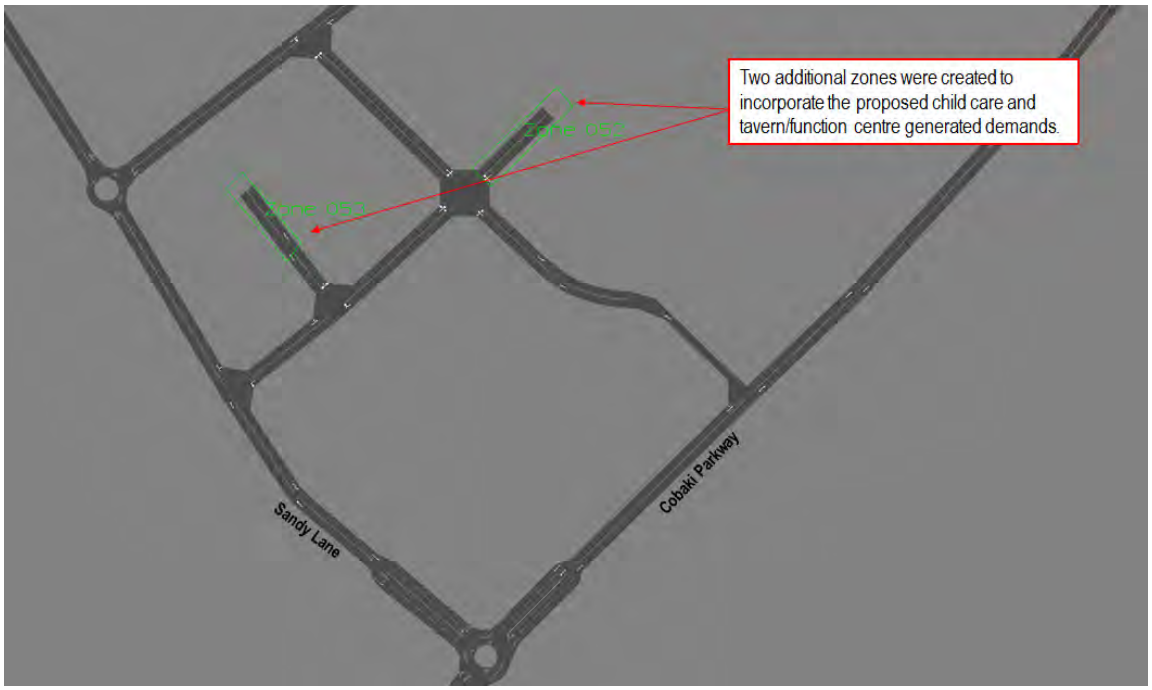


Figure 3.3: Additional Zones

3.5.2 Access Points

Three access points (intersections) are proposed for the developments which include a left in only from Cobaki Parkway and a secondary access onto Sandy Lane which operates as a left in/ left out only. An all movement's access is also proposed on the western side of the proposed development which intersects with a local road as a priority controlled intersection. The location of the access points is shown in Figure 3.4 below.

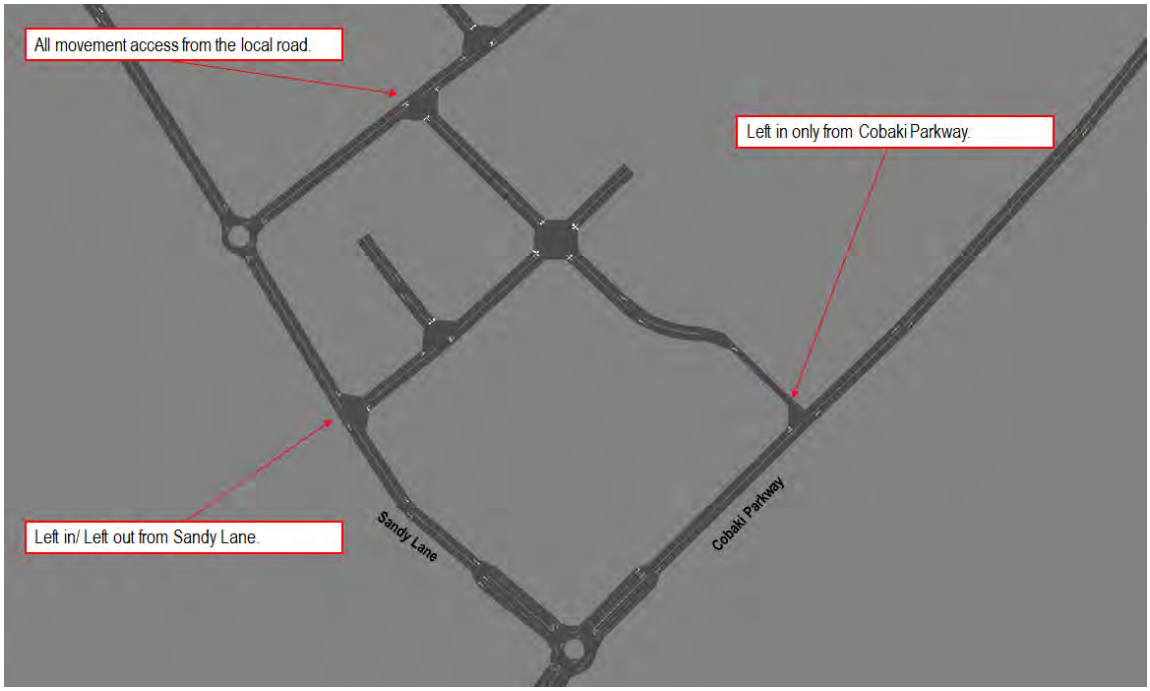


Figure 3.4: Access Locations

3.5.3 Development Traffic Distribution

Development-generated traffic was distributed internally to the residential zones within the Cobaki development and Bilambil residential development (Zone 50) located south of the proposed developments.

Figure 3.5: Proposed Development Traffic Distribution

As shown in Figure 3.5 above the development generated traffic (Zone 52 and Zone 53) has been distributed equally to the residential development located within the Cobaki development.

The traffic generated by the child care centre were only included in the 2031 AM peak model however the PM model included both the child care and tavern-generated traffic.

3.5.4 Paramics Modelling Results

To understand the impact the development will have on the network, traffic volumes were extracted from the model at three key locations show in Figure 3.6.

Figure 3.6: Locations of Link Volumes

Table 3.2 and Table 3.3 provide the traffic volumes at the nominated locations in Figure 3.6 and compare them to volumes without the development.

Table 3.2: 7:00AM – 9:00AM Peak Link Volumes

2031 Link Volumes	7:00AM – 9:00AM Peak 2031			
	Eastbound		Westbound	
	With Development	*Without Development*	With Development	*Without Development*
Site A	1329	*1116*	625	*430*
Site B	1264	*1129*	784	*597*
Site C	2569	*2423*	2061	*2034*

Table 3.3: 4:00PM – 6:00PM Peak Link Volumes

2031 Link Volumes	4:00PM – 6:00M Peak 2031			
	Eastbound		Westbound	
	With Development	*Without Development*	With Development	*Without Development*
Site A	693	*485*	1285	*774*
Site B	888	*832*	962	*892*
Site C	1931	*1991*	2445	*2453*

Figure 3.7 provides the maximum queue lengths with the development for the surrounding road network.

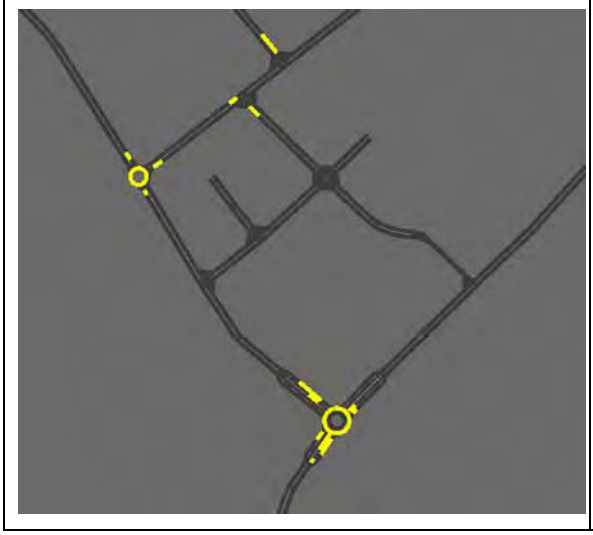
AM Maximum Queue Length	PM Maximum Queue Length
	

Figure 3.7: Operational Queue Lengths

The above figures highlight that the proposed development is expected to have minimal operational impact on the proposed network. Figure 3.8 shows the typical road network operation.

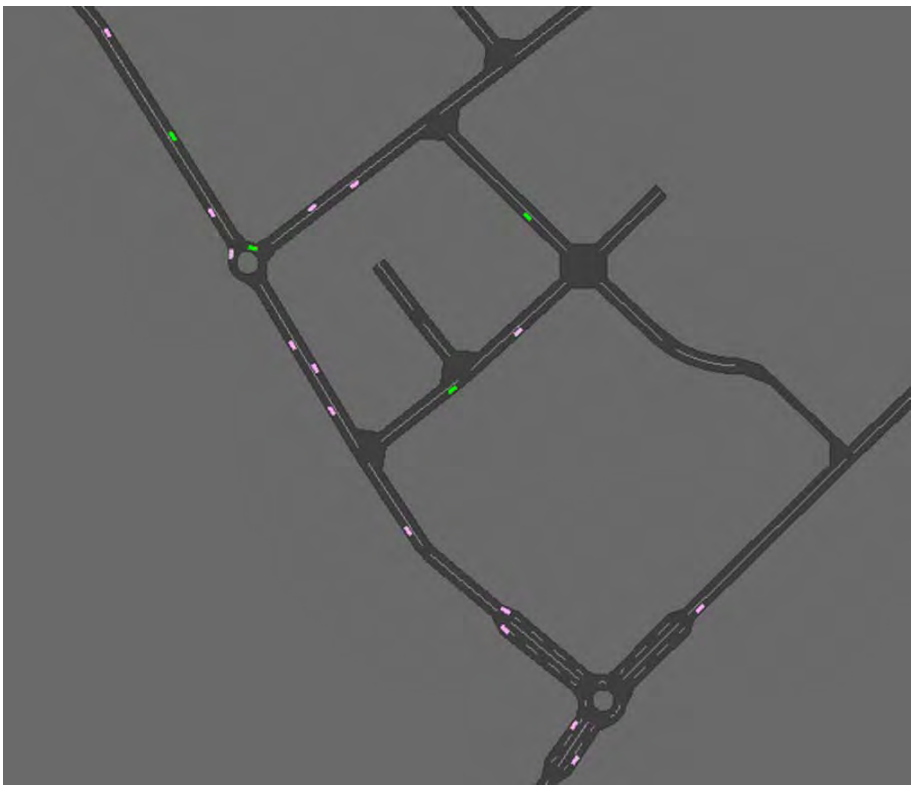


Figure 3.8: Typical Road Network Operation

3.6 PARKING ASSESSMENT

3.6.1 Parking Provision

The car parking of development has been assessed under Tweed Development Control Plan: *Section A2 – Site Access and Parking Code.* The parking requirements are summarised in Table 3.4 below.

Table 3.4: Parking Requirements

Land Use	Type	Car Parking	Units	Parking

		Requirements		Requirement
Child Care Centre	Staff	1 per staff member	14	14
Child Care Centre	Visitors	1 per 7.5 child	80	11
Tavern (Club)	Staff	0.3 per staff member	50*	15
Tavern (Club)	Visitors	1/10m^2 licensed floor area	3003.02m^2	301

**Assumed Number of Staff*

With the allotted area of 19,878m^2 set aside for car parking, an estimate of 399 parking spaces can be provided. The proposed development requires 341 parking spaces, with the allotted area there should be sufficient space for both developments.

The bicycle parking of development has also been assessed under Tweed Development Control Plan: *Section A2 – Site Access and Parking Code.* The parking requirements are summarised in Table 3.5 below.

Table 3.5: Parking Supply Requirements

Land Use	Type	Bicycle Parking Requirements	Units	Parking Requirement
Child Care Centre	Staff	1 per 4 staff	14	3.5
Tavern (Club)	Staff	1 per 25m^2 of bar area + 1 per 100m^2 lounge/beer garden	3003.02m^2 lounge/beer garden	30
Tavern (Club)	Visitors	1 per 25m^2 of bar area + 1 per 100m^2 lounge/beer garden	3003.02m^2 lounge/beer garden	30

The required bicycle parking for both premises is 64 spaces and will have to be further review once total bar areas are assessed.

3.6.2 Bus Servicing

The Tweed Development Control Plan: *Section A2 – Site Access and Parking Code* specifies that 1 bus seat should be provided for every ten seats that exist within the entertainment facility. The proposal includes the provision of two bus stops either side of Sandy Lane. It is recommended that a pedestrian refuge style crossing be incorporated in the vicinity of the bus stop locations to enable safe crossing of Sandy Lane.

Each of the bus stops should include a bus seat with shelter.

3.6.3 Coach Parking

The entertainment facility is likely to attract coach services bringing groups into the area. Consideration should be given to providing an area internal to the site for coach parking.

3.6.4 Site Access

The proposed development site is proposed to be accessed via Cobaki Parkway (left in only), Sandy Lane (left in / left out only) and the main internal frontage street (all movements). The access provisions from

Cobaki Parkway and Sandy Lane enable efficient site servicing minimising impacts to surrounding residential areas whilst also reducing unnecessary circuitous routing of destination vehicles.

3.6.5 Servicing/Waste Collection

Council's Code state that for the Child Care Centre it is required to provide for a Small Rigid Vehicle (SRV) and for Tavern (Pub) it is required to provide for a Heavy Rigid Vehicle (HRV). The site has currently been designed to support these vehicle movements within each facility.

4. STAKEHOLDER CONSULTATION

Various stakeholders were consulted in the preparation of this traffic report including:

- Queensland DTMR;
- City of Gold Coast;
- Tweed Shire Council;
- Translink;
- RMS;
- TfNSW;
- Southern Cross University;
- Transit Australia Group;
- NSW Premier and Cabinet;
- NSW Trade and Investment; and
- NSW Department of Industry.

Stakeholders were consulted through a variety of means including emails, meetings, telephone discussions, presentations/workshops. Traffic models were presented to Queensland DTMR, City of Gold Coast, Translink, RMS, Tweed Shire Council and Southern Cross University representatives.

The key traffic concerns raised from Queensland DTMR revolved around the risk of opening the north facing ramps at Boyd Street interchange. Whilst the proposal to include ramp meters for the northbound entry ramp appeared to be well received, the issue remained on how the southbound returning traffic would be managed to protect the M1.

RMS and Tweed Shire Council took a specific interest in the likely impacts to the Kennedy Drive interchange and the intersection operations along Kennedy Drive. The traffic modelling presented and the associated intersection operations appeared to satisfy their concerns however it was understood that further detail surrounding the Kennedy Drive interchange operations may be required.

Tweed Shire Council was also interested to understand the funding implications of the revised Boyd Street interchange configuration and in particular the northbound entry ramp. The proposal to reduce Cobaki Parkway to a single lane carriageway in each direction with stand-up lanes at intersections along that corridor appeared to be well received.

City of Gold Coast and Tweed Shire Council raised concerns around the transport mode share targets adopted in completing the traffic completing assessment. The travel mode share targets are based on what can be achieved at successful university precincts such as University of Wollongong and existing town centres in the surrounding areas. The proposal to include 30% on-site student accommodation provides a significant 'head-start' in achieving the required targets.

Tweed Shire Council raised additional concerns surrounding the town centre road network and initial road cross-sections. Further meetings with Tweed Shire Council were conducted and these items have been updated and included in the latest town centre road network plan / road cross-sections as included in Appendix F. Tweed Shire Council also raised concerns about how the proposed relocated public school would operate in close proximity to the town centre. The revised town centre layout has given due consideration to bus access and parent parking requirements, integrating the school operations with open space areas and associated overflow parking opportunities.

Translink and the Transit Advisory Group raised concerns regarding current cross-border bus operational limitations. These issues will need to be addressed at a higher level to enable the logical extension of existing bus services from Queensland in NSW.

5. SUMMARY AND KEY CONCLUSIONS

5.1 OVERVIEW

Bitzios Consulting was requested by Leda Manorstead Pty Ltd to prepare a traffic study to assess the potential additional impacts associated with the additional proposed university and town centre related uses. Strategic traffic modelling has identified that the additional university and employment lands creates a substantial level of trip internalisation from the Concept Plan approved Cobaki residential land uses. The level of trip internalisation is sufficient to offset any increase in traffic from external areas that directly relate to the additional university / town centre uses.

An additional assessment was also undertaken for the proposal to include additional Child Care and Tavern Uses on the site located at the southern intersection of Sandy Lane and Cobaki Parkway.

5.2 STRATEGIC ALIGNMENT (SEAR 1)

The proposal to incorporate university uses, university accommodation and an increase in employment opportunities within the town centre is aligned with many of the existing NSW (and Qld) strategic planning directions.

The proposals identified in the Modified Plan, in comparison to the current Concept Plan Approval, offer substantial opportunities to design an active and vibrant transit focussed town centre which internalises much of the trips demands that would have otherwise been looking to travel to external centres such as Robina, Pacific Pines, Coolangatta and Tweed Heads.

The integration of university uses within the town centre provides a critical mass necessary to justify increases to the amenity for public transport, walking and cycling use that in-turn will assist with achieving stated travel mode share targets.

5.3 INTERNAL NETWORK TRAFFIC IMPACT ASSESSMENT (SEAR 5A)

The town centre masterplan has been designed to separate and protect vulnerable roads users from high speed, high volume and heavy vehicle traffic. Corridors have been identified for Supermarket and heavy vehicle site servicing access, whilst separate corridors have been identified for pedestrian, cycling and local destination based parking.

Town centre parking stations and bus nodes have been designed to reduce the attractiveness of car access, but to also promote walking along the 'main street'.

The internal street network has been designed based on a Paramics microsimulation model established for the project area. The street network will have sufficient capacity to cater for the forecast traffic volumes. Key access intersections along Sandy Lane have been designed with consideration given to queue-back effects to Cobaki Parkway. To manage this risk, the access intersections have been designed as T-intersection to minimise the probability of this occurring.

Street cross-sections have been provided for the range of uses consistent with Urban Growth cross-sections adopted for contemporary town centre plans across the Sydney Metropolitan area. In addition, parking demand calculations have been based on a combination of RTA standard parking rates as well as the use of consistent standard parking rates across office/retail/business uses which is consistent with many local government practices across the Sydney Metropolitan area to allow flexibility for future interchangeability of uses based on market demand at the time.

The total quantum of parking supply will be in the order of 4,300 car spaces of which approximately 3,000 car spaces will be publicly available. More importantly the town centre has been planned to provide in excess of 1,800 bicycle racks of which over 500 spaces will be publicly available.

Off-street parking stations are likely to require some form of 'pay parking' when constructed. The introduction of 'Pay Parking' however would need to comply with the processes outlined in RMS guidelines prior to implementation. The introduction of 'Pay Parking' will further assist with encouraging students to

live in close proximity and/or rely on the use of public transport / cycling which will improve the transport mode share, and ultimately reduce the impact on the surrounding road network.

5.4 EXTERNAL NETWORK TRAFFIC IMPACT ASSESSMENT (SEAR 5B)

The key purpose of this report (assessment) was to analyse whether the introduction of additional university and town centre land uses will increase traffic impacts to the surrounding road network.

The EMME modelling conducted verified that the introduction of the SCU/Additional Town Centre uses will not increase traffic impacts to the M1 / Tugun Bypass.

AM and PM 2hr peak microsimulation models were created to refine the required surrounding intersection requirements. They were also used to be able to extract more refine peak hour traffic volume forecasts across the project area. The results of assessing the forecast traffic demands using the Concept Plan approved road network, and considering the current planning position associated with the CBTS, the modelled traffic network was continually refined. This resulted in the following network changes from that assumed to be included under the Concept Plan Approval (it should be noted that many of the below changes are not as a direct result of the proposed development, but rather a change in state/local agency position as a result of the CBTS or other planning initiatives, such as the upgrade to Kennedy Drive interchange):

- Upgrade to the Kennedy Drive interchange to discourage unreasonable route diversions via Cobaki Parkway;
- New north facing ramps at the Boyd Street interchange, with the on-ramp containing ramp metering managed by Queensland DTMR and the Boyd Street / Ramp intersections signalised;
- A single traffic lane in each direction along Cobaki Parkway, except at intersection approaches;
- A single traffic lane in each direction along Boyd Street, except at key intersection approaches;
- A reduced intersection arrangement at the Boyd Street / Gold Coast Highway intersection, incorporating bus priority;
- Refinement of the intersection at the Piggabeen Road / Kennedy Drive intersection;
- Refinement of the Cobaki Parkway/ Piggabeen Road intersection to a single lane roundabout (in lieu of a channelized right turn intersection);
- Replacement of the roundabout at the Sandy Lane / Cobaki Parkway intersection with a signalised intersection; and
- Introduction of an additional left in-left out along Cobaki Parkway into the Town Centre.

The introduction of the north facing ramps at the Boyd Street interchange results in a heavily reduced level of traffic along Boyd Street, to a level that it can remain as one lane in each direction. In addition, the extent of the upgrades needed at the Gold Coast Highway intersection can be reduced and re-focussed on delivering bus priority-based solutions and to support active transport. It should be noted that the addition of north facing ramps also offers substantial access benefits to the John Flynn Hospital.

The introduction of north facing ramps at Boyd Street is consistent with the findings of the CBTS. The CBTS however also recommended the need to upgrade the M1 to six lanes between Boyd Street interchange and Stewart Road interchange should the north facing ramps be installed.

Under the Modified Plan, comparing traffic volumes on the M1 north of Boyd Street under the 'with' and 'without' north-facing ramps on the M1, there is a clear increase in trips expected to use that section as a direct result of the ramps being installed. Conversely, there is a clear reduction in daily trips on the M1 section to the south of the Boyd Street interchange. The daily traffic volumes rise from 93,000vpd to 104,000vpd between Boyd Street and Stewart Road interchanges whilst the volume reduces from 93,000vpd to 80,000vpd south of Boyd Street (which provides clear capacity benefits to the RMS-owned asset). It should be noted however that the traffic distribution and route choice outputs from EMME are based link delays only assessment and do not consider the effects of localised intersection or merge-based congestion or any subsequent 'pinchpoint removal' initiatives.

From the EMME modelling, it is clear that the dis-benefit that is placed on the Qld DTMR owned asset north of the Boyd Street interchange is somewhat offset by the benefit to the RMS owned asset to the south of the Boyd Street interchange. Cross border negotiations between the two State agencies should occur to discuss appropriate funding mechanisms for this 'cross-border' section of road in the longer term.

In the short term, to operationally manage the peak period operating conditions of the M1, ramp metering for the northbound entry ramp would be highly beneficial. Consideration should also be given to ramp metering influential ramps to the north (in the southbound direction) such as Bermuda Street interchange and Tallebudgera Drive interchange. There is currently a high volume of traffic exiting the M1 at Stewart Road interchange. Whilst some of that traffic will divert to the Boyd Street interchange, the majority will be retained along the Gold Coast Highway corridor, subsequently the upgrade to the Stewart Road to Boyd Street section of the M1 is unlikely to be required until six laning occurs between Robina and Stewart Road interchange.

In summary, the solution to implement ramp metered north facing ramps at Boyd Street is a much improved network planning outcome than adopting the current Concept Plan. *The funding logistics of managing the inequality of cross-border network benefits is something that needs to be resolved between NSW and Qld State agencies. Notwithstanding this, in the interim there is a solution available that encourages peak hour spreading and management of the integrity and performance of the M1 operations across the day.*

5.5 PUBLIC TRANSPORT IMPACTS (SEAR 5C)

The bus servicing strategy within the Cobaki town centre is proposed to be established considering cross-border implications. Proposed servicing frequencies have been designed to target the forecast staff / student numbers estimated to exist within the town centre.

Translink have advised that there are contractual and legislative issues that are required to be resolved for service extensions from the existing '768' service to occur into NSW. Notwithstanding this constraint, in the interim it is recommended to operate an 'on demand' chartered bus service be provided until public bus services can cater for the demands.

To facilitate ease of access to the Boyd Street / Golden Four Drive bus stop, bus priority is proposed to be incorporated into the proposed future Gold Coast Highway / Boyd Street intersection. Continuing to run bus services down Golden Four Drive enhances the opportunity to also pickup students that choose to live in the medium-high density apartments that exist along the beachfront within that corridor.

Bus services in NSW appear to be able to be fairly simply extended from the existing '601' service up to Cobaki.

Consideration should be given to working with other key attractors in the area to jointly fund the running of a 'free shuttle' service.

5.6 SUSTAINABLE TRANSPORT

The proposed mode share targets specifically for the SCU and Cobaki land release areas have been designed to guide the shape of the town centre to promote car-free travel where possible.

A number of sustainable transport supportive measures have been recommended in this report to complement the town centre masterplan that has been developed.

5.7 CLUB / CHILD CARE ADDITIONAL USES

The proposed additional uses nominated at the southern corner of Cobaki Parkway and Sandy Lane introduces a slight increase in traffic on the southern part of the road network. The Paramics microsimulation modelling used to assess the development's impacts shows that the Cobaki transport network has suitable spare capacity to cater for the additional trips generated. In addition, the proposed child care uses will result in a large proportion of 'diverted' trips whilst the tavern uses will contain traffic demands outside of typical AM and PM peak periods.

The area provided for the proposed facility is considered to be sufficient enough to cater for the required parking and site servicing requirements. The non-coinciding peak demands of the child care centre and the tavern uses will result in the ability to cross-utilise the availability of parking.

5.8 CROSS BORDER ISSUES / RECOMMENDATIONS

5.8.1 Traffic

It is recommended that Queensland, NSW and Federal agency representatives develop an agreement to part fund the required upgrade of the M1 between Stewart Road and Boyd Street when its requirement is triggered. The 2031 EMME modelling forecast are based on a number of assumptions occurring before that timeframe such as full residential growth in the surrounding areas, and M1 upgrades from Varsity Lakes to Tugun. Based on the range of assumptions that need to be met for the widening to become required, it is forecast that the widening may be more likely to be required between 2036 and 2041.

Whilst the asset for the six laning upgrade of the M1 resides in Queensland (ie Boyd Street to Stewart Road), the three-way joint funding agreement should acknowledge the benefits to:

- NSW of housing and jobs in the short and long term;
- asset management cost reduction and the delay to upgrading the southern section of the M1 to Kennedy Drive, and
- the long distance freight sector (as outlined as a targeted improvement in the Sydney to Brisbane Corridor Study – Federal Government).

In effect, this agreement will act as enabler to release residential and employment lands in northern NSW as this agreement may present the Queensland Government with suitable confidence to allow the north facing ramps to be introduced at Boyd Street in lieu of increasing traffic capacity along Boyd Street and the Gold Coast Highway corridors (which are ear-marked for future active transport improvements).

5.8.2 Public Transport

It is also recommended that TfNSW and Translink agree on a contractual arrangement that enables the service provider (which is the same operator in both Northern NSW and South East Queensland) to operate a bus service for the Cobaki land release area that will promote the use of sustainable modes of transport through the removal of the cross-border barrier.

APPENDIX A

TOWN CENTRE MASTERPLAN