MIDCOAST council

Planning Proposal to amend Greater Taree Local Environmental Plan 2010 to:

Increase economic development and employment opportunities in Taree by facilitating business and industrial development within the Glenthorne Employment Area as an addition to the Manning River Drive Employment Precinct, on land near the Pacific Highway interchange at Glenthorne.

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Version	Purpose of Document	Author	Date
1	For Gateway Determination	LP	5 December 2018
2	For Gateway Determination – as amended and reported to Council	RD	4 March 2019
3	Minor amendments in response to DP&E comments	RD	1 July 2019

1. Introduction

This planning proposal (herein referred to as the Glenthorne Employment Area planning proposal) has been prepared by MidCoast Council in accordance with Section 3.33 of the *Environmental Planning and Assessment Act 1979* and the relevant Department of Planning and Environment (Department) Guidelines, including *A Guide to Preparing Local Environmental Plans* (2016) and *A Guide to Preparing Planning Proposals* (2016). It outlines the intended effect of, and justification for, the proposed amendments to *Greater Taree Local Environmental Plan 2010* (GT LEP 2010)

The proclamation of 12 May 2016 ratified the merger of the Local Government Areas of Gloucester Shire, Greater Taree and Great Lakes Councils into MidCoast Council. A four way merger was later created by the addition of MidCoast Water. Greater Taree LEP 2010 still stands as a separate environmental planning instrument. This planning proposal seeks to amend GT LEP 2010 to increase economic development and employment opportunities in the Taree environs by facilitating development on certain land in Glenthorne with strong economic prospects and distinct locational advantages.

In developing the planning proposal, a number of pre-lodgement meetings were held between Council and the proponents. A meeting was also held between Council, the proponents and the NSW Roads and Maritime Services (RMS). The issues discussed at those meetings are summarised below:

- Strategic merit will need to be addressed, particularly in relation to the relevant Regional Economic Development Strategy (REDS).
- The desired use is for employment lands. IN1 and B6 are likely to be appropriate for achieving the desired outcomes.
- Whilst only part of the land is identified in Council's draft Manning Valley Local Strategy (MVLS), it is appropriate to consider the entire portion of Lot 2 DP 827097.
- Access would be a key issue and a link from Manning River Drive southbound may be considered. Access off Manning River Drive eastbound may be suitable, subject to assessment and possible provision of a deceleration lane.
- A stage 1 traffic study will be required and will need to model the affected roundabouts and intersections and investigate the split between local and highway traffic. The RMS need to know what impact the proposal would be likely to have on the highway and in particular the Taree South interchange. No modelling is likely to be required for the Taree South interchange. Council and the RMS will provide available data.
- The development would be considered under the Industrial ET category rating and negotiations may be required for water and sewer easements through adjoining properties.
- Water mains would need to be upgraded to service the lots.
- Stormwater quality and quantity treatments should be integrated. A concept strategy would be required after Gateway Determination to demonstrate that Council's targets can be achieved.
- No flood study is required to be lodged prior to Gateway Determination.
- The Stage 1 PP should include the following specialist studies:
  -Preliminary Ecological Assessment.
  -Traffic Impact Assessment.
  -Economic Assessment.
  -Aboriginal Archaeology.

- A Development Control Plan (DCP) for the land will be required to be prepared after the Gateway Determination and it is likely that the development would be included on the Urban Release Area map in GT LEP 2010.

2. Description of the Land and Surrounds

This planning proposal relates to four parcels of land (the land) in Glenthorne, south of Taree. The subject land includes:

- Lot 50 DP 863972 (51 Glenthorne Road) being 6.42ha and owned by Michael and Heather Barrett;

- Lot 2 DP 573214 (55 Glenthorne Road) being 4.05ha and owned by Edward Gersbach;

- Lot 2 DP 827097 (50 Eriksson Lane) being 12.94ha and owned by Michael and Heather Barrett; and

- Lot 20 DP 836884, known as Eriksson Lane and owned by MidCoast Council.

The subject land is located approximately 1.7km south of Taree and adjoins the existing Manning River Drive Employment Precinct. It is intended that the subject land will be the last addition to the precinct in the foreseeable future (to the east) as it provides the last area of land suitable for employment zones in this area.

The land has site-specific locational advantages, being in close proximity to the Pacific Highway, with existing road infrastructure in place to allow efficient vehicle movements in and out of the land without significant alterations to the current road network. In addition, there are high volumes of local traffic passing the land each day, providing a unique opportunity to capitalise on local trade and consolidate Taree South as an employment precinct.

The location of the subject land is shown in Figure 1.

The subject land is currently zoned RU1 Primary Production, with all lots currently used for extensive agriculture. The subject land contains two minor streams in the south and a third order stream in the north, with scattered native and exotic vegetation. It has a gently undulating topography primarily draining to the north-east. A dwelling is located on each lot.

To the west the subject land adjoins the B6 Enterprise Corridor, B5 Business Development and IN1 General Industrial zones within the Manning River Drive Employment Precinct. To the north and east the subject land adjoins RU1 Primary Production land used for extensive agriculture and rural lifestyle properties. To the south the subject land adjoins the RU5 Village zone of Purfleet on the opposite side of Manning River Drive. The Manning River Drive / Pacific Highway interchange is located approximately 350m east of the subject land. At its closest point the Manning River is located approximately 1.1km to the north.

Existing formal public access to the subject land is available from both Eriksson Lane and Glenthorne Road, with Eriksson Lane being only 660m in length and providing access to 50 and 55 Eriksson Lane, 235 Glenthorne Road and 79 Glenthorne Road. Glenthorne Road provides access to a number of rural properties and is approximately 2.8km long, providing access to properties down to the edge of the Manning River.

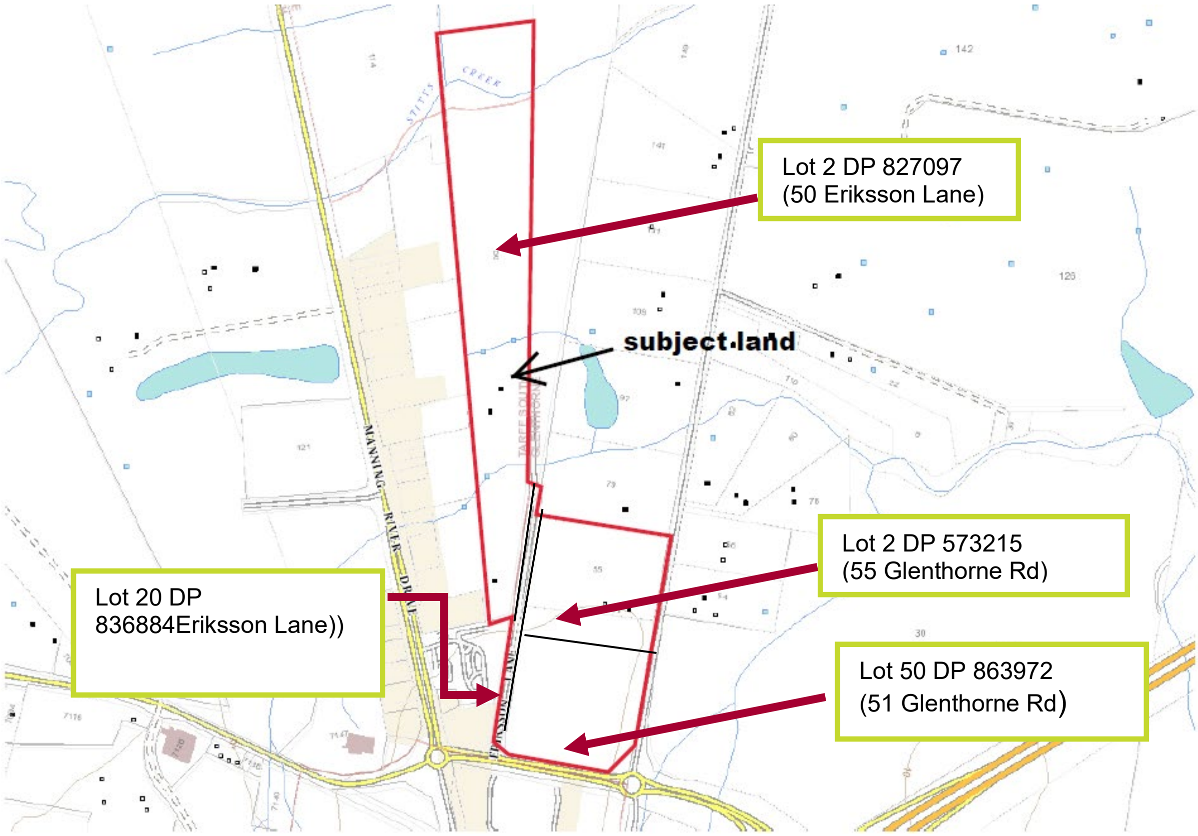

Figure 1: Location of Subject Land

3. Potential Development Outcomes

The delivery of the planning proposal will enable a coordinated extension to the Manning River Drive Employment Precinct. Future land subdivision and development upon newly created lots will be carried out in accordance with a site-specific development control plan (DCP). The DCP will provide principles for lot and road layout, principles for providing quality built form, ensure conservation of sensitive areas, ensure adherence to Water Sensitive Urban Design (WSUD) principles and indicative staging in accordance with the requirements of clause 6.3 in GT LEP 2010.

4. Planning Proposal

Part 1 - Objectives or intended outcomes

(s.3.33(2)(a) A statement of the objectives or intended outcomes of the proposed instrument)

The objectives of the planning proposal are to change the statutory controls over Lot 50 DP 863972, Lot 2 DP 573214, Lot 20 DP 836884 and Lot 2 DP 827097 (the 'subject land') to facilitate industrial and business development and environmental conservation outcomes as follows:

- Lot 50 DP 863972 – B6 Enterprise Corridor;
- Lot 2 DP 573214 – IN1 General Industrial and E2 Environmental Conservation;
- Lot 2 DP 827097 - IN1 General Industrial and E2 Environmental Conservation.[1]
- Lot 20 DP 836884 (Eriksson Lane) - B6 Enterprise Corridor and IN1 General Industrial.

The intention is to amend GT LEP 2010 in accordance with the above so that a range of employment, industrial and service-related uses are permissible on the subject land. The intent is to facilitate an easterly orderly extension to the Manning River Drive Employment Precinct by taking advantage of the subject land's distinctive locational strengths to activate the creation of new employment opportunities.

Part 2 - Explanation of provisions

(s.3.33(2)(b) An explanation of the provisions that are to be included in the proposed instrument)

The objectives and intentions would be achieved by an amendment to GT LEP 2010. The amendment would bring the planning controls on the subject land into alignment with the rest of the Manning River Drive Employment Precinct. This would be achieved by amending the GT LEP 2010 maps as follows:

- The Land Zoning (LZN) Map – Sheet LZN_015A as it affects the subject land would be amended by changing the zone of the subject land from RU1 Primary Production to IN1 General Industrial, B6 Enterprise Corridor and E2 Environmental Conservation. Note that the RU1 zone currently applies to all of the subject land.
- The Floor Space Ratio (FSR) Map – Sheet FSR_015A as it affects the subject land would be amended by changing the maximum floor space ratio on Lot 50 DP 863972 to 1. Note that no FSR standard currently applies to the subject land.
- The Height of Buildings (HOB) Map – Sheet HOB_015A as it affects the subject land would be amended by changing the maximum building height on Lot 50 DP 863972 to 8.5m. Note that no HOB standard currently applies to the subject land.
- The Lot Size (LSZ) Map – Sheet LSZ_015A as it affects the subject land would be amended by removing the minimum lot size applying to Lot 50 DP 863972, Lot 2 DP

[1] *E2 zones are subject to further investigation post Gateway*

573214 and Lot 2 DP 827097 within the IN1 and B6 zones and applying a 40ha minimum lot size to the E2 zone. Note that a 40ha minimum lot size standard currently applies to the subject land.

- The Urban Release Area Map – Sheet URA_015A as it affects the subject land would be amended by including Lot 50 DP 863972, Lot 2 DP 573214 and Lot 2 DP 827097 as an urban release area. Note that no part of the subject land is currently within an urban release area and areas proposed to be zoned E2 will not be contained in the Urban Release Area Map.

A site-specific DCP will be prepared and exhibited after the Gateway Determination in accordance with Part 6 of GT LEP 2010 to guide the orderly development of the land and address site constraints, design and staging. The site-specific DCP will be enabled through an amendment to Part L of *Greater Taree Development Control Plan 2010*.

Part 3 - Justification

(s.3.33(2)(c) Justification for the objectives or intended outcomes and the process for their implementation)

Section A – Need for the Planning Proposal

3.A.1 Is the planning proposal a result of any strategic study or report?

Draft Manning Valley Local Strategy (June 2016):

The planning proposal is consistent with the draft Manning Valley Local Strategy (MVLS), prepared by MidCoast Council and dated 27 May 2016. Although the MVLS was not adopted by Council, the former Greater Taree City Council resolved to exhibit the Strategy and on 13 July 2016 the Strategy was reported to MidCoast Council for adoption. The matter was deferred as a result of the Council amalgamation. The MVLS however still provides a blue-print for growth across the Manning Valley and seeks to align Council's planning strategies to facilitate the coordinated delivery of key infrastructure, tourism, open space and community facilities.

The land was partly identified in the draft MVLS as shown in the extract below.

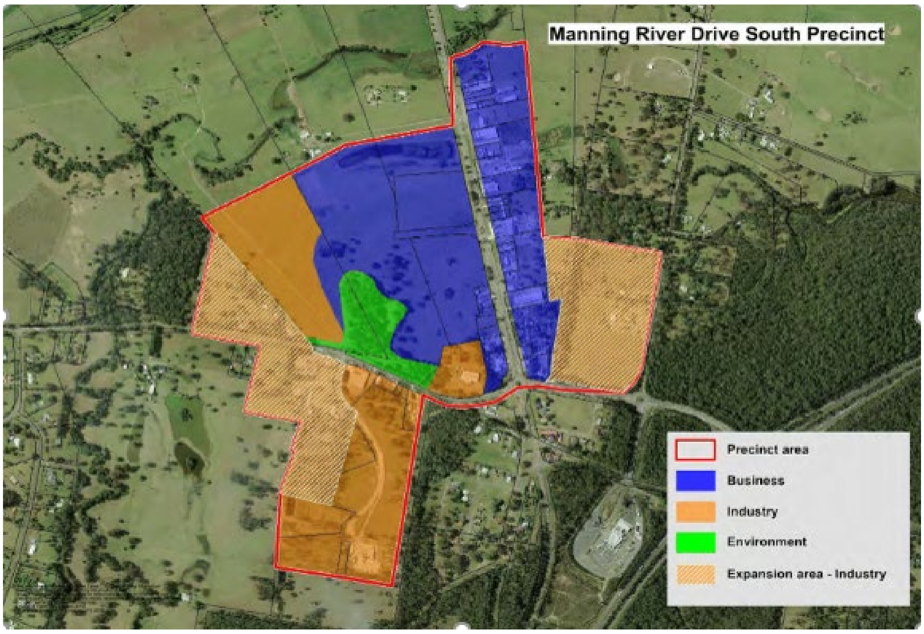

Figure 2: Extract from Draft Manning Valley Local Strategy showing the subject land identified as an expansion area for industry.

A key goal of the MVLS is to 'grow the local economy', by offering accessible and affordable options for new businesses. One of the high-level priorities in the MVLS is the provision of a commercial and industrial hub within the Manning River Drive precinct, which is recognised in the MVLS as a key economic precinct. It has been recognised as providing good access to the Pacific Highway with high volumes of passing traffic.

Goal 1 of the MVLS is to:

- Grow our local economy.

Direction 1.1 of the draft Strategy is to:

- Establish strong economic precincts.

"To plan for economic growth, we need to ensure employment lands are located and serviced appropriately to meet future business needs and trends. These include:

- *reliance on road freight for manufacturing. Today a key locational factor for manufacturing is good access to the Pacific Highway*".

The subject land has good access to the Pacific Highway and brings natural locational strengths to activate the creation of new employment opportunities, particularly in the provision of:

- truck and passenger vehicle related retail;
- transport related accommodation/hospitality (bringing flow-on effects to tourism);
- transport related servicing and manufacturing; and
- technical services, logistics and manufacturing enterprises.

MidCoast Regional Economic Development Strategy 2018 - 2022:

The planning proposal is consistent with the Regional Economic Development Study (REDS) for the MidCoast region, prepared by the NSW Department of Premier and Cabinet (2018). The REDS for the MidCoast region provides a vision for future economic development through strategies, initiatives and actions that will be implemented to the year 2022. There are three core strategies that are being targeted for the MidCoast:

1. The first core strategy looks to strengthen the region as a 'location of choice'. In doing so improvements to core infrastructure, such as roads and businesses, will help drive growth and increase tourism into the area.

2. The second looks to create a supportive business environment through reducing/removing regulatory barriers that should allow for the growth of new and existing businesses.

3. The third will target marketing the MidCoast region to business owners, local residents and future retirees that will encourage growth in the labour force and hence economic development within the area.

The region's proximity to Sydney and Newcastle via the Pacific Highway, coupled with affordable land, makes it ideal for general industrial and freight/logistic businesses and industries. This potential will be accelerated following the completion of the Northern Gateway project which will make Taree a hub for freight and logistics that will significantly reduce freight costs in and out of the region. The proposal will ensure that Taree capitalises on all opportunities associated with the Pacific Highway, at both the southern and northern entries, to provide land for freight and logistics business and industry.

Looking forward the strategy plans to consolidate the region's key industries. This will include boosting productivity in agriculture through greater use of technology and innovation (which will be supported through the addition of the NBN), growing the local aquaculture industry, leveraging advantages for freight and logistics and building on its strength as an attractive location for people to reside and visit. The proposal has the potential to be a key contributor to achieving the strategy's objectives through the provision of land that is of a suitable zone and size and has locational advantages due to its proximity to a major transport corridor.

3.A.2 Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The planning proposal provides the only way of achieving the intended outcome. The current zoning (RU1) permits rural uses on the land. The only means of achieving industrial and employment uses would be a planning proposal to rezone the subject land to IN1 General Industrial and B6 Enterprise Corridor. Sensitive areas on the land would be best protected from future development by applying an E2 Environmental Conservation zone.

Section B – Relationship to Strategic Planning Framework

3.B.1 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy?

Assessment Criteria:

a) Does the proposal have strategic merit? Is it:

- **Consistent with the relevant regional plan outside of the Greater Sydney region, the relevant district plan within the Greater Sydney region, or corridor / precinct plans applying to the site, including any draft regional, district or corridor / precinct plans released for public comment; or**

- **Consistent with a relevant local council strategy that has been endorsed by the Department; or**

- **Responding to a change in circumstances, such as the investment in new infrastructure or changing demographic trends that have not been recognised by existing planning controls.**

Hunter Regional Plan 2036

The planning proposal is consistent with the objectives and actions contained within the Hunter Regional Plan 2036. A summary of the planning proposal's consistency with the Plan is provided in Appendix A of this planning proposal.

b) Does the proposal have site-specific merit, having regard to the following:

- **The natural environment (including known significant environmental values, resources or hazards); and**

- **The existing uses, approved uses and likely future uses of land in the vicinity of the proposal; and**

- **The services and infrastructure that are or will be available to meet the demands arising from the proposal and any proposed financial arrangements for infrastructure provision**.

At January 2017 there was 750ha of employment zoned land within the MidCoast LGA, with 172ha (approximately 23%) known to be undeveloped. When compared to the rest of the Hunter region, the supply of undeveloped land is comparably low, with 51 per cent or 4,179 hectares undeveloped across the Hunter region. Almost 80 per cent of the undeveloped zoned employment land was located in the Greater Newcastle Metropolitan area.[2]

Whilst the data indicates that there is still a moderate supply of undeveloped employment zoned land in the LGA, the proposal has significant and distinctive site specific merit in comparison to other lands zoned for employment and has the potential to be a significant

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[2] *Data sourced from https://www.planning.nsw.gov.au/Research-and-Demography/Employment-Lands-Development-Monitor/Employment-Land-Precincts*

contributor to the growth of the local economy as it is strategically located as a basis of greater service provision for locals and visitors to the area and is therefore able to 'tap into' the economic opportunity that the land's accessibility and exposure presents. In addition, the local road network and infrastructure require little modification or upgrade to enable development of the land, unlike other industrial land which requires significant cost input for the provision of road, water or sewer infrastructure.

The proposal will ensure mutual co-location benefits that support the wider region over a staged development provision. The proposal also seeks to incorporate provision for new economic and cultural development opportunities in partnership with the Purfleet-Taree Local Aboriginal Land Council given its close proximity to the village.

The Glenthorne Employment Area rezoning will consolidate the significance of the Manning River Drive Employment Precinct as an important southern entry to Taree. The proposal complements the Northern Gateway precinct, ensuring that Taree captures every opportunity to trade from highway traffic and local resident movements in order to maximise the available local economic benefits.

The proposal's distinctive locational strengths will contribute to growing the local economy by offering accessible and affordable options for new businesses and has the potential to trigger much needed local investment and job creation. This objective is key to current Council and State Government initiatives to strengthen the regional economy and to build local resilience in the face of challenging demographic and economic trends.

In 2016, the value of industrial approvals in MidCoast was $2,660,000[3], which provides a relatively significant contribution to the local economy. There are strong site specific economic grounds to support the proposed rezoning of land at Glenthorne which will contribute to redressing Taree's current demographic trends, with a view to achieving a healthier balance between household formation and labour workforce.

In December 2017 Council provided a letter to the proponents indicating that the planning proposal has strategic merit. That letter is included at Appendix H.

The land is capable of being fully serviced. A water and sewer servicing strategy will be completed after Gateway Determination to demonstrate serviceability of the development and outline required works.

3.B.2 Is the planning proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

MidCoast 2030: Shared Vision, Shared Responsibility

The planning proposal is consistent with Council's Community Strategic Plan *MidCoast 2030: Shared Vision, Shared Responsibility.* The following targets and actions are of relevance to the planning proposal:

[3] *Data sourced from https://www.planning.nsw.gov.au/Research-and-Demography/Employment-Lands-Development-Monitor/Employment-Land-Precincts*

Target	Action	Consistency
Our region is a popular place to visit, live, work and invest	Provide an environment to grow and strengthen local businesses and attract new business.	The proposal seeks to provide an extension to the Manning River Drive employment precinct. Its locational advantages and co-location with existing industrial and business uses will contribute to providing an environment to grow and strengthen local businesses and attract new businesses, particularly in the transport and logistics sector.
Our villages and business precincts are vibrant commercial, cultural and social hubs	Ensure strategies and processes recognise, maintain and support sustainable economic growth.	The proposal will contribute to sustainable economic growth by creating an opportunity for new industries to establish in a location with unique economic advantages.

3.B.3 Is the planning proposal consistent with applicable state environmental planning policies?

The planning proposal is consistent with applicable state environmental planning policies (SEPPs). A summary of the planning proposal's consistency with applicable SEPPs is provided in Appendix B of this planning proposal.

3.B.4 Is the planning proposal consistent with applicable Ministerial Directions (s.9.1 directions)?

The planning proposal is consistent with applicable S.9.1 Ministerial Directions. A summary of the planning proposal's consistency with relevant s.9.1 Ministerial Directions is provided in Appendix C of this planning proposal.

Section C – Environmental, Social and Economic Impact

3.C.1 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

The subject land contains a number of vegetation communities, all of which have been highly modified by past activities. It is unlikely that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal.

A preliminary ecological constraints assessment was undertaken to inform the planning proposal, and is contained in full at Appendix D. The findings of that assesment are summarised as follows:

(a) Environment Protection Biodiversity Conservation Act 1999:

a. There are no relevant Threatened Ecological Communities (TECs) on the land.

b. The land is not important to any migratory species.

c. Future development is unlikely to require referral to the Department of the Environment and Energy, unless a local population of Green and Golden Bell Frog (Litoria aurea) is recorded (very low to unlikely probability), a listed plant is detected (very low to unlikely probability), or possibly if loss of all known Koala habitat occurs.

(b) Biodiversity Conservation Act 2016:

a. Lot 2 DP 827097 contains portions of the generally larger local occurrence of two Endangered Ecological Communities (EECs): Freshwater Wetlands and Swamp Sclerophyll Forest on Coastal Floodplains (both possibly derived due to historical clearing), and adjoin the EEC – Subtropical Floodplain Forest on Coastal Floodplains east of Lot 2. The local occurrence of the Freshwater Wetlands EEC in the central drainage line on Lot 2 is limited to the land and study area.

b. Hollow-bearing trees are only present along the road reserve along Eriksson Lane, but most have few or poorly developed hollows. Hollows present are only suitable for small to medium fauna. Further survey is required to determine if any threatened hollow-obligate species (eg. Squirrel Glider, Brushtailed Phascogale) are present, if development is proposed within Eriksson Lane (currently not anticipated).

c. Future development is likely to trigger entry into the Biodiversity Offset Scheme (BOS) for development on any lot where native vegetation is cleared above the nominated threshold for the current or future minimum lot size. The western half of Lot 2 DP 573214 is contains mostly native vegetation and hence is most likely to enter the BOS if clearingis proposed. Lot 50 DP 863972 and Lot 2 DP 827097 have limited native vegetation and development of these lots may possibly only need assessment under the Five Part Tests (subject to further investigation of groundcover composition on Lot 50 and evaluation of the criteria of the Paddock Tree module in the BAM). Regardless, a Stage 1 Biodiversity Development Assessment Report (BDAR) using the BAM has been identified to be undertaken post Gateway. This will assist in determining whether removal of vegetation can be considered and if so, the impact on the proposed zoning.

(c) SEPP 44 – Koala Habitat Protection:

a. The land contains potential Koala habitat, mostly as very young regrowth on Lot 2 DP 573214 and in the road reserve of Eriksson Lane.

b. Evidence of Koalas was found in the form of a small number of confirmed scats under trees along the Eriksson Lane road reserve. Further survey as part of the BDAR is required to determine if the land qualifies with confidence as core Koala habitat.

Additional work to be undertaken after Gateway determination: A more detailed biodversity assessment will be undertaken following Gateway determination and shall include, but not be limited to the following:

- A Biodiversity assessment in the form of a Stage 1 Biodiversity Development Assessment Report (BDAR) under the provisions of the Biodiversity Assessment Method (BAM) of the *Biodiversity Conservation Act 2016*. The nature of clearing and development should be cognisant of likely outcomes of development facilitated by the proposed zones of the land (including whether it is appropriate to consider offsetting any vegetation removal to permit further industrial employment opportunities as part of any draft master-planning prepared for the rezoning). Field surveys shall be undertaken and described in accordance with the requirements of the BAM, and include targeted flora and fauna species surveys (particularly the Koala).

- Application of the BAM by an accredited person will identify the biodiversity values present on the site. This information can be used to inform decisions to avoid and minimise impacts and will provide evidence of these efforts. It will also help to identify the biodiversity values that require offsets for future development facilitated by the rezoning.

- The assessment shall include a review and summary of available information pertaining to threatened biodiversity and special ecological values for the locality of the planning proposal area (defined as a 5-kilometre radius of the planning precinct). The assessment shall describe (in detail), the landforms, landscape features, vegetation community types, floristic diversity and wildlife habitats/ features of the planning precinct and relevantly proximal surrounds.

- The assessment shall consider and report on the following on the site and in relevant proximity:
    - Biodiversity Values Map
    - Known and potential Threatened Species
    - Endangered Ecological Communities
    - High Conservation Value Vegetation
    - Wildlife Corridors (local, sub-regional, regional)
    - Wildlife Habitats
    - SEPP44 - Potential and Koala Habitat
    - Coastal SEPP
    - Environmental protection zones
    - Existing conservation areas
    - Areas protected by orders / notices
    - Watercourses and / or riparian zones

- The proposed rezoning (with consideration of the development and land uses that the rezoning would facilitate) shall be described in relation to ecological and biodiversity impacts within and proximal to the planning precinct.

- The assessment shall also investigate, describe, assess and consider the relevant provisions (or at least the aims and objectives) of:
    - s7.3 of the *Biodiversity Conservation Act 2016*, and
    - Other *Biodiversity Conservation Act 2016* provisions (biodiversity values map, biodiversity offset scheme thresholds, SAII), and
    - s4.15 of the *Environmental Planning and Assessment Act 1979*, and
    - *State Environmental Planning Policy (Coastal Management) 2018* – coastal wetlands or land in proximity to coastal wetlands, and
    - *State Environmental Planning Policy (Coastal Management) 2018* – littoral rainforests or land in proximity to littoral rainforests, and
    - *State Environmental Planning Policy (Coastal Management) 2018* – land in the coastal environment, and
    - *State Environmental Planning Policy No. 44 Koala Habitat Protection*, and
    - Special ecological provisions in Local Environmental Plans, and
    - Special ecological provisions in Development Control Plans, and
    - *Fisheries Management Act 1995* (marine vegetation, threatened species), and
    - *National Parks and Wildlife Act 1974*, and
    - *Marine Parks Act 1997*, and
    - *Environment Protection and Biodiversity Conservation Act 1999*, and
    - Any other matter relevantly identified by Council's Ecologist or government agencies.

- Where offset requirements are identified; then a plan for the sourcing and delivery of these offsets shall be provided. There may be local offsets that are required to be provided in addition to the offsets identified under the BC Act. Offsetting may involve active revegetation, conservation, enhancement or restoration on local public or suitable private lands or payment of an amount to enable Council to deliver such actions. If ultimately proposed, either outcome needs to be either be included in a Planning Agreement or a Development Control Plan applying to the land

- Environmental zones shall be identified on the planning proposal area, as required. These zones should consider the constraints and opportunities of the site but also consider the wider context of the land. Details as to how environmentally zoned land will be managed in perpetuity are very important.

- A Planning Agreement or Development Control Plan shall be developed to identify commitments to biodiversity conservation and ecological management outcomes identified in the planning proposal.

- A Strategic Assessment of biodiversity under Commonwealth legislation may be required under the *Environment Protection and Biodiversity Conservation Act 1999* for the Koala.

3.C.2 Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

Development of the subject land may have a potential impact on coastal management matters as well as the following:

- Bushfire
- Flooding and drainage
- Servicing
- Acoustics
- Air quality
- Traffic and access
- Acid sulfate soils
- Water quality and stormwater management
- Contamination
- Landscape and amenity
- Soils
- Archaeology and cultural heritage

Potential impacts and proposed management of those impacts are examined further below and where relevant will be included in the proposed Development Control Plan applying to this site.

3.C.2.1 Coastal management issues

State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) applies to part of the site, being the northern part of Lot 2 DP 827097. The northern part of Lot 2 DP 827097 is within the Coastal Use Area, refer to Figure 3, and this area has been identified for rezoning to E2 Environmental Conservation. The Coastal Use Area and further land within the lot but to the south is also within the Coastal Environment Area, refer to Figure 4. The proposed draft DCP will consider whether any controls related to the SEPP will need to be included in future development assessment.

Figure 3: Extract from the SEPP (Coastal Management) 2018 maps showing the subject land and Coastal Use Area

Legend

Coastal Wetlands

Proximity Area for Coastal Wetlands

Coastal Use Area Map

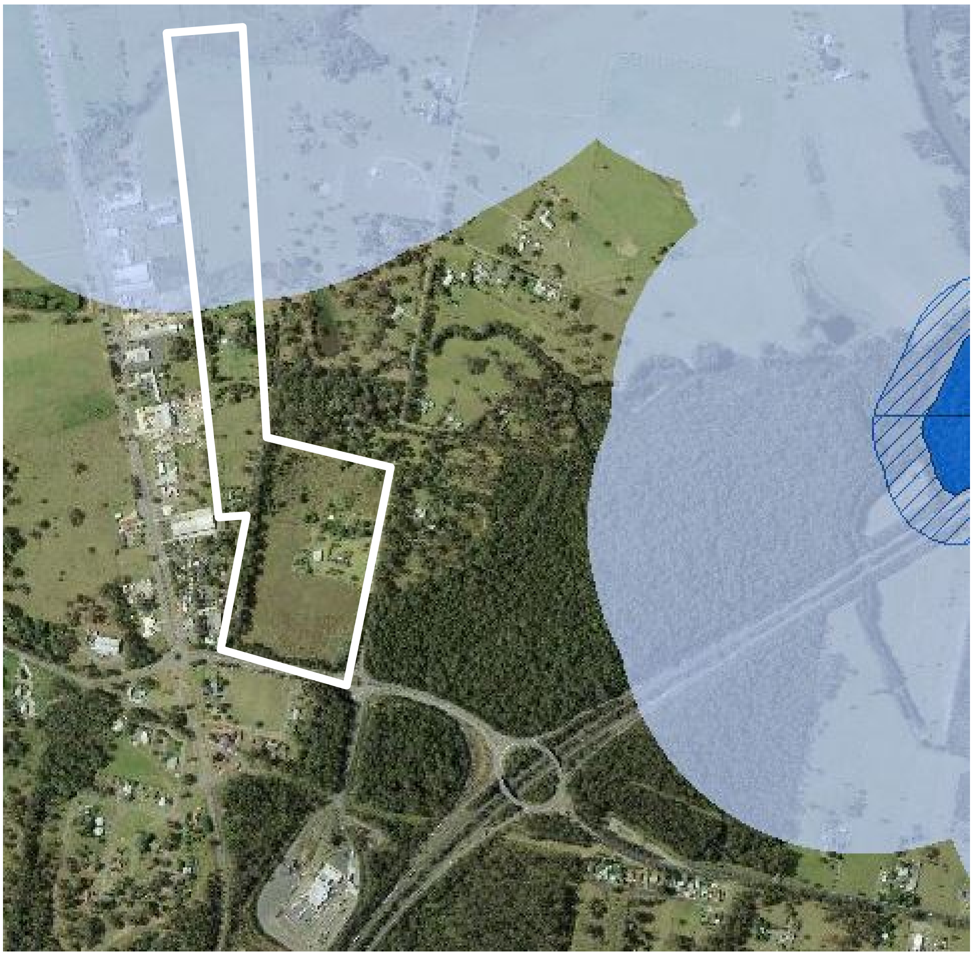


Figure 4: Extract from the SEPP (Coastal Management) 2018 maps showing the subject land and Coastal Environment Area

Legend

Coastal Wetlands

Proximity Area for Coastal Wetlands

Coastal Environment Area Map

3.C.2.2 Bushfire

Part of the subject land is mapped as bushfire prone, refer to Figure 5, however the planning proposal does not include residential land, does not enable inappropriate development in bush fire prone areas and does not introduce controls that will prohibit bushfire hazard reduction within APZs. Compliance with the aims and objectives of *Planning for Bushfire Protection (PBP) 2006* can be achieved by development on the subject land and will be addressed in detail at the development application stage. Consultation with the Commissioner of the NSW Rural Fire Service will occur under section 56 of the EP&A Act and may result in a requirement for a detailed bushfire hazard assessment to be prepared.

The proposed referral of the planning proposal post Gateway to the NSW Rural Fire Service will confirm whether any specific considerations for bushfire need to be included in the proposed Development Control Plan.

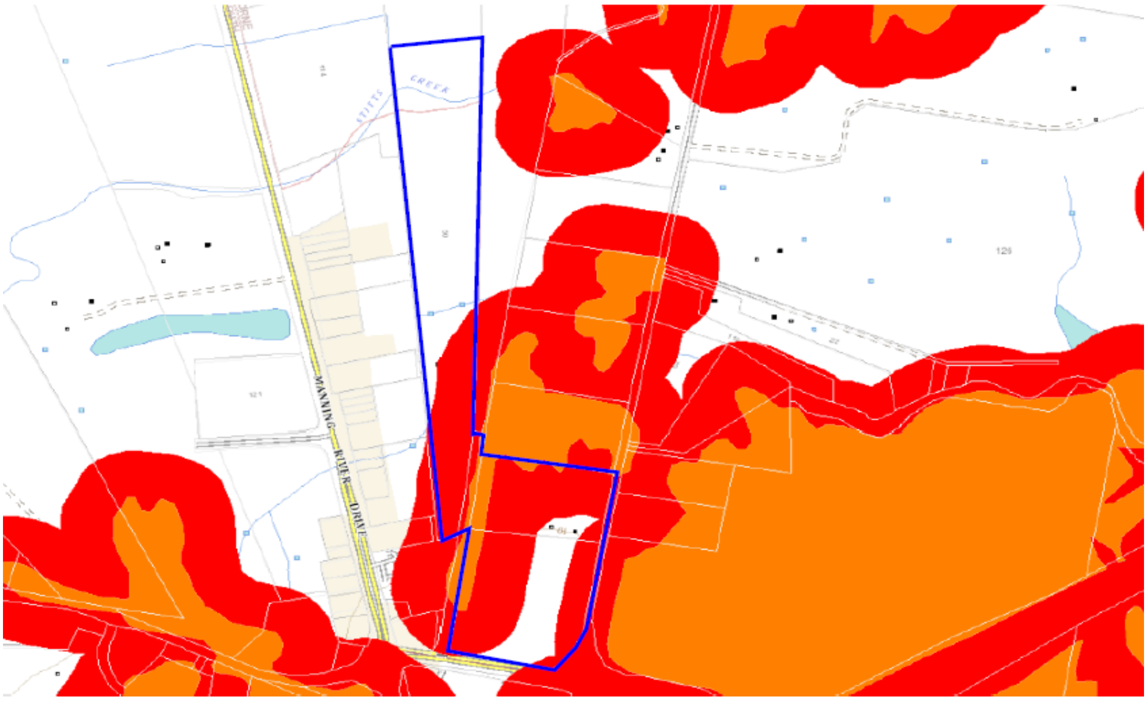


Figure 5: Extract from MidCoast Council Bushfire Prone Land Mapping, October 2018

3.C.2.3 Acid Sulfate Soils (ASS)

The southern half of the subject land contains Class 5 ASS, and the majority of the northern half contains Class 4 ASS. Small portions of Class 3 and Classes 2a and 2b occur in the far north of the land, within the area that will be zoned for environmental conservation (E2). Clause 7.1 of GTLEP 2010 contains the standard ASS risk management provisions to appropriately control future development of the land. As development would only occur on Class 4 and Class 5 ASS, this will be addressed in detail at the development application stage and no further consideration of ASS is required for the planning proposal.

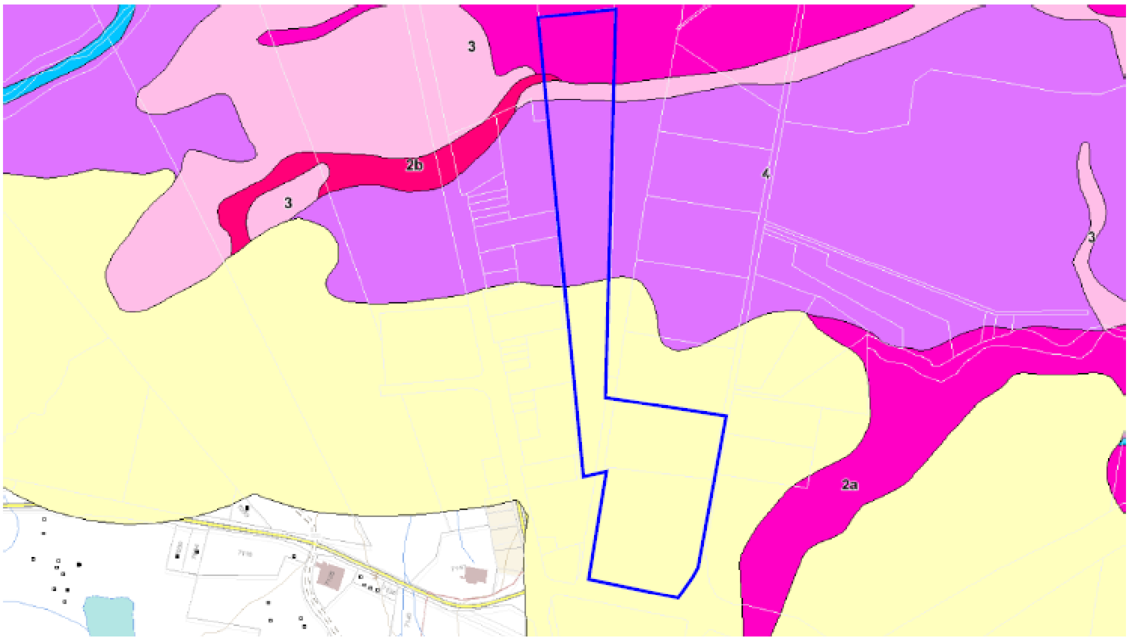


Figure 6: Extract from MidCoast Council Acid Sulfate Soils Mapping, October 2018

3.C.2.34 Flooding and Drainage

A portion of the central and northern parts of the subject land are located within Council's mapped FPL3 flood prone land area. The Manning River Flood Study (adopted by Council in November 2016) applies to the land and the Manning River Floodplain Risk Management Plan, currently under preparation by Council, will apply to the land when it is completed.

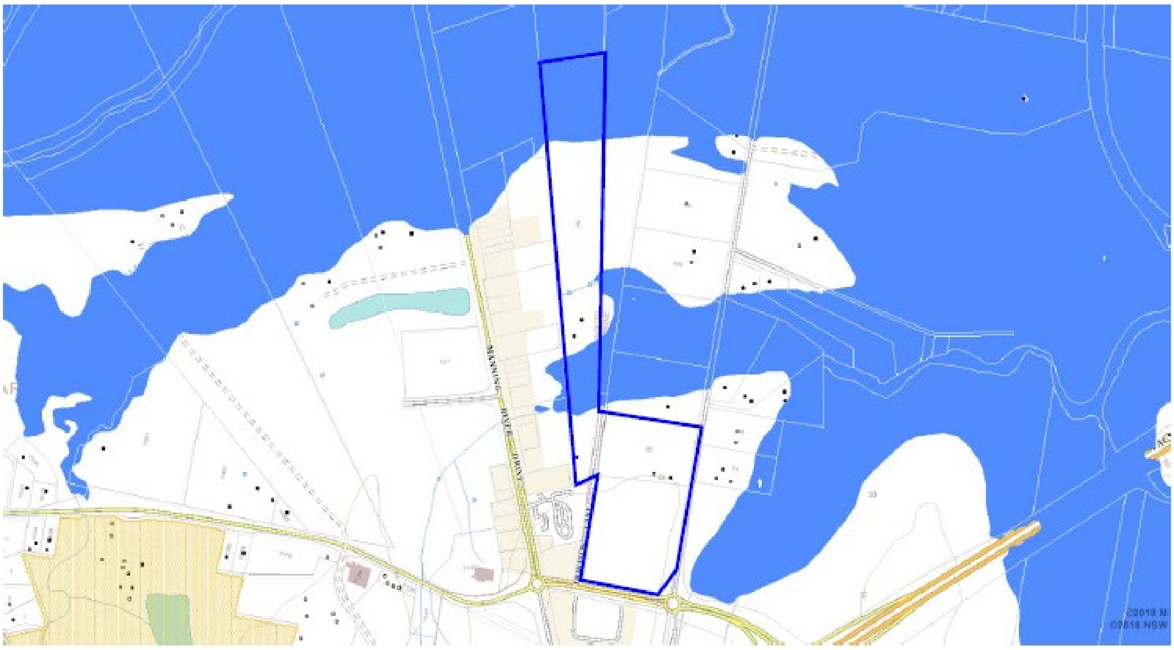


Figure 7: Extract from MidCoast Council Flood Prone Land Mapping, October 2018

Clause 7.2 of GT LEP 2010 contains the standard flood planning and flood risk management provisions to appropriately control future development of the land. Part E of DCP 2010 contains the flood assessment requirements in accordance with the *NSW Floodplain Development Manual 2005*.

Notably, the land is not proposed to be zoned for residential purposes, and the areas noted as flood prone will potentially be located within the E2 Environmental Conservation zone, particularly where Stitts Creek traverses the property, therefore risk to life and property from the proposal is minimal.

Flood free access to the northern part of Lot 2 DP 827097 will be possible via future industrial subdivision of this lot. The DCP for the site will contain a requirement that future subdivision in this vicinity will need to cater for an access handle to the northern part of Lot 2 DP 827097.

Additional work to be undertaken after Gateway Determination: A preliminary local flooding and drainage assessment of the land will be undertaken for the planning proposal following Gateway determination. This will comprise assessment of the two watercourses in the southern half of the land only. The watercourse (Stitts Creek) and flood prone area in the northern portion of the land will be contained entirely within an E2 zone and will not be developed or have any potential impact on the industrial land or its potential land uses.

The preliminary flooding assessment of the two watercourses in the southern half of the land will comprise hydrology and hydraulics calculations based on the following:

- Utilising 10m interval contours to identify the overall catchments for each of the two watercourses.
- Identifying the length and the overall slope of the overland flow paths for the catchments for both watercourses.
- Utilising the Rational Method to calculate the 1:100 year Average Recurrence Interval (ARI) peak flow rate for each watercourse.
- Utilising the Manning Formulae for each watercourse to estimate the water level for the 1:100 year ARI.

3.C.2.45 Stormwater Management

Stormwater represents a significant proportion of the natural water cycle, and all development has the potential to impact on the behaviour of stormwater through the addition of impervious surfaces, diversions and drainage. Stormwater runoff also has the potential to impact on water quality as rain events result in stormwater that flows over impervious surfaces carrying untreated pollutants into waterways.

The subject land generally drains in a northerly direction towards Stitts Creek and the Manning River further north, though the undulating topography of the land means that this is slightly variable across the entire area and some variation to the levels may be required to achieve effective stormwater drainage. On-site stormwater detention would be included in the developed land on individual lots to ensure that post-development flow rates from the land are not greater than pre-development flow rates, including runoff from the internal roads. The design storm standard used for on-site detention will be 1 in 100 as per Council's *On-site Stormwater Detention Guidelines* (former Greater Taree City Council).

Studies to be undertaken after Gateway Determination: To address stormwater management issues, after Gateway Determination, a Concept Stormwater Management Strategy (CSWMS) will be developed. As the subdivision details are not known at planning proposal stage, the CSWMS will be limited to the 'concepts' of stormwater management that will be applied to the land to demonstrate how the proposal can meet the water quality objectives of Council's *Stormwater Management Policy* (26 July 2017). It is intended that the CSWMS will address:

- relevant details of sub-catchments, soils, topography, ecology and groundwater;
- identification of water quality objectives and the pre-condition of the land for MUSIC modelling to be undertaken at subdivision stage;
- identification of options for treatment of stormwater including integrated treatment solutions, indicative treatment areas required to achieve the identified targets and ongoing maintenance requirements;
- the impact of the staging of the development on the provision of stormwater treatment measures; and
- treatment options for runoff from internal roads.

3.C.2.6 Services

The land is capable of being fully serviced.

The design and construction of all water and sewer infrastructure required to service the development would be undertaken by the developer in accordance with standards published by the Water Services Association of Australia, and MidCoast Council. The developer would be responsible for the costs of design and construction of water and sewerage infrastructure required to service the development, as well as the development charges applicable at the time of development.

The proponents met with Council's Water Services Division in February 2018 to discuss water and sewer servicing capability based on a preliminary consideration of the land and planning proposal. The following preliminary advice was provided:

- **Water Servicing:** The subject land adjoins an existing Council water service area. There is currently sufficient capacity in the Council water treatment plant to service the proposed development.

- **Sewer Servicing:** The subject land adjoins an existing Council sewer service area. There is sufficient capacity in the Council sewer treatment plant to serve the proposed development. Pump station TS-SPS-01 is the closest pump station. There is currently sufficient capacity within pump station TS-SPS-01 to cater for the proposed development.

Additional work to be undertaken after Gateway Determination: A water and sewer servicing strategy will be completed after Gateway Determination to demonstrate serviceability of the development and outline required works.

3.C.2. 7 Contamination

The land is not mapped as potentially contaminated. The land has historically been used for agriculture (grazing) and no contaminating activities are known to have occurred on land.

Additional work to be undertaken after Gateway determination: A preliminary contamination assessment will be prepared to confirm that the land is not contaminated and the land is suitable for the zones and uses suggested.

3.C.2.8Acoustics

The subject land is surrounded by rural land to the east and north and a business zone to the west. A small caravan park is operating adjacent the south west corner of the subject land on the opposite side of Eriksson Lane, which acts as a buffer of moderate width between the subject land and the caravan park. The development control plan to be prepared after Gateway Determination will ensure that an adequate buffer distance is included between any potential future development and the existing caravan park.

The village of Purfleet is located to the south of the subject land on the southern side of Manning River Drive which is four lanes in this location. As the village area is separated by Manning River Drive which is approximately 46m wide in this location, it is unlikely that the development of the subject land would have significant negative noise impacts on the village of Purfleet.

3.C.2.9Landscape and Amenity

Lot 50 is located at the southern entry to Taree and presents an opportunity to provide a key gateway entry site with high amenity including roadside landscaping. Manning River Drive in this location is approximately 46 metres wide and contains a mounded barrier. The barrier, constructed and landscaped as part of the Taree bypass and highway upgrade works, contains scattered native trees (immature – semi mature) and shrubs. This landscaping is currently poorly maintained.

High quality landscaping (together with a high level of urban design) will be required with future development and as a result future development stemming from the planning proposal is unlikely to have a negative impact on landscape / streetscape and amenity along the east-west leg of Manning River Drive. The site-specific DCP prepared for the subject land following Gateway Determination is likely to propose removal of this mound and poor landscaping and replacement with development with a high standard of urban design, complimented with landscaped areas to provide a more visually pleasing entryway to Taree.

3.C.2.10 Air Quality

The development of the land for industrial and business purposes has the potential to have a minor negative impact on air quality as increased vehicular traffic will be accessing the land. As the land is located adjacent to an existing business zone to the west, there are unlikely to be sensitive receivers to the west. The exception to this is the caravan park adjacent to the south western corner of the land. The development control plan that will be prepared after Gateway Determination will incorporate a development setback from this receiver to minimise any potential impacts. Notably, the uses adjacent to the caravan park will be "business" uses, as opposed to the likely industrial uses over the two lots further north, therefore land uses adjacent to the caravan park are unlikely to generate airborne pollutants.

The properties to the east and north of the land are all rural, with dwellings dispersed over the properties at considerable distance from the subject land. Given the distances to sensitive receivers, it is unlikely that air pollution would have a significant impact on those dwellings. Further consideration of setbacks will be contained in the development control plan.

3.C.2.11 Soils

The subject land consists of an A horizon of fine clay loam that overlays a B Horizon of fine clay loam sand (NSW Soil and Land Information System), with alluvial soils likely to be present in association with the waterways. Impacts on soils will be considered at development application stage when proposed development will be subject to erosion and sediment control.

Additional work to be undertaken after Gateway Determination: Following Gateway Determination a geotechnical survey will be undertaken to determine the presence of alluvial soils and to provide the data required to assist in determining an appropriate stormwater management strategy and the distribution of EECs on the land.

3.C.2.12 Traffic and Access

The Traffic Impact Assessment (TIA) included at Appendix G considers the potential impacts of the planning proposal (excluding construction traffic) on the local road network and the Pacific Highway[4]. Suitable mitigation strategies have been recommended to ensure that the road network is not negatively impacted by the proposal.

The assessment was based on the following assumptions for the land, which are conceptual only and were confirmed by Council's traffic engineers to be suitable for the purpose of the assessment:

- **Industrial land (IN1 – General Industrial)**: Approximately 38,800m^2 Gross Floor Area (GFA).
- **Business land (B6 – Enterprise Corridor) excluding the service station**: Approximately 20,600m^2 GFA.
- **Service Station**: Approximately 855m^2 GFA (approximately 24,000m^2 land area).

The development forecasts used in the assessment are considered to be highly conservative with land development (including land use type and yield) realistically being driven by market demand, which is unknown. The traffic forecast includes a 2% per annum growth in existing traffic, added to the rezoning land traffic and the traffic estimated for the Manning River Drive Business Park DCP area (within the wider Manning River Drive Employment Precinct). The forecasts represent the 2020, 2025, 2030 and 2040 future horizon years.

The intersections considered for the purpose of the assessment were:

- The Bucketts Way / Manning River Drive
- Manning River Drive / Glenthorne Road / Caltex Service Centre Access Road
- Pacific Highway / Manning River Drive / Old Bar Road
- Biripi Way / Manning River Drive

Traffic surveys were undertaken during the AM and PM peak periods on Thursday 26th July 2018 at each of the four study intersections. In addition to the peak surveys, a 24-hour automatic traffic count was undertaken to determine the potential drop-in traffic volumes associated with the proposal.

Intersection analysis was undertaken using SIDRA Intersection 7.0, which concluded the following:

Glenthorne Road/Manning River Drive/Caltex Service Station:

This intersection would operate acceptably beyond 2040 with background growth and background development only. With the addition of the traffic generated by the planning proposal, the results indicate that the intersection will operate above the desired threshold for a roundabout in 2030 and beyond, based upon the development assumptions. It is important

[4] *The TIA does not include detailed review of any future development layouts, parking or potential construction traffic impacts of the proposed development, as this will form part of future applications for development of the land.*

to recognise that the analysis at this intersection makes no allowance for the potential for the existing Caltex Service Centre (on the southern leg of the intersection) to be accessed via the approved direct connection from the Pacific Highway. This connection would result in a significant reduction in traffic volumes at this intersection, potentially reducing the intersection upgrading required at this location.

To offset the impacts of future development the intersection would require upgrading to signals, with three through lanes in each direction on Manning River Drive. Figure 4 of the TIA details the recommended intersection form.

Old Bar Road/Manning River Drive/Pacific Highway Ramps:

This intersection will operate above the desired threshold for a roundabout in 2030 (and beyond) with or without traffic generated by the planning proposal. The impact of the traffic generated by the proposal is to cause intersection capacity to fail approximately three (3) years sooner (by 2026) than failure would occur with background traffic only (by 2029). The existing roundabout form could accommodate the rezoning traffic up until approximately 2026.

As with the previous intersection discussed above, it is important to recognise that the analysis at this intersection makes no allowance for the potential for the existing Caltex Service Centre (on the southern leg of the intersection) to be accessed via the approved direct connection from the Pacific Highway. This connection would result in a significant reduction in traffic volumes at this intersection, potentially reducing the intersection upgrading required at this location.

To offset the impacts of future development the roundabout requires a short additional lane on the eastern approach as well as an additional circulating lane between the eastern and southern legs. Figure 7 of the TIA details the recommended intersection form to achieve an acceptable level of operation up to 2040.

The Bucketts Way/Manning River Drive:

The intersection will operate above the desired threshold for a roundabout in 2030 and beyond with and without traffic generated by the planning proposal. The impact of the traffic generated by the proposal is to cause intersection capacity to fail approximately one year sooner (by 2026) than failure would occur with background traffic only (by 2027).

To offset the impacts of the future development the roundabout requires a continuous left slip lane from the northern approach as well as a short additional lane on the western approach. Figure 9 of the TIA details the recommended intersection form. However, by 2040 its operation will again exceed the desired threshold. The TIA recommends that to improve the operation in 2030 and 2040 the roundabout could be upgraded to signals requiring three right turn lanes from east to north and two left slip lanes (signalised) on the northern approach. It is suggested that whilst this is the ultimate outcome, it is unrealistic as the 2040 horizon is so distant and traffic volumes are based on conservative assumptions. Figure 10 of the TIA details the recommended intersection form to achieve the ultimate level of operation up to 2040 and beyond.

Biripi Way/Manning River Drive:

This intersection will operate above the desired threshold for a roundabout in 2040 (and beyond) with or without traffic generated by the planning proposal. The impact of the traffic generated by the proposal is to cause intersection capacity to fail approximately one year sooner (by 2032) than failure would occur with background traffic only (by 2033).

To offset the impacts of the future development the roundabout requires an additional short lane for left turning traffic from both the northern and southern approaches (including a third circulating lane from north to east and south to west). Figure 12 of the TIA details the recommended intersection form to achieve an acceptable level of operation up to 2040.

Additional work to be undertaken after Gateway Determination:

The traffic study will be expanded to include internal road and access arrangements, including consideration of a link from Manning River Drive southbound to Glenthorne Road via the subject land and the implementation of a service road for businesses fronting Manning River Drive (south-bound) to be accessed from the Biripi Way roundabout.

3.C.2.13 Archaeology and Cultural Heritage

The subject land does not contain any listed or potential items of European heritage significance and is not located within close proximity to a heritage conservation area.

An Aboriginal Heritage Impact Assessment (AHIA) was undertaken for the planning proposal and is included at Appendix E. Twenty six known Aboriginal sites have been recorded within five kilometres of the subject land. No sites of archaeological significance were identified on the subject land during the survey for the planning proposal. One potential archaeological deposit (PAD) was identified at the northern end of the project on the southern side of Stitts Creek. Although the nature of the PAD remains unknown, it will be included with a proposed environmental conservation (E2) zone and will not be located within a development area, therefore no further investigation is necessary for the planning proposal.

Figure 8: PAD location at the northern end of the study area
Source: McCardle Cultural Heritage, August 2018

The AHIA concludes that it is highly unlikely that the subject land would have been favoured for past large-scale Aboriginal occupation but would have been suitable for small-scale camping and hunting and gathering grounds and for travelling to the Manning River.

The AHIA assesses the cumulative impact to Aboriginal heritage in the area to be limited given that:

- the net development footprint (i.e. the area of direct impact) is small and does not affect a high proportion of any particular landform present within the region; and

- a comparable suite of landforms (simple slopes) that are expected to and do contain a similar archaeological resource occur in multiple contexts both within the local area and throughout the region.

Consultation with the Aboriginal community was undertaken for the purpose of documenting the social and cultural significance of the subject land. No aesthetic, historic, scientific or social / spiritual significance was assigned by the Registered Aboriginal Participants (RAPs) to the subject land.

The recommendations in the AHIA are applicable to the development application stage, therefore no further consideration is necessary for the planning proposal.

Additional work to be undertaken after Gateway Determination: The proponents will enter into further discussions with the local Aboriginal community or Purfleet-Taree Local Aboriginal Land Council after Gateway Determination to consider an amount of floor space for employment and cultural services for the local Aboriginal community.

3.C.3 Has the planning proposal adequately addressed any social and economic effects?

The planning proposal has an overall positive socio-economic impact. An Economic Assessment has been lodged with the planning proposal and is contained at Appendix F. In summary the Assessment found that there are strong economic grounds to support the proposed rezoning of land at Glenthorne for the following reasons:

- Glenthorne is strategically located as a basis of service provision for locals and visitors to the area and is therefore able to ‘tap into’ the economic opportunity that the land’s accessibility and exposure to the Pacific Highway presents. The provision of additional services at the Glenthorne southern gateway will complement the nearby existing Caltex highway service centre and other automotive services planned for the north of Taree at Cundletown.

- Employment zones on the subject land capitalise on the land’s distinctive locational strengths (i.e. highway accessibility and co-location with the existing employment precinct) and has the potential to trigger much needed local investment and job creation.

- The proposal offers the opportunity to incorporate economic and cultural development opportunities in partnership with the Purfleet/Taree Local Aboriginal Land Council.

- The total estimated benefit from stage one of development of the land is likely to equate to approximately $1.73 million annually.

- The Glenthorne rezoning will strengthen the significance of the Manning River Drive Employment Precinct as an important southern entry into Taree. The proposal complements the Northern Gateway precinct, ensuring that Taree captures every opportunity to trade from highway traffic and local resident movements in order to maximise the available local economic benefits.

- The proposed rezoning is consistent with the aims of the draft Manning Valley Local Strategy which seeks to 'grow the local economy' by offering accessible and affordable options for new businesses. This objective is key to current Council and state government initiatives to strengthen the regional economy and to build local resilience in the face of challenging demographic and economic trends.

The planning proposal will result in increased traffic, traffic noise and amenity impacts commensurate with any other industrial and commercial development. This may have an impact, though unlikely to be adverse, on existing residents in the surrounding residential areas. Based upon the economic opportunities but tempered by the gradual increase in traffic, associated noise and change in visual amenity over time it is concluded that development from the planning proposal will have an overall positive community impact. A comprehensive social impact assessment is considered unnecessary in this instance.

Four distinct employment precincts (including B5 Business Development, B6 Enterprise Corridor and IN1 General Industrial) exist north of the planning proposal area, all of which are within a 10 km radius of Taree. These include:

- The Taree CBD and surrounds. It contains a variety of employment zones much of which is developed and in some instances transitioning from transport and rural related services to more service related industries.

- The Brimbin urban release area. This area contains 112 hectares of vacant employment and industrial land. This land is a component of the new town of Brimbin. A detailed master planning process for the new town is scheduled to begin in July 2019. Take up of the employment and industrial land is unlikely to begin in the next 5 years and has been identified for employment generating purposes to employ and service new residents of Brimbin.

- The Northern Gateway Transport Hub at Cundletown. This project area is subject of a current planning proposal (with a Gateway Determination) to establish approximately 67 hectares of road transport and related services / industries. The land has been identified for these purposes because of its proximity to Pacific Highway (Stage 1 located on the north-west corner of the Pacific Highway interchange) and its connection to Taree Airport to the west. Take up of this land will be related primarily to road / air and related services in accordance with a specific clause introduced into GT LEP 2010 to achieve this outcome.

- Kolodong Industrial Estate. This estate, established by Council, is approximately two-thirds developed. The remaining third is heavily vegetated and contains koala habitat making future development in this area problematic without considerable biodiversity offsets in place. Nine small lots are yet to be sold by Council or developed for industrial purposes, while the remaining undeveloped land is proposed to be rezoned for conservation purposes in the new Mid Coast LEP.

Section D – State and Commonwealth Interests

3.D.1 Is there adequate public infrastructure for the planning proposal?

Consultation has been undertaken with the following public authorities during the preparation of the planning proposal to determine the adequacy of public infrastructure for the planning proposal:

- MidCoast Council Water Services;
- NSW Roads and Maritime Services;

MidCoast Council's Water Services Division (MCCWS) have advised that the land is capable of being serviced by the existing water and sewer network with appropriate upgrades (refer to Appendix I). To provide the details of how this would be achieved, a Water and Sewer Servicing Strategy will be required to be lodged following Gateway Determination (details are provided in 3.C.2.5).

Development of the area being rezoned would not require any significant up-front public infrastructure upgrades as the road network is capable of servicing the development in its early stages. Road and intersection upgrades are able to be undertaken in stages over the life of the future development of the land when certain development thresholds are met as demonstrated in the TIA at Appendix G.

There is adequate public infrastructure for the planning proposal to proceed.

3.D.2 What are the views of State and Commonwealth public authorities consulted in accordance with the Gateway determination?

The proponents and Council met with the NSW Roads and Maritime Service (RMS) on 2 May 2018. The potential development outcomes were explained in order to provide the RMS with the opportunity to provide feedback and discuss any concerns that should be addressed in the planning proposal. The proponents also requested from the RMS, details of any potential highway upgrades that may have an impact upon the proposal.

The RMS were unable to provide details of any relevant upgrades, stating that there are no works proposed within the RMS' current five year plan that may affect the land or the proposal, and of particular note, there were no current plans to upgrade the Taree South highway interchange.

The RMS advised that modelling would not be required for the highway interchange for the planning proposal, unless modelling and traffic counts for the roundabouts on Manning River Drive indicate that traffic queuing on to the highway may result from the proposal. The RMS' primary concern is whether the development would be likely to cause any queuing back onto the highway. The RMS also stated that they would be concerned if the development included a Highway Service Centre.

As a result of the discussions with the RMS, it was agreed that a TIA for stage 1 of the planning proposal will investigate yield and traffic generated by the potential development of the land for industrial and business purposes, as well as a service station (as this type of development has high traffic volumes and as such provides a more conservative estimate of impact).

In particular, the TIA investigates the split between local traffic and highway traffic and considers whether the planning proposal would have a likely impact on the Pacific Highway and in particular the Old Bar Road / Taree South interchange. This has been considered in detail in the TIA at Appendix G. The modelling results show that the proposal would be unlikely to cause queuing on the Pacific Highway.

Following Gateway determination, it is proposed to undertake consultation with the following agencies:

- NSW Roads and Maritime Services
- NSW Office of Environment and Heritage
- NSW Rural Fire Service
- TransGrid / Essential Energy
- Telstra / NBN Co
- Taree Airport

Part 4 - Mapping

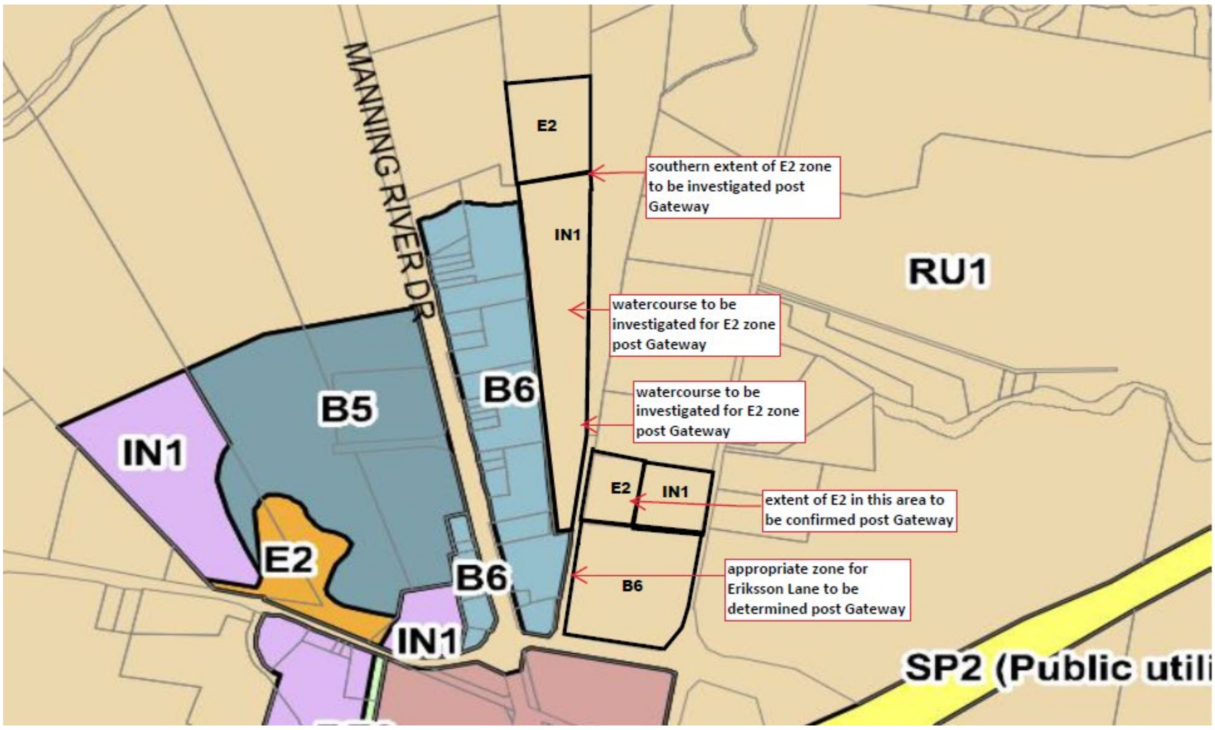
(s.55(2)(d) Maps to be adopted by the proposed instrument)

The proposed amendment to allow for employment lands to be created on the subject land will require amendments to existing map layers/tiles as outlined below.

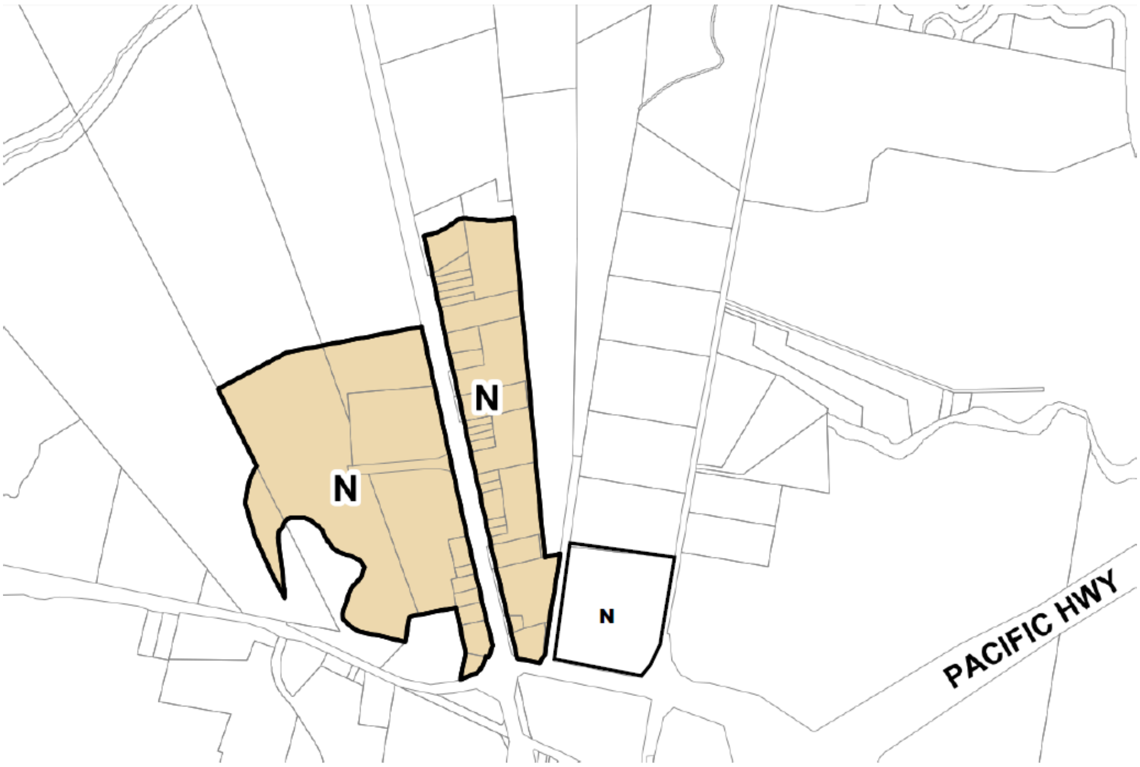
Additional amendments may be identified as the proposal progresses through public exhibition and subsequent stages in the timeline. Should this occur, the planning proposal will be amended and the subsequent amendment to GT LEP 2010 revised to reflect this.

Council will prepare mapping associated with the proposed amendments in accordance with the *Standard Technical Requirements for LEP Maps* for the amended LEP document as follows:

1. The Land Zoning (LZN) Map – Sheet LZN_015A as it affects the subject land would be amended by changing the zone of the subject land from RU1 Primary Production to IN1 General Industrial, B6 Enterprise Corridor and E2 Environmental Conservation. Note that the RU1 zone currently applies to the land. A number of areas across the subject land require further investigation post Gateway to determine the appropriate land use zone.



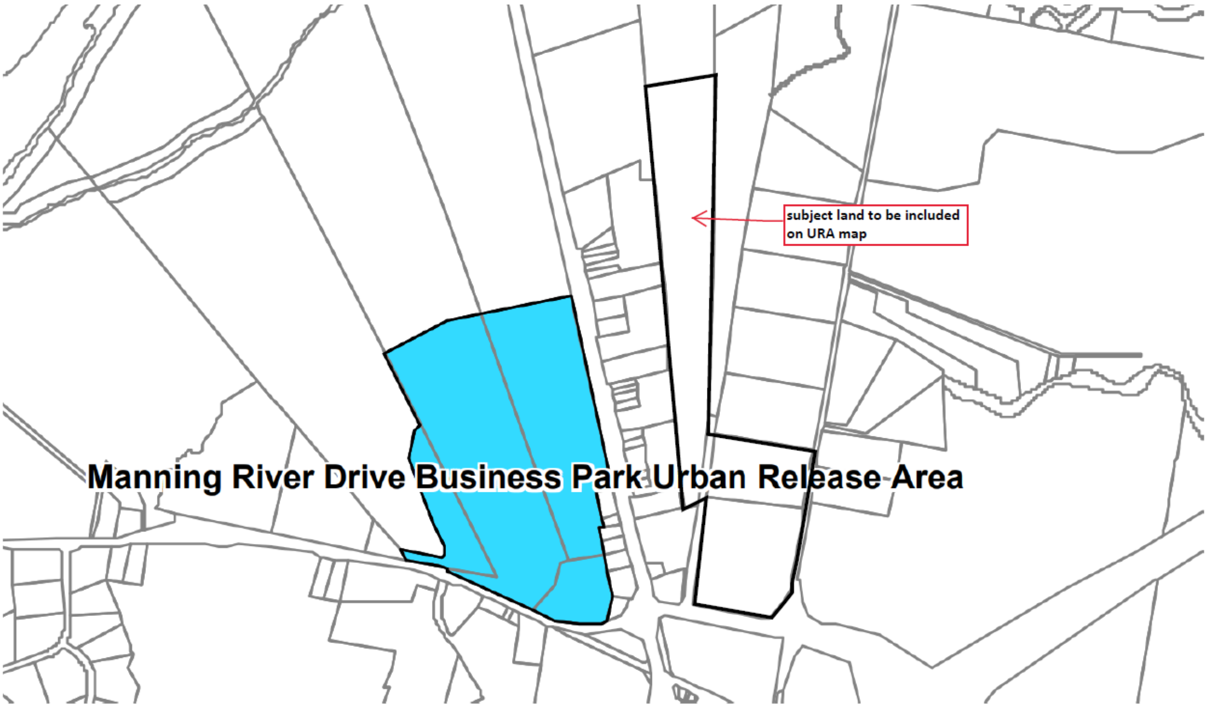
2. The Floor Space Ratio (FSR) Map – Sheet FSR_015A as it affects the subject land would be amended by changing the maximum floor space ratio on Lot 50 DP 863972 to 1 (N). Note that no FSR standard currently applies to the land.



3. The Height of Buildings (HOB) Map – Sheet HOB_015A as it affects the subject land would be amended by changing the maximum building height on Lot 50 DP 863972 to 8.5m. Note that no HOB standard currently exists on the land.

4. The Lot Size (LSZ) Map – Sheet LSZ_015A as it affects the subject land would be amended by removing the minimum lot size applying to Lot 50 DP 863972, Lot 2 DP 573214 and Lot 2 DP 827097 within the IN1 and B6 zones and applying a 40ha minimum lot size to the E2 zone. Note that a 40ha minimum lot size standard currently exists on the land.

5. The Urban Release Area (URA) Map – Sheet URA_015A as it affects the subject land would be amended by including Lot 50 DP 863972, Lot 2 DP 573214 and Lot 2 DP 827097 as an urban release area. Note that no part of the land is currently located within a URA.



Part 5 - Community consultation

In accordance with Section 3.34(2)(c) of the *Environmental Planning and Assessment Act* 1979, this planning proposal will be made publicly available for a minimum of 28 days.

In accordance with Council's adopted consultation protocols the following will also be undertaken:

- Notices in the local newspaper;
- Direct mail notification to potentially affected land owners;
- Exhibition material and all relevant documents will be available at Council's Taree, Forster and Gloucester administrative offices;
- Exhibition material and all relevant documents will be available on Council's website.

Any further consultation required by the Gateway Determination will also be undertaken.

Part 6 - Project timeline

In accordance with the Department of Planning and Environment guidelines, the following timeline is provided, which includes the tasks deemed necessary for the making of this local environmental plan.

Task	Responsibility	Timeframe	Date (approximate)
Council resolution to support the Planning Proposal	Council	-	March 2019
Lodgement of Planning Proposal for Gateway Determination	Council	-	April 2019
Gateway Determination Issued	Minister for Planning		June 2019
Completion of outstanding studies post Gateway	Applicant		June – August 2019
Consultation with Public Authorities in accordance with Gateway Determination	Council	Minimum 21 days	September 2019
Public exhibition of Planning Proposal	Council	Minimum 28 days	October/November 2019
Revision of planning proposal	Council		November 2019
Report to Council	Council	-	December 2019/February 2020
Making of local environmental plan	Minister for Planning	6 – 8 weeks	April 2020

Part 7 - Conclusion

The primary aims of the planning proposal are to amend the existing Land Zoning, Floor Space Ratio, Height of Buildings, Lot Size and Urban Release Area maps as they affect the subject land to capitalise on the land's locational strengths in order to contribute to growing the local economy and triggering much needed local investment and job creation. This will be achieved by amending the zones on the subject land as follows:

Lot 50 DP 863972 – B6 Enterprise Corridor;

Lot 2 DP 573214 – IN1 General Industrial and E2 Environmental Conservation; and

Lot 2 DP 827097 - IN1 General Industrial and E2 Environmental Conservation.

The Proposal is considered to have strategic merit as it:

- Is consistent with the objectives and actions in the *Hunter Regional Plan 2036*;
- Is consistent with the draft Manning Valley Local Strategy;
- Provides a significant contributor to the three core strategies for economic development within the REDS;

- Has distinctive site-specific locational advantages due to its proximity to the Pacific Highway and Manning River Drive, without impacting on highway function; and

- Provides improved amenity at Taree's major entry.

This Planning Proposal identifies relevant environmental, social, economic and site specific considerations and the scope for further investigation of key issues. The additional work that would be undertaken after Gateway determination includes:

1. Preparation of a site specific development control plan (DCP) for the subject land.

2. A Water and Sewer Servicing Strategy

3. A Biodiversity Assessment prepared in consideration of the BC Act.

4. A preliminary local flooding and drainage assessment of the subject land.

5. A Concept Stormwater Management Strategy.

6. A Preliminary contamination assessment.

7. Geotechnical survey.

8. An updated Traffic Impact Assessment.

9. Consultation with the local Aboriginal community regarding possible cultural retail floor space within the built development.

Appendix A – Consistency with Hunter Regional Plan Goals, Directions & Actions

HUNTER REGIONAL PLAN 2036, NSW Government Planning and Environment

Goal 1 – The leading regional economy in Australia	
Direction 1 – Grow Greater Newcastle as Australia's next metropolitan city	
Direction 1 is not relevant to this planning proposal as it relates only to the Greater Newcastle area.	
Direction 2 – Enhance connections to the Asia-Pacific through global gateways	
Direction 2 is not relevant to this planning proposal as it relates only to the Greater Newcastle area.	
Direction 3 – Revitalise Newcastle City Centre	
Direction 3 is not relevant to this planning proposal as it relates only to the Newcastle city centre.	
Direction 4 – Enhance inter-regional linkages to support economic growth	
Action 4.1 Enhance inter-regional transport connections to support economic growth.	**Consistent**. The location of the subject land adjacent to a major Pacific Highway interchange, only 2 hours drive north of Newcastle, supports this action.
Action 4.2 Work with stakeholders to upgrade transport network capacity in line with changing demands.	**Not relevant to this planning proposal.** This action relates to public agency infrastructure provision.
Action 4.3 Strengthen and leverage opportunities from the interconnections with other regions, particularly the Pacific Highway, the Golden Highway and the New England Highway.	**Consistent.** The planning proposal strengthens opportunities for interconnections with the North Coast region as it proposes to create an employment lands area located in close proximity to the Pacific Highway on the northern fringe of the Hunter. It is expected that businesses will be attracted from both within the Hunter and from the North Coast Region, Greater Sydney and beyond.
Action 4.4 Promote freight facilities that leverage the Port of Newcastle and its associated freight transport network.	**Consistent.** Whilst the planning proposal is not located in close proximity to the Port of Newcastle it is expected that it will make a contribution to leveraging the Port of Newcastle via potential freight movements, particularly associated with imports and exports.
Action 4.5 Plan for multimodal freight facilities that support economic development of the region and respond to the location of the proposed Freight Rail Bypass.	**Not relevant to this planning proposal.** The proposal does not relate to a multimodal freight facility and is not located in the vicinity of the proposed freight rail bypass.
Action 4.6 Investigate opportunities for logistics and freight growth and other complementary land uses around airports, leveraging investments at Taree and Newcastle airports.	**Consistent**. Although the subject land is not located within direct proximity to the Taree airport, the growth of logistics and freight industries on the subject land is likely to support the use of Taree Airport (being located approximately 6km north) and strengthen the intention of the Northern Gateway project to make Taree a hub for freight and logistics.
Action 4.7 Enhance the efficiency of existing nationally significant transport corridors and protect their intended use from inappropriate	**Consistent.** The subject land will result in development that is appropriate for this location within close proximity to the Pacific Highway, whilst

surrounding land uses.	not encroaching on to the Highway corridor.
Action 4.8 Enable development that relies on access to the Hunter Expressway interchanges,	**Not relevant to this planning proposal.** The proposal is not located in the vicinity of the Hunter Expressway interchanges.
Action 4.9 Balance competing interests and deliver conservation, transport and land use planning objectives in the national pinch point area by: • identifying preferred habitat corridors and priorities for investment in conservation to sustain habitat connectivity; and • developing an integrated management plan for the area.	**Not relevant to this planning proposal.** The proposal is not located in the national pinch point area.
Action 4.10 Prepare a strategy for land along the Hunter Expressway that considers its region-shaping potential.	**Not relevant to this planning proposal.** The proposal is not located along the Hunter Expressway.
Action 4.11 Update the Hunter Regional Transport Plan to ensure there are improved connections to jobs, study and centres for Hunter residents.	**Not relevant to this planning proposal.** This action is the responsibility of State government agencies.
Direction 5 – Transform the productivity of the Upper Hunter	
Direction 5 is not relevant to this planning proposal as it relates only to the Upper Hunter area.	
Direction 6 – Grow the economy of MidCoast and Port Stephens	
Action 6.1 Enhance tourism infrastructure and connectivity, recognising the importance of: • regional and inter-regional connections via the Pacific Highway and the Newcastle and Taree airports and cruise ship gateways; and • local routes such as the Lakes Way and Nelson Bay Road.	**Consistent.** The proposal includes zones that can provide a service for specialised vehicle repair for tourists travelling on the Pacific Highway.
Action 6.2 Enhance links to regional services in Greater Newcastle.	**Not relevant to this planning proposal.** This action is the responsibility of State government agencies.
Action 6.3 Enable economic diversity and new tourism opportunities that focus on reducing the impacts of the seasonal nature of tourism and its effect on local economies.	**Not relevant to this planning proposal.** The proposal would not have an impact on the tourist sector.
Action 6.4 Promote growth of industries that can leverage accessibility provided by the Pacific Highway.	**Consistent.** The rezoning would promote the growth of industries that can leverage efficient access on to the Pacific Highway without requiring heavy vehicles to travel through towns or residential areas.
Action 6.5 Plan for and provide infrastructure and facilities that support the ageing population.	**Not relevant to this planning proposal.** The proposal does not include zones that would directly enable the provision of infrastructure and facilities

	that would support the ageing population.
Direction 7 - Develop advanced manufacturing, defence and aerospace hubs	
Action 7.1 Facilitate development opportunities on land surrounding Newcastle Airport at Williamtown to cluster emerging high-technology industry, defence and aerospace activities.	**Not relevant to this planning proposal.** The proposal is not located on land surrounding Newcastle Airport.
Action 7.2 Grow and diversify the manufacturing sector through local planning and appropriate planning controls.	**Consistent.** The proposal would provide land to allow growth and diversification of the manufacturing sector by zoning the subject land for uses that include manufacturing.
Action 7.3 Promote manufacturing business export opportunities and become part of global supply chains.	**Consistent.** The proposal would provide land that would allow promotion of manufacturing business export opportunities that are capable of becoming part of global supply chains due to proximity to good transport links, including road and air.
Action 7.4 Facilitate research partnerships between tertiary education providers and businesses.	**Consistent.** The proposal would provide land that could facilitate research partnerships between tertiary education providers and businesses as it provides land suitable for advanced manufacturing, defence and aerospace hubs close to major transport routes.
Action 7.5 Protect strategic defence establishments with appropriate planning controls and compatible adjoining land uses.	**Not relevant to this planning proposal.** The proposal is not located on land within the vicinity of strategic defence establishments.
Direction 8 – Promote innovative small business and growth in the service sectors	
Action 8.1 Implement initiatives to promote small business growth and innovation, particularly in Newcastle City centre and other strategic centres.	**Consistent.** The proposal would allow for implementation of initiatives to support small business growth and innovation.
Action 8.2 Facilitate opportunities for incubator spaces for technology and non-technology early stage businesses and ensure opportunities for new and emerging enterprises are encouraged.	**Consistent.** The proposed zoning would facilitate opportunities for incubator spaces and ensure that suitable land within MidCoast is available for establishment of new and emerging enterprises.
Action 8.3 Improve connectivity to the region's major health and education precincts and strategic centres.	**Not relevant to this planning proposal.** The proposal is not located on land within the vicinity of strategic or major centres for health and education. While the Manning Health Precinct is located in Taree, this proposal will not impact upon it.
Action 8.4 Foster education precincts in Greater Newcastle to encourage a centre of excellence in tertiary and vocational education.	**Not relevant to this planning proposal.** The proposal is not located within Greater Newcastle.
Action 8.5 Establish a health precinct around Metford and other hospitals in the region, including Manning Base Hospital at Taree.	**Not relevant to this planning proposal.** The proposal is not located on land within the vicinity of a health precinct. While the Manning Health Precinct is located in Taree, this proposal will not impact

	upon it
Action 8.6 Determine potential to grow allied health services on land around hospitals and health services at Kurri Kurri, Belmont, Cessnock, Gloucester, Muswellbrook, Singleton, Nelson Bay and Dungog.	**Not relevant to this planning proposal.** The proposal is not located on land near these centres.
Direction 9 – Grow Tourism in the region	
Direction 9 is not relevant to this planning proposal as it does not relate to any zone that facilitates tourist development.	
Direction 10 – Protect and enhance agricultural productivity	
Action 10.1 Protect locations that can accommodate agricultural enterprises from incompatible development, and facilitate the supply chain, including infrastructure, distribution areas, processing facilities and research and development in local plans.	**Consistent.** The proposed zoning would facilitate opportunities for some agricultural enterprises related to supply chains (e.g. distribution centre). The land proposed for rezoning adjoins an existing employment precinct and is not itself suitable for agricultural enterprises. The proximity of the land to the Pacific Highway makes it particularly suitable for employment uses.
Action 10.2 Address sector-specific considerations for agricultural industries through local plans.	**Not relevant to this planning proposal.** The proposal is not related to sector-specific agricultural industries.
Action 10.3 Protect the region's wellbeing and prosperity through increased biosecurity measures.	**Not relevant to this planning proposal.** The proposal does not enable development that relates to biosecurity measures.
Action 10.4 Encourage niche commercial, tourist and recreation activities that complement and promote a stronger agricultural sector and build the sector's capacity to adapt to changing circumstances.	**Consistent.** The proposed zoning would facilitate opportunities for niche commercial activities related to artisan food and drink industries.
Action 10.5 Develop an agribusiness industry strategy in areas experiencing high population growth to retain jobs and agribusiness growth for the Hunter.	**Not relevant to this planning proposal.** The proposal is not located in an area experiencing high population growth.
Action 10.6 Manage Biophysical Strategic Agricultural Land and other important agricultural land as locations for agricultural activities and complementary uses.	**Not relevant to this planning proposal.** The proposal is not located on Biophysical Strategic Agricultural Land.
Direction 11 – Manage the ongoing use of natural resources	
Direction 11 is not relevant to this planning proposal as this direction relates to the mining sector.	
Direction 12 – Diversify and grow the energy sector	
Direction 12 is not relevant to this planning proposal as this direction relates to the energy sector.	
Direction 13 – Plan for greater land use compatibility	
Action 13.1 Identify and protect important agricultural land, including intensive agricultural clusters, in local plans to avoid land	**Consistent.** The proposal is not located on important agricultural land or within an agricultural cluster. The proposal would be unlikely to result in

use conflicts, particularly associated with residential expansion.	land use conflicts.
Action 13.2 Limit urban and rural housing encroachment into identified agricultural and extractive resource areas, industrial areas and transport infrastructure when preparing local strategies.	**Not relevant to this planning proposal.** The proposal does not facilitate residential development.
Action 13.3 Amend planning controls to deliver greater certainty of land use.	**Consistent.** The proposal delivers greater certainty of land use.
Action 13.4 Provide non-statutory guidance on the types of land uses that would be considered most appropriate, suitable or sympathetic to existing land uses in the Upper Hunter and other areas where land use conflicts occur.	**Not relevant to this planning proposal.** The proposal is for an amendment to an environmental planning instrument as an addition to an existing employment precinct and is not in an area where land use conflicts are experienced
Goal 2 – A biodiversity-rich natural environment	
Direction 14 - Protect and connect natural areas	
Action 14.1 Identify terrestrial and aquatic biodiversity values and protect areas of high environmental value to sustain the lifestyle, economic success and environmental health of the region.	**Consistent.** The proposal includes rezoning areas of high environmental value within the subject land for protection in perpetuity.
Action 14.2 Identify and strengthen biodiversity corridors as places for priority biodiversity offsets.	**Not relevant to this planning proposal.** The land is not known to contain any biodiversity corridors.
Action 14.3 Improve the quality of, and access to, information relating to high environmental values.	**Not relevant to this planning proposal.** The land relates to a proposed rezoning for employment purposes.
Action 14.4 Protect biodiversity by maintaining and, where possible, enhancing existing protection of high environmental value areas; implementing appropriate measures to conserve validated high environmental value areas; developing local strategies to avoid and minimise the impacts of development on areas of high environmental value and biodiversity corridors; and identifying offsets or other mitigation measures for unavoidable impacts.	**Consistent.** The proposal includes areas proposed to be rezoned for environmental conservation (E2) in order to protect the aquatic and terrestrial biodiversity values on the land.
Action 14.5 Secure the long term protection of regionally significant biodiversity corridors.	**Not relevant to this planning proposal.** The land is not known to contain any regionally significant biodiversity corridors.
Direction 15 - Sustain water quality and security	
Action 15.1 Protect water catchments to sustain high quality and dependable water supplies across the region.	**Consistent**. Stormwater detention and treatment measures will ensure that water quality is not reduced as a result of the development.
Action 15.2 Effectively manage surface and groundwater use in agricultural areas to support ecosystem function and food	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.

production, and to cater for the increasing demand of urban communities and industry.	
Action 15.3 Plan for the security of the region's town water supply.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 15.4 Implement catchment-based plans for the ongoing sustainable management and health of estuaries.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 15.5 Apply the neutral or beneficial water quality objectives to land use planning in surface and groundwater drinking water catchment areas to minimise the effects of development on waterways, including watercourses, wetlands, groundwater dependent ecosystems, riparian lands, estuaries, lakes, beaches and marine waters.	**Consistent.** The proposal will facilitate stormwater treatment measures that will result in a neutral or beneficial outcome for water quality. The land is not within a drinking water catchment.
Action 15.6 Reduce the risk of introduction or spread of aquatic pests and diseases from new development that may affect fisheries and aquaculture industry practices.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 15.7 Incorporate water-sensitive design into development that is likely to have an adverse impact on coastal water catchments, water quality and flows.	**Consistent.** Water sensitive design will be incorporated into the layout of the development to ensure that adverse impacts on water quality are minimised.
Direction 16 – Increase resilience to hazards and climate change	
Action 16.1 Manage the risks of climate change and improve the region's resilience to flooding, sea level rise, bushfire, mine subsidence, and land contamination.	**Consistent.** Flood prone areas will be located within an E2 zone to protect infrastructure from increased flooding impacts. A flooding and drainage study will be undertaken after Gateway Determination consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005. Post Gateway Determination a preliminary local flooding and drainage assessment will be undertaken. A Concept Stormwater Management Strategy and a geotechnical survey (alluvial soils assessment) will also be undertaken. Part of the land is mapped as bushfire prone however the planning proposal does not involve the introduction of residential zones on the land. Nevertheless, consultation with the Commissioner of the NSW Rural Fire Service will occur under section 56 of the EP&A Act and may result in a requirement for a detailed bushfire hazard assessment to be prepared or site specific controls to be included in the proposed Development Control Plan. A preliminary contamination assessment will be prepared to confirm that the land is not contaminated and the land is suitable for the zones and uses proposed.

Action 16.2 Review and consistently update floodplain risk and coastal zone management plans, particularly where urban growth is being investigated.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 16.3 Incorporate new knowledge on regional climate projections and related cumulative impacts in local plans for new urban development.	**Not relevant to this planning proposal.** While this proposal is for the creation of employment lands and hence is new urban development, there is no new knowledge of regional climate change projections that have not already been considered under this planning proposal.
Action 16.4 Review and update the Newcastle Mines Grouting Fund and investigate its relevance to other areas.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands in the MidCoast LGA.
Goal 3 – Thriving communities	
Direction 17 – Create healthy built environments through good design	
Direction 17 is not relevant to this planning proposal as this direction relates to design for communities.	
Direction 18 – Enhance access to recreational facilities and connect open spaces	
Direction 18 is not relevant to this planning proposal as this direction relates to planning for active and passive recreation.	
Direction 19 – Identify and protect the region's heritage	
Action 19.1 Consult with the local Aboriginal communities to identify and protect heritage values to minimise the impact of urban growth and development, and to recognise their contribution to the character and landscape of the region.	**Consistent.** An Aboriginal Heritage Impact Assessment was undertaken for the purpose of the planning proposal. As part of that assessment the local Aboriginal community was consulted in accordance with the NSW Government's *Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010).* In addition, the Purfleet – Taree LALC have been offered floor space in the final built development to run a cultural/retail centre that would benefit the local Aboriginal community at Purfleet. This will be further explored post Gateway.
Action 19.2 Assist the preparation of appropriate heritage studies to inform the development of strategic plans, including regional Aboriginal cultural heritage studies.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Direction 20 – Revitalise existing communities	
Direction 20 is not relevant to this planning proposal as this direction relates to planning for centres.	
Direction 21 – Create a compact settlement	
Direction 21 is not relevant to this planning proposal as this direction relates to planning for housing.	
Direction 22 – Promote housing diversity	

Direction 22 is not relevant to this planning proposal as this direction relates to planning for housing.	
Goal 4 – Greater housing choice and jobs	
Direction 23 – Grow centres and renewal corridors	
Action 23.1 Concentrate growth in strategic centres, local centres and urban renewal corridors to support economic and population growth and a mix of uses.	**Consistent.** The subject land would provide an extension to the existing Manning River Drive Business Precinct, hence supporting economic growth of Taree and the MidCoast.
Action 23.2 Develop precinct plans for centres to take an integrated approach to transport, open space, urban form and liveable neighbourhoods, and investigate the capacity of centres to accommodate additional housing supply and diversity without compromising employment growth.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 23.3 Consider improvements to the public transport network when planning new renewal corridors and precincts.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 23.4 Investigate locations for new and expanded centres, including within the Newcastle– Lake Macquarie Western Corridor and Maitland Corridor growth areas, and in the established urban areas that are projected to have high demand for housing growth.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands and is not in the nominated or high growth areas.
Action 23.5 Focus commercial and retail development within existing centres and transport hubs and ensure that locations for new centres are integrated with existing or planned residential development; do not undermine existing centres; encompass high quality urban design; and consider transport and access requirements.	**Consistent.** The subject land would provide an extension to the existing Manning River Drive Business Precinct. It will increase the potential for jobs growth and build upon the region's demonstrated economic strengths.
Direction 24 – Protect the economic functions of employment land	
Action 24.1 Locate new employment land so that it does not conflict with surrounding residential uses.	**Consistent.** The subject land is not located adjacent to residential land and will not conflict with surrounding residential uses.
Action 24.2 Protect the economic functions of employment land by not permitting non-industrial uses unless: • opportunities for urban renewal arise through the relocation of industry and in locations well-serviced by public transport; and • contaminated land can be remediated.	**Not relevant to this planning proposal.** The proposal is for the creation of employment lands.
Action 24.3 Provide for mixed use opportunities and themed employment precincts in local plans.	**Consistent.** The planning proposal includes a mix of business and industrial zoned land that will provide for mixed use opportunities.

Direction 25 – Monitor housing and employment supply and demand	
Action 25.1 Establish and implement an Urban Development Program to develop data on existing zoned land supply and its servicing status, monitor dwelling production and take-up rates, and coordinate the staged release and rezoning of land.	**Not directly relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands.
Action 25.2 Establish and implement an Employment Lands Development Program to develop data on existing and future planned stocks of employment land.	**Not directly relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands.
Action 25.3 Sequence new greenfield urban development that makes efficient use of infrastructure networks and capacity.	**Consistent.** The proposal is for a site-specific rezoning that makes efficient use of existing infrastructure networks and capacity.
Action 25.4 Maintain an adequate supply of employment land that is appropriately serviced and to respond to changing industry demands for land use, location and floor space.	**Consistent.** The proposal will provide employment land that is capable of being appropriately serviced and can respond to changing industry demands for highway-related land-uses and lot sizes to allow greater floor space for manufacturing, transport and logistics services.
Direction 26 – Deliver infrastructure to support growth and communities	
Action 26.1 Align land use and infrastructure planning to maximise the use and capacity of existing infrastructure and the efficiency of new infrastructure.	**Consistent.** The subject land is in close proximity to the Pacific Highway to capitalise on accessibility and exposure. The land's distinctive locational strengths have the potential to trigger local investment and job creation. Only minor infrastructure upgrades would be required for delivery of the proposal.
Action 26.2 Enable the delivery of health facilities, education, emergency services, energy production and supply, water and waste water, waste disposal areas, cemeteries and crematoria, in partnership with infrastructure providers.	**Not relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands.
Action 26.3 Protect existing and planned major infrastructure corridors and sites, including inter-regional transport routes like the M1 Pacific Motorway and the railway, port and airports, to support their intended functions.	**Not directly relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands. The land is located outside of the Pacific Motorway corridor.
Action 26.4 Coordinate the delivery of infrastructure to support the timely and efficient release of land for development, including working with councils and service providers on inter-regional infrastructure and service delivery issues between growing areas.	**Not directly relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands, though it does rely upon the delivery of efficient inter-regional infrastructure.
Action 26.5 Ensure growth is serviced by enabling and supporting infrastructure.	**Not directly relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands, though it does rely upon enabling and supporting infrastructure.

Action 26.6 Review and finalise the Hunter Special Infrastructure Contributions Plan.	**Not directly relevant to this planning proposal.** This is a State government action.
Direction 27 – Strengthen the economic self-determination of Aboriginal communities	
Action 27.1 Work with the Purfleet–Taree, Forster, Karuah, Worimi, Mindaribba, Awabakal, Bahtabah, Biraban and Wanaruah Local Aboriginal Land Councils to identify priority sites that can create a pipeline of potential projects.	**Consistent.** The proposal includes the potential dedication of floor space to the Purfleet – Taree LALC for an economic self-determination purpose. This will be further explored post Gateway.
Action 27.2 Identify landholdings and map the level of constraint at a strategic scale for each site to develop options for the potential commercial use of the land.	**Not directly relevant to this planning proposal.** The proposal is for the site-specific creation of employment lands, though it does contribute to the commercial use of land.

Appendix B – Consistency with State Environmental Planning Policies (SEPPs)

State Environmental Planning Policy (SEPP)	Response
SEPP No 1—Development Standards	Not applicable (NA).
SEPP No 19—Bushland in Urban Areas	N/A. This SEPP does not apply to the MidCoast local government area.
SEPP No 21—Caravan Parks	N/A. Development consent is not being sought for a caravan park.
SEPP No 30—Intensive Agriculture	N/A. The proposal does not involve a cattle feedlot or piggery and the provisions of this SEPP are not relevant to the proposal.
SEPP No 33—Hazardous and Offensive Development	The proposal is consistent with the objectives of the SEPP.The planning proposal would permit with consent potentially hazardous and potentially offensive forms of industry on the industrial zoned land. Any application for potentially hazardous and potentially offensive forms of industry will require consideration of the matters under Clause 13 for the purposes of determining such an application, including a hazard risk analysis. There are no existing or likely future residential zones adjoining the proposed industrial land. A village zone is located on the southern side of Manning River Drive, approximately 45m south of the potential service station site and a caravan park is located approximately 160m west. The risks associated with any current or likely future land uses are low.
SEPP No 36—Manufactured Home Estates	N/A. The proposed zones will not permit a caravan park or manufactured home estate (nor is it appropriate to do so) and as such the provisions of the SEPP are not relevant to this proposal.
SEPP No 44—Koala Habitat Protection	The proposal is consistent with the objectives of the SEPP. The proposal seeks to rezone those areas with the highest concentration of Koala feed trees for environmental conservation. Post Gateway Determination a more detailed biodiversity assessment (Stage 1 BDAR) will be undertaken to determine and assess Core Koala habitat and other aspects pertaining to SEPP 44. Consultation with OEH will confirm the appropriateness of this additional work.
SEPP No 47—Moore Park Showground	Not applicable
SEPP No 50—Canal Estate Development	Not applicable
SEPP No 52—Farm Dams and	Not applicable

State Environmental Planning Policy (SEPP)	Response
Other Works in Land and Water Management Plan Areas	
SEPP No 55—Remediation of Land	The land has not been identified as contaminated. Post Gateway Determination a preliminary contamination assessment will be prepared to confirm that the land is not contaminated and is land suitable for the zones and uses permitted.
SEPP No 62—Sustainable Aquaculture	Not applicable
SEPP No 64—Advertising and Signage	The planning proposal would permit with consent advertising and signage associated with the likely future commercial and industrial uses. Any application for this type of development would require consideration of the matters under Schedule 1 of the SEPP for the purposes of determining advertising and signage applications. The planning proposal is consistent with this SEPP
SEPP No 65—Design Quality of Residential Apartment Development	Not applicable
SEPP No 70—Affordable Housing (Revised Schemes)	Not applicable
SEPP (Aboriginal Land) 2019	Not applicable
SEPP (Affordable Rental Housing) 2009	Not applicable
SEPP (Building Sustainability Index: BASIX) 2004	Not applicable
SEPP (Coastal Management) 2018	The land is partly located within the Coastal Environment Area. The application of the proposed E2 zones on the subject land will ensure that the objectives of the Coastal Environment Area are achieved. Consideration of the need for any site specific controls to accord with the Coastal Environment Area of the SEPP will be considered when preparing the DCP.
SEPP (Educational and Child Care Facilities) 2017	Not applicable
SEPP (Exempt and Complying Development Codes) 2008	The planning proposal would permit certain commercial and industrial development as exempt or complying which are not currently permitted, by virtue of the introduction of the IN1 and B6 zones.
SEPP (Gosford City Centre) 2018	Not applicable
SEPP (Housing for Seniors or People with a Disability) 2004	Not applicable
SEPP (Infrastructure) 2007	The planning proposal would permit with consent various forms

State Environmental Planning Policy (SEPP)	Response
	of traffic-generating development that are to be referred to Roads and Maritime Services (RMS) in accordance with Cl.104 of the SEPP. In determining an application, the consent authority must take in to account any submission from the RMS, as well as the accessibility of the land and any potential traffic safety, road congestion or parking implications. The planning proposal will be referred to the RMS for comment following completion of the detailed traffic assessment and development of the DCP. The future development of the land is likely to require minor alterations to the existing electricity and communications networks in the vicinity of the land. The planning proposal will be referred to TransGrid and Essential Energy for comment.
SEPP (Kosciuszko National Park—Alpine Resorts) 2007	Not applicable
SEPP (Kurnell Peninsula) 1989	Not applicable
SEPP (Mining, Petroleum Production and Extractive Industries) 2007	Not applicable
SEPP (Miscellaneous Consent Provisions) 2007	Not applicable
SEPP (Penrith Lakes Scheme) 1989	Not applicable
SEPP (Rural Lands) 2008	The proposal intends to amend the zoning of rural land for the purposes of employment. The subject land is not State significant agricultural land and provides only marginally productive agricultural land. The proposal is not in conflict with the aims or rural planning principles of the SEPP.
SEPP (State and Regional Development) 2011	The planning proposal is not State or Regional development but may enable the delivery of those forms of development subject to approval by the relevant determining authority.
SEPP (State Significant Precincts) 2005	Not applicable
SEPP (Sydney Drinking Water Catchment) 2011	Not applicable
SEPP (Sydney Region Growth Centres) 2006	Not applicable
SEPP (Three Ports) 2013	Not applicable
SEPP (Urban Renewal) 2010	Not applicable
SEPP (Vegetation in Non-Rural Areas) 2017	The SEPP applies to land within the proposed zones. Any clearing of vegetation on the subject land would be subject to Council approval unless it is clearing authorised under other legislation.

State Environmental Planning Policy (SEPP)	Response
SEPP (Western Sydney Employment Area) 2009	Not applicable
SEPP (Western Sydney Parklands) 2009	Not applicable

Appendix C – Consistency with S9.1 Ministerial Directions

Environmental Planning and Assessment Act 1979

9.1 Directions by the Minister

S9.1 Ministerial Direction	Consistency
1. Employment and Resources	
1.1 Business and Industrial Zones	Direction applies and the planning proposal is consistent with direction 1.1 (4). The planning proposal does not reduce the total potential floor space area for employments uses and related public services in business zones. The planning proposal does not reduce the total potential floor space area for industrial uses in industrial zones. The planning proposal seeks to co-locate new industrial and business zoned land within an existing employment lands precinct. The proposed new employment area is consistent with the MidCoast REDS (prepared by the NSW Department of Premier and Cabinet, 2018) focus on industry specialisation and capitalisation on locational advantages, and largely consistent with the area identified in the draft MVLS for expansion of the Manning River Drive Employment Precinct. Hence, this planning proposal is Consistent with this Direction.
1.2 Rural Zones	Direction applies and the planning proposal is inconsistent with direction 1.2 (4a) This inconsistency however can be justified on the basis that the planning proposal would rezone marginal rural land for industrial and business purposes, which is important for the realisation of the outcomes of the MidCoast REDS. The proposed new employment area is consistent with the draft MVLS (June 2016), and the MidCoast REDS. However, the planning proposal can be considered Consistent if it is prepared in accordance with a relevant Regional Plan (1.2(5c)) or is of minor significance (1.2(5d)). This planning proposal meets both of these parts and hence it is Consistent with this Direction.
1.3 Mining, Petroleum Production and Extractive Industries	Direction applies and the planning proposal is consistent with direction 1.3 (3). The planning proposal does not alter the permissibility of mining, petroleum production or extractive industries on the subject land. There are no mines or quarries in proximity to the land or any State or regionally significant resources identified either on, or in close proximity to, the land.
1.4 Oyster Aquaculture	Direction applies and the planning proposal is consistent with direction 1.4 (3). The subject land is located a minimum of 10km upstream of Oyster Aquaculture areas within the Manning River and is not located within close proximity to any Priority Oyster Aquaculture Area. There is unlikely to be a negative impact on water quality on the Manning River as control of stormwater will be required for the development lands and the subject land will be connected to reticulated sewer.
1.5 Rural Lands	Direction applies as the planning proposal will affect land within an existing rural zone (1.5(3a)). While the planning proposal is consistent with some parts under clause 4, it is

S9.1 Ministerial Direction	Consistency
	inconsistent with others. However, as it is deemed to be of minor significance (clause 6(b)) it is therefore consistent with this Direction. The proposed new employment area is consistent with the draft MVLS (June 2016), and the MidCoast REDS
2. Environment and Heritage	
2.1 Environmental Protection Zones	Direction applies and the planning proposal is consistent with direction 2.1 (4). A preliminary ecological assessment has been undertaken to inform the planning proposal, refer to Section 3.C.1 and Appendix D. The sensitive areas on the land, identified by further detailed ecological assessment of the planning proposal, will be rezoned for environmental conservation purposes. Post Gateway Determination, a more detailed biodiversity assessment will be undertaken to determine, amongst other matters: specific plant community types on the land, whether the land comprises Core Koala habitat, presence of threatened species and Endangered Ecological Communities (EECs), and actions required to minimise impacts. The detailed biodiversity assessment will be in the form of an assessment using Stage 1 (as a minimum) of the Biodiversity Assessment Method under the *Biodiversity Conservation Act 2016* and prepared by an accredited person under the Act.
2.2 Coastal Management	Direction applies and the planning proposal is consistent with direction 2.2 (4). The sensitive areas on the land will be rezoned for environmental conservation purposes to protect the values of the coastal zone and achieve the objects of the *Coastal Management Act 2016*. Under the SEPP (Coastal Management) 2018 no part of the land is located within a coastal vulnerability area or on land affected by Coastal Wetlands, Proximity Area for Coastal Wetlands, Littoral Rainforests, or Proximity Area for Littoral Rainforests. The northern part of Lot 2 DP 827097 is within the Coastal Environment Area and this area has been identified for rezoning to E2 Environmental Conservation. This area and further land within the lot but to the south is also within the Coastal Environment Area and consideration for specific development controls will occur in the preparation of the site specific DCP.
2.3 Heritage Conservation	Direction applies and the planning proposal is consistent with direction 2.3 (4). The land does not contain any listed or potential items of European heritage significance and is not located within close proximity to a heritage conservation area. With respect to Aboriginal heritage, an Aboriginal Heritage Impact Assessment (AHIA) has been undertaken, refer to Section 3.C.2.13 and Appendix E. The AHIA identified a potential Aboriginal deposit (PAD) at the northern end of the subject land that will be conserved through the application of an environmental conservation zone. No other items of heritage significance are known to occur on the land.
2.4 Recreation Vehicle Areas	Not applicable. The planning proposal does not enable land to

S9.1 Ministerial Direction	Consistency
	be developed for the purpose of a recreational vehicle area.
2.5 Application of E2 and E3 zones and Environmental Overlays in Far North Coast LEPs	Not applicable. The subject land is not located on the Far North Coast.
3. Housing, Infrastructure and Urban Development	
3.1 Residential Zones	Not applicable. No residential zones are proposed.
3.2 Caravan Parks and Manufactured Home Estates	Not applicable. Caravan Parks and Manufactured Home Estates are not permitted in the current RU1 zone nor the proposed zones recommended within the planning proposal.
3.3 Home Occupations	Not applicable. No residential zones are proposed.
3.4 Integrating Land Use & Transport	Under clause 3.4(4) this Direction states that a planning proposal must locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of: (a) *Improving Transport Choice – Guidelines for planning and development* (DUAP 2001), and (b) *The Right Place for Business and Services – Planning Policy* (DUAP 2001). The planning proposal is consistent with direction 3.4 (4) and the aims, objectives and principles of the above-mentioned publications. The planning proposal involves the creation of additional industrial and business zoned land located in the vicinity of the existing Manning River Drive Employment Precinct. The subject land has direct access to Glenthorne Road and Eriksson Lane and potentially access, at a later date, to Manning River Drive. The subject land is located close to the Pacific Highway interchange to provide for the efficient movement of freight. *Integrating Land Use and Transport – Improving Transport Choice* (DUAP, 2001) suggests that industrial zones in urban fringe locations are suitable for businesses with significant freight movements and low employment density, which is consistent with the proposed use of the subject land. However, there are existing and frequent bus services along Manning River Drive. Future uses within the planning proposal area will support an increase in the operation of the local (private) public bus service. Extensions to the existing footpath and cycleway network (within the site) will connect the subject land to Taree and be documented in the site specific DCP. Post Gateway Determination an updated Traffic Impact Assessment will be prepared to include internal road and access arrangements, including consideration of a link from Manning River Drive southbound to Glenthorne Road via the subject land.

S9.1 Ministerial Direction	Consistency
3.5 Development Near Licensed Aerodromes	The subject land is identified within the Obstacle Limitation Surface Map (Sheet OLS_015A) contained in GT LEP 2010 and hence this Direction applies. The subject land is near a regulated airport, namely Taree Airport. Consistency with this Direction will be demonstrated by consultation with, and consideration of comments from, the lessee / operator of Taree Airport. Consultation with the operators of Taree Airport will occur post Gateway Determination.
3.6 Shooting Ranges	Not applicable. The subject land is not located within close proximity to a shooting range.
3.7 Reduction in non-hosted short term rental accommodation period	Not applicable. The subject land is not located within the Byron Bay local government area.
4. Hazard & Risk	
4.1 Acid Sulfate Soils	Direction applies and the planning proposal is inconsistent with direction 4.1 (6) which requires an acid sulfate soils (ASS) study prior to the preparation of a planning proposal. An ASS study has not been prepared. The southern half of the subject land contains Class 5 ASS, and the majority of the northern half contains Class 4 ASS. Small portions of Class 3 and Classes 2a and 2b ASS occur in the far north of the land, within an area that will be zoned for environmental conservation, refer to Section 3.C.2.3. Clause 7.1 of GT LEP 2010 contains the standard ASS risk management provisions to appropriately control future development of the land at the DA stage. The inconsistency with direction 4.1 (6) however can be justified on the basis that the soils likely to be impacted upon by future development are Class 4 and 5 and Council has ASS risk management provisions within GT LEP 2010 to consider the impact of development at the DA stage. Therefore, the inconsistency is considered minor and under clause 8(b) it is then considered as being consistent with this Direction.
4.2 Mine Subsidence and Unstable Land	Not applicable. The subject land is not located within a Mine Subsidence District.
4.3 Flood Prone Land	Direction applies and the planning proposal is inconsistent with direction 4.3 (5) which states that a planning proposal must not rezone land within the flood planning areas to a Business or Industrial zone. Flooding and drainage is addressed in Section 3.C.2.4 and identifies that a small portion of the central and northern parts of the subject land are located within Council's Flood Prone Land mapped area. Clause 7.2 of GTLEP 2010 contains the standard flood planning and flood risk management provisions to appropriately control future development of the land.

S9.1 Ministerial Direction	Consistency
	The majority of the flood prone land will be contained within an environmental conservation zone and will therefore not be developed. A flooding and drainage study will be undertaken after Gateway Determination to ensure that the proposal is consistent with the NSW Government's *Flood Prone Land Policy* and the principles of the *Floodplain Development Manual 2005*, and to ensure that the development is commensurate with the flood hazard and includes consideration of the potential flood impacts both on and off the subject land. The inconsistency with direction 4.3 (5) however can be justified on the basis that the majority of the flood prone land will be within an environmental conservation zone and a flooding and drainage study will be undertaken after Gateway Determination consistent with the NSW Government's *Flood Prone Land Policy* and the principles of the *Floodplain Development Manual 2005.* Post Gateway Determination a preliminary local flooding and drainage assessment will be undertaken. A Concept Stormwater Management Strategy and a geotechnical survey (alluvial soils assessment) will also be undertaken. Only a very small part of the site is deemed inconsistent with this Direction. As 4.3(9b) allows a minor inconsistency to be deemed consistent, this planning proposal is deemed to be consistent with this Direction.
4.4 Planning for Bushfire Protection	Direction applies and it is not yet possible to determine if the planning proposal is consistent with direction 4.4 (5) and 4.4 (6) which require introduction of controls that avoid placing inappropriate developments in hazardous areas. As identified in Section 3.C.2.2 part of the land is mapped as bushfire prone, however the planning proposal does not include residential land and is unlikely to enable inappropriate development in bush fire prone areas. The proposal does not introduce controls that will prohibit bushfire hazard reduction within APZs. The compliance of any future development with *Planning for Bushfire Protection 2006* will be addressed in detail at development application stage. Consultation with the Commissioner of the NSW Rural Fire Service should therefore occur under section 56 of the EP&A Act, thereby confirming Consistency with this Direction and whether any additional controls need to be included in the proposed site specific Development Control Plan.
5. Regional Planning	
5.1 Revoked	Not applicable.
5.2 Sydney Drinking Water Catchments	Not applicable. The subject land is not located within the Sydney Drinking Water catchment area.
5.3 Farmland of State and Regional Significance on the NSW Far North Coast	Not applicable. The subject land is not located within the NSW Far North Coast.

S9.1 Ministerial Direction	Consistency
5.4 Commercial and Retail Development along the Pacific Highway, North Coast	Not applicable. Although the subject land is located near to the Pacific Highway, it does not have frontage to the Pacific Highway, being located approximately 200m west of the Old Bar Road Taree South interchange.
5.5 Revoked	Not applicable.
5.6 Revoked	Not applicable.
5.7 Revoked	Not applicable.
5.8 Second Sydney Airport: Badgerys Creek	Not applicable. The subject land is not located within the vicinity of the second Sydney Airport
5.9 North West Rail Link Corridor Strategy	Not applicable. The subject land is not located within the vicinity of the North West Rail Link Corridor
5.10 Implementation of Regional Plans	Direction applies and the planning proposal is consistent with direction 5.10 (4) requiring planning proposals to be consistent with a Regional Plan release by the Minister for Planning. The relevant Regional Plan is the Hunter Regional Plan 2036. The planning proposal is consistent with all of the relevant goals, directions and actions of the Hunter Regional Plan 2036 as outlined in Section 3.B.1 and as detailed in Appendix A.
5.11 Development of Aboriginal Land Council land	Not applicable. This Direction will eventually apply to all relevant planning proposal authorities however at the point of preparation of this planning proposal the Direction applied only to land in the Central Coast local government area.
6. Local Plan Making	
6.1 Approval and Referral Requirements	Direction applies and the planning proposal is consistent with direction 6.1 (4). The planning proposal does not include any additional provisions relating to concurrence, consultation or referral of development applications.
6.2 Reserving Land for Public Purposes	Direction applies and the planning proposal is consistent with direction 6.2 (4). The planning proposal does not involve the creation of land that would be reserved for public purposes.
6.3 Site Specific Provisions	Direction applies and the planning proposal is consistent with direction 6.3 (4). The planning proposal seeks to rezone the land to an existing zone already applying in the Environmental Planning Instrument.
7. Metropolitan Planning	
7.1 Implementation of A Plan for Growing Sydney	Not applicable. The subject land is not located in the Sydney Metropolitan area.
7.2 Implementation of Greater Macarthur Land Release Investigation	Not applicable. The subject land is not located in the Greater Macarthur area.
7.3 Parramatta Road Corridor Urban Transformation Strategy	Not applicable. The subject land is not located in the Parramatta Road corridor.

S9.1 Ministerial Direction	Consistency
7.4 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	Not applicable. The subject land is not located in the North West Priority Growth area.
7.5 Implementation of Greater Parramatta Priority Growth Area Land Use and Infrastructure Implementation Plan	Not applicable. The subject land is not located in the Parramatta Priority Growth area.
7.6 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	Not applicable. The subject land is not located in the Wilton Priority Growth area.
7.7 Implementation of Glenfield to Macarthur Urban Renewal Corridor	Not applicable. The subject land is not located in the Glenfield to Macarthur Urban Renewal Corridor.
7.8 Implementation of Western Sydney Aerotropolis Interim Land Use and Infrastructure Implementation Plan	Not applicable. The subject land is not located in the Western Sydney Aerotropolis Precinct.
7.9 Implementation of Bayside West Precincts 2036 Plan	Not applicable. The subject land is not located in the Bayside West Precinct.
7.10 Implementation of Planning Principles for the Cooks Cove Precinct	Not applicable. The subject land is not located in the Cooks Cove Precinct.

Appendix D – Preliminary Ecological Assessment

Monday, 24 September 2018

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Dear Lisa,

Re: Preliminary ecological constraints assessment for future development of Lot 50 DP 863972, Lot 2 DP 827097, Lot 2 DP 573214 and Lot 20 DP 836884, Eriksson Lane and Glenthorne Road, Taree South.

As per request, we provide a preliminary ecological constraints assessment (PECA) to inform a Stage 1 Planning Proposal to obtain Mid Coast Council (MCC) support for a future rezoning of the subject land.

This PECA is intended to provide sufficient information to MCC to support a Planning Proposal for the potential rezoning of the subject land. The Stage 2 rezoning investigations will require additional and more detailed assessment to address statutory requirements (as detailed subsequently).

The findings of this PECA are summarised as follows:

(a) *Environment Protection Biodiversity Conservation Act 1999*:

a. There are no relevant Threatened Ecological Communities (TECs) on site.

b. The site is not important to any migratory species.

c. Future development is unlikely to require referral to the Department of the Environment and Energy, unless a local population of Green and Golden Bell Frog (*Litoria aurea*) is recorded (very low to unlikely probability), a listed plant is detected (very low to unlikely probability), or possibly if loss of all known Koala habitat is likely.

(b) *Biodiversity Conservation Act 2016*:

a. Lot 2 DP827097 contains portions of the generally larger local occurrence of two Endangered Ecological Communities (EECs): *Freshwater Wetlands* and *Swamp Sclerophyll Forest on Coastal Floodplains* (both possibly derived due to historical clearing), and adjoin the EEC – *Subtropical Floodplain Forest on Coastal Floodplains* east of Lot 2. The local occurrence of the *Freshwater Wetlands* EEC in the central drainage line on Lot 2 is limited to the site and study area (latter defined as 100m radius around the site).

b. Hollow-bearing trees are only present along the road reserve along Eriksson Lane, but most have few or poorly developed hollows. Hollows present are only suitable for small to medium fauna. Further survey is required to determine if any threatened hollow-obligate species (eg. Squirrel Glider, Brushtailed Phascogale) are present.

c. Future development is likely to trigger off entry into the Biodiversity Offset Scheme (BOS) for development on any lot where native vegetation is cleared above the nominated threshold for the current or future minimum lot size. Lot 2 DP573214 and Lot 20 are covered in mostly native vegetation and hence are most likely to enter the BOS. Lots 50 and Lot 2 DP2827097 have limited native vegetation and development of these lots may possibly only need assessment under the Five Part Tests (subject to further investigation of groundcover composition on Lot 50 and evaluation of the criteria of the Paddock Tree module in the BAM).

(c) SEPP 44 – *Koala Habitat Protection*:

a. The site contains Potential Koala Habitat, mostly as very young regrowth on Lot 2 DP573214, which could potentially be removed via transitional provisions of the *Native Vegetation Act 2003* and the *Local Land Services (Amendments) Act 2017*; and in the road reserve of Eriksson Lane.

b. Evidence of Koalas was found in the form of a few confirmed scats under some trees along the Eriksson Lane road reserve, but no sightings. Further survey is required to determine if the site qualifies with confidence as Core Koala Habitat.

c. If the site is deemed to form part of Core Koala Habitat, maximum retention of Koala food trees (KFTs), retention of corridors, offset to loss of KFTs, planning of roads to minimise, mitigate or avoid impacts on Koalas, and controls on dogs will be required.

(d) Preliminary recommendations:

a. Maximise retention of the vegetation in the road reserve of Eriksson Lane via using Glenthorne Road as the primary access.

b. Maximise retention all hollow-bearing trees in Eriksson Lane.

c. Maximise retention of mature Koala food trees, especially Forest Red Gum due to its dual value as a nectar source during seasonal shortages for several nomadic threatened species.

d. Retain and rehabilitate the EECs, and establish an appropriate fully vegetated buffer with due consideration of stormwater management, upper catchment condition and bushfire constraints.

e. Stormwater management in the catchments of the EECs must demonstrate maintaining or improving current water quality.

1 BACKGROUND INFORMATION:

The approximately 24ha portion (hereon referred to as the site) of the nominated lots is proposed to be rezoned from RU1 (Primary Production) to IN1 (General Industrial) and B6 (Business Enterprise). Some areas may also be rezoned to E2 to address ecological constraints.

Review of aerial photographs suggest the site has been subject to a disturbance history which has significantly altered historical vegetation structure, floristics and extent.

This preliminary assessment has the following objectives:

(a) Undertake a rapid ecological assessment to identify key constraints such as EECs, Koala habitat, and hollow-bearing trees.
(b) Identify and evaluate threatened species with potential to occur.
(c) Provide preliminary recommendations.
(d) Provide an overview of statutory requirements.

2 VEGETATION OVERVIEW

2.1 Vegetation communities

The site's vegetation communities are briefly described as follows:

Table 1: Vegetation communities overview

Vegetation community	Description	Location
Blackbutt Tall Open Forest	Overview: Tall open forest to about 25m high. Presents as a grassy groundcover, possibly with a mesophyllic understorey. Generally immature regrowth. Canopy: Dominated by Blackbutt (*Eucalyptus pilularis*). Understorey/shrub layer: Possibly normally consists of *Pittosporum undulatum* plus *Acacia* spp. May possibly be a wet sclerophyll in recovery. Groundcover: Dominated by grasses comprising Wiry Panic (*Entolasia marginata, E. stricta*), Kangaroo Grass (*Themeda australis*) and range of herbs.	Adjoining land north of Lot 2 DP573214 and edge of northern end of Lot 20. Adjoining stand is most definitive.
Tallowwood - Forest Red Gum – White Mahogany - Pink Bloodwood tall open forest	Overview: Tall open forest to about 25m high. Presents as a grassy groundcover, possibly with a mesophyllic understorey but currently high weed content. Mix of remnant senescent trees to young recruits. Canopy: Dominated by Tallowwood and Forest Red Gum (*E. tereticornis*). Forest Red Gum is most common in mid to footslope position, with what appears to possibly be several Sydney Blue Gums (*E. saligna*) coming in the southern end of Lot 20. White Mahogany (*E. acmenoides*) locally common on crest, with Broad-leaved Mahogany (*E.*	Dominates Lot 20, and also patch on Lot 2 DP827097. Also appears to comprise the regrowth on Lot 2 DP573214.

Vegetation community	Description	Location
	umbra) also increasingly common in mid-storey of Lot 20. Pink Bloodwood is a common associate. Understorey/shrub layer: Unclear what originally was as this stratum is missing or weed infested. Aside from many young eucalypts/bloodwoods, also includes *M. nodosa* on footslope with *Acacia* spp and *Geebung linariifolia,* with various rainforest species also being common on the midslope to crest. Groundcover: Dominated by grasses (*Entolasia marginata, E. stricta*, Kangaroo Grass) and range of herbs with numerous weeds.	
Melaleuca styphelioides swamp forest (mid-high open forest)	Overview: Derived low swamp forest about 10m high along a first order watercourse modified by dams upstream. Canopy: Semi-closed canopy of *M. styphelioides* with some fringing *M. nodosa*. Groundcover: Dominated by low diversity of *Carex* spp sedges with some herbs and moss. Grades to pasture grasses on outer edges.	Southern end of Lot 2 DP827097.
Sedgeland	Two forms. Drainage line north of northern dwelling dominated almost monospecifically by *Typha domingensis* with *Persicaria strigosa.* Southern drainage line contains this community fringing a dam and lining the original channel upstream of the dam. Mix of native sedges such as *Schoenoplectus mucronatus* with Frogsmouth (*Philydrum lanuginosum*) and *Persicaria strigosa*. A drainage line at the northern end of Lot 2 was not inspected as it proposed to remain under its current zoning, however aerial photography and viewing of similar vegetation in the same edaphic context from Manning River drive suggests a mix of pasture grasses with sedges and aquatic herbs.	Lot 2 DP827097
Mixed pasture	Varies with location. Dominates most of Lot 2 DP827097, where it predominantly consists of exotic grasses and weeds ie. Carpet Grass (**Axonopus* spp.), **Sporobolus* spp., **Paspalum dilatatum*. Dominates Lot 50, with composition varying. Composition was difficult to determine due to recent slashing, but **Setaria* spp. is common with Whisky Grass (**Andropogon virginicus*). Native grasses and herbs are locally common on the western side and may be mixed across the larger slashed area eg. *Digitaria* spp., Weeping Grass (*Microlaena stipoides*), Scented-Top Grass (*Capillipedium spicigerum).*	Lot 50, Lot 2 DP573214, Lot 2 DP827097

Vegetation community	Description	Location
Managed areas/lawns/gardens	Refers to gardens and lawns around existing dwellings. These are generally managed via regular mowing. Trees consist of retained and planted natives, native cultivars and exotics.	Lot 50, Lot 2 DP573214, Lot 2 DP827097

Further survey will be required to determine the specific Plant Community Types (PCTs) on site. This will require plot based survey and correlation to PCT descriptions which are currently being updated for the region due to novel PCTs and the difficulty in correlating to current profiles.

2.2 Conservation Significant Vegetation

2.2.1 EECs

The site contains two EECs, with a third in the study area (within 100m of the site), as follows.

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

The EEC – *Freshwater Wetlands on Coastal Floodplains*, is comprised by the sedgeland dominated by Cumbungi within a relic watercourse just north of the northern dwelling on Lot 2 DP827097. This community qualifies as an EEC on the following criteria (NSWSC 2004a):

- Occurs in the specified region and Local Government Area (LGA).
- Occurs on mapped alluvial soils (Troedson and Hashimoto 2005).
- Occurs within a topographical unit described in the Final Determination ie. depressions, flats, drainage lines, backswamps, lagoons and lakes.
- Structure and floristics correlate with the Final Determination.

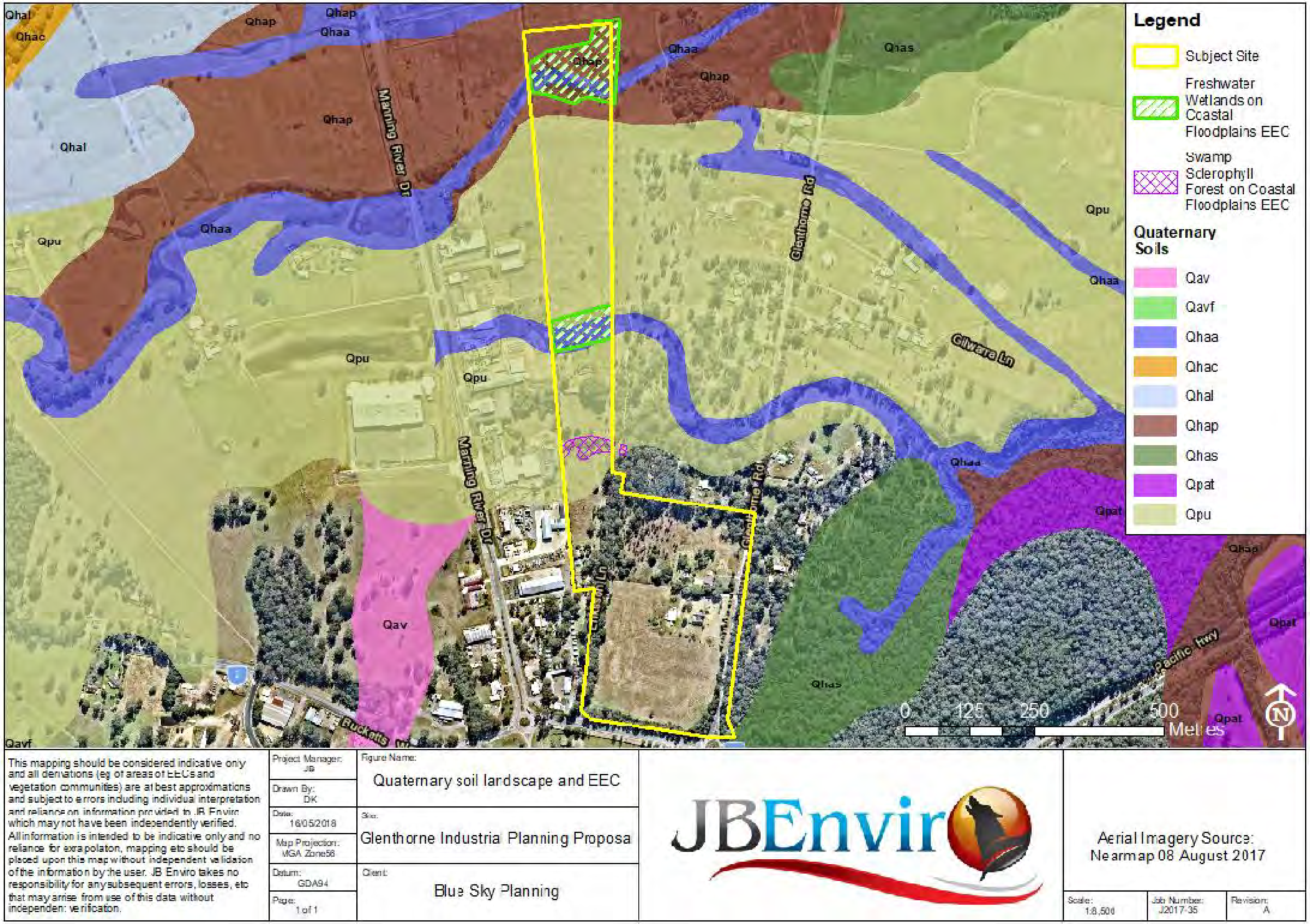
The local occurrence of this EEC in this watercourse here extends off-site east and west to extend within the remainder of the relic watercourse, which due to filling in the west and modification to a dam in the east, is essentially a billabong. A channel has been dug along the northern side, and the wetland is divided by two crossings – the eastern one being the more elevated and used. Weeds are present in the form of **Myriophyllum* spp. on site, with **Setaria* spp. being very common on the western boundary and in the upstream portion.

A dam in the drainage line to the south does not qualify as this EEC although it is largely vegetated with native wetland vegetation, as artificial structures are excluded from this EEC.

The other relic watercourse in the northern end of Lot 2 also qualifies as an example of this EEC, but is another local occurrence as it does not have a direct fluvial connection and hence exchange of genetic materials between both occurrences would be limited to major flood events and movement of waterfowl.

Both occurrences historically would have been enclosed by forested wetlands, most likely comprising the following EEC.

Figure 1: EECs on site



Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

This EEC comprises the small stand of *Melaleuca styphelioides* in the drainage line between the two dwellings on Lot 2 DP827097. This EEC is actually a derived stand from the EEC – *Subtropical Floodplain Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*, which occurs in a limited area on adjoining land to the east of Lot 2 (as detailed subsequently).

This community qualifies as this EEC as:

- Occurs in the specified region and Local Government Area (LGA).
- Occurs on mapped alluvial soils.
- Occurs within a topographical unit described in the Final Determination.
- Structure and floristics correlate with the Final Determination.

This EEC is likely to have been derived from historical clearing of the EEC - *Subtropical Floodplain Forest,* which as noted below dominates the lower reaches of the watercourse. Both EECs share the same understorey on site (*M. nodosa* is not listed as an indicator of this EEC, but *M. styphelioides* is) and groundcover species. Only a single young Pink Bloodwood occurs in the site remnant, hence its overall character is currently reflected as this EEC.

All of the Coastal Floodplain Final Determinations reflect the complex intergrades of these EECs, which the site evidences.

Subtropical Floodplain Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

This EEC occurs on adjacent land to the east, with a few remnant or regrowth *M. nodosa* just to the north of the EEC – *Swamp Sclerophyll Forest* indicating the original extent of this EEC on site.

This EEC is indicated by the dense understorey of *M. nodosa* with emergent canopy trees comprising Pink Bloodwood and Forest Red Gum. The extent of this EEC appears to be limited due to the small catchment of the watercourse and local clearing, but also *M. nodosa* also extends over the same ridgeline where the lithic influences appear to dominate, not alluvial as discussed below. Hence *in situ* soil profile tests are needed to confirm the extent of this EEC.

This EEC appears to be in very good condition, with disturbance history indicating previous clearing, with current grazing by domestic stock being the main threat.

Other areas of alluvial soils:

As shown in Figure 1, other areas of Lot 2 are also mapped as being on alluvial soils. The low ridgeline between the two areas of *Freshwater Wetland* EEC are virtually completely non-native vegetation and hence the EEC has effectively been rendered dysfunctional here. Similarly south of the *Swamp Sclerophyll Forest* EEC, the vegetation is essentially exotic pasture with a few trees comprising the last vestiges of the original EEC.

The clump of forest southeast of the northern dwelling on Lot 2 occurs on mapped alluvial soils (see Figure 1), however while Forest Red Gum and Pink Bloodwood are indicative of the EEC – *Subtropical Floodplain Forest on Coastal Floodplains*, Tallowwood is not (NSWSC 2004a).

Thick-leaved Mahogany also comprises many trees in the clump to the west on the same landform. Both species are considered to indicate residual soil influences dominate, hence this area is also not considered to be an EEC or EEC habitat.

2.2.2 Threatened flora and credit species preliminary occurrence assessment

Preliminary survey results:

Threatened flora surveys for this PECA were limited to a random meander over the more intact portions of the site, inspecting remnant vegetation along the Eriksson Lane, and the visible portions of the dams for threatened vines, trees, shrubs and conspicuous herbs. This survey was a rapid assessment only, and hence small, inconspicuous species (eg. *Asperula asthenes*) and cryptic orchids only detectable when flowering (eg. *Pterostylis chaetophora*) would not have been detectable.

No conspicuous threatened species was found.

The Red Gums were almost all flowering (excluding young trees) at the time of survey, strongly suggesting by both this season and shape of buds found on the ground that they are *E. tereticornis* as *E. seeana* usually flowers from November to December (Brooker and Kleinig 2006). Hence it appears unlikely that the Endangered Population of *E. seeana* occurs on site.

Similarly, *E. glaucina* normally flowers from September-November, hence appears unlikely to occur on site.

Potential occurrences:

Table 4 in Appendix 1 reviews locally known threatened flora for their potential to occur on site. The following table lists species identified as requiring further survey to confirm presence/absence as they are species credit species under the BC Act.

Table 2: Threatened flora requiring targeted survey

Species	Legal Status	Location of potential habitat	Potential to occur
Trailing Woodruff *(Asperula asthenes)*	V-BCA, V-EPBCA	Dams and drainage lines on Lot 2 DP573214.	Low
Pale Yellow Doubletail *(Diuris flavescens)*	E-BCA CE-EPBCA	Tall open forest on Lot 20. Native grassland mixed with young tall open forest regrowth on Lot 2 DP573214.	Unlikely to very low
Eucalyptus seeana population in the Greater Taree local government area,	EP-BCA	Tall open forest on Lot 20. Native grassland mixed with young tall open forest regrowth on Lot 2 DP573214.	Unlikely to very low. Formal survey required to confirm absent.
Slaty Red Gum *(Eucalyptus glaucina)*	E-BCA	Tall open forest on Lot 20. Native grassland mixed with young tall open forest regrowth on Lot 2 DP573214.	Unlikely to very low. Formal survey required to confirm absent.

Species	Legal Status	Location of potential habitat	Potential to occur
Taree Rustyhood *(Pterostylis chaetophora)*	V-BCA	Tall open forest on Lot 20. Native grassland mixed with young tall open forest regrowth on Lot 2 DP573214.	Unlikely to very low

Assessment under the Biodiversity Assessment Method (BAM) as part of future Development Applications may identify additional species needing survey, depending on the final PCTs identified.

3 SEPP 44

3.1 Potential Koala Habitat

Figure 2 shows the location of primary preferred Koala food trees on site. Tree locations were recorded by a standard hand-held GPS, with trees >10cm diameter at breast height individually recorded. The exception was the clumps of young regrowth trees on Lot 2 DP as about 150-200 trees occur here, and hence the perimeter of the clumps was mapped to show their location and relative extent.

The regrowth patches are sufficient to qualify the site as Potential Koala Habitat, as are the numbers of trees in the road reserve of Lot 20 (Eriksson Lane). The small clump adjacent to the northern dwelling on Lot 2 DP827097 is also Potential Koala Habitat.

3.2 Evidence of Koalas and Core Koala Habitat

Scat searches in line with the Spot Assessment Technique (SAT) were undertaken under each primary preferred KFT individually located by GPS. All trees onsite were also inspected for Koalas by a highly experienced Koala ecologist. Survey was completed on the 9th May with fair weather conditions.

The SAT's statistical assumptions are unlikely to be satisfied due to the linear nature of most of the habitat, and as tree trunk diameter appears to also influence tree use (eg. Biolink 2013) indicating that an assessment in the regrowth on Lot 2 DP573214 may be misrepresentative, a single SAT was undertaken in the clump of forest on Lot 2 DP827097. No Koala scats were found in this clump, but 3 definite Koala scats (Brushtail Possum scats were also found) were found under Tallowwoods on Lot 20 (Eriksson Lane road reserve).

Detection of a few Koala scats was reasonably expected given nearby records (OEH 2018a), and the relative abundance of KFTs. Most of the KFTs appear to occur on a residual soil landscape which may have limited fertility and hence carrying capacity (Biolink 2013a). The site and adjacent habitat, while suitable for Koalas in terms of KFTs, is also bound by the Pacific Highway to the east, and busy local roads to the south and west, and cleared land. These two factors limit both the size of the local population in the habitat encapsulated within these barriers, and its long term viability due to the associated threats (eg. vehicle strike, extensive bushfire, barriers to immigration).

It is however possible that the site forms part of the home range (perhaps the western fringe) of a small aggregate of Koalas which occupy this larger area of semi-isolated habitat.

Figure 2: Koala food trees

Further survey is required (eg. a series of periodic diurnal or nocturnal visits comprising searches of all trees coupled with call playback during the Koala breeding season) to confirm if the site contains Core Koala Habitat and hence a Koala Plan of Management is required.

4 THREATENED FAUNA

4.1 Habitat Evaluation

The following table provides a rapid evaluation of habitat values on the site and its potential values to threatened species:

Table 3: Habitat evaluation summary

Habitat attribute	On-site values	Significance
Aquatic/wetland habitat	• Tall sedgeland: Cumbungi-dominated billabong on Lot 2 offers very good frog habitat with good quality water (clear and running at time of survey) and very dense cover, with numerous basking opportunities. Constrained however by Plague Minnow and bound by pasture, as well as upstream industrial zone. • Drainage line and dam: In southern end of Lot 2, this dam offers good frog habitat but limited edge refugia due to low height of vegetation. Remainder of drainage line has a narrow channel with no significant pools.	• Tall sedgeland: Some generic potential for Green and Golden Bell Frog, but likelihood constrained by lack of nearby records. Too small for threatened waterfowl – at most a Black-necked Stork may briefly forage during non-breeding movements. • Drainage line and dam: As for tall sedgeland but less value as poor cover for Green and Golden Bell Frog, and less suitable for waterfowl.
Marine/estuarine habitats eg estuarine, rocky foreshores, open beaches, open ocean.	Absent	N/A
Caves, cliffs, overhangs, etc	Absent	N/A
Logs and stumps	Logs limited to few piles on Lot 2 DP573214 where a small windrow was once piled. Some minor refuge values. No significant stumps.	None large enough for Quoll dens. Limited generic refugia for prey species.
Groundcover/shrub layer/undergrowth	Groundcover only well developed on Lot 2 DP573214 due to a lapse in maintenance. It consist of a mix of native and exotic grasses, offering no significant value for granivores or cover dependent threatened species due to poor connectivity with similar cover, open structure and previous maintenance history. Shrub layer/undergrowth is generally	No particular threatened species considered likely to occur. Potential habitat for exotic rodents which may add to prey base.

Habitat attribute	On-site values	Significance
	limited to the road reserves where it is often dominated by weeds including lantana. Some localised but large brambles of lantana on Lot 2 DP573214. This offers some generic refuge and foraging habitat for small passerine birds.	
Leaf Litter	Well developed, often deep in the Eriksson Lane road reserve, where offers very good habitat for common reptiles and arthropods.	No potential for any significant fauna as dependent species are likely to have been long displaced by historical clearing (eg. Long-nosed Potoroo).
Wattles, Melaleucas, Callistemons and Banksias (shrub layer)	No Banksias. Melaleucas and wattles common but low diversity – species with small inflorescences, hence poor nectar source but provide an insect attractant.	Source of prey attractant in form of insects and honeyeaters, offering some marginal habitat for Squirrel Glider. No significant nectar sources for Eastern Pygmy Possum eg. banksias.
Yangochiropteran bat habitats	In general, the site forms part of a wider modified landscape which contains a mosaic of remnant forest, pasture, small patches of forest and scattered trees. The site and study area mostly offers suitable structure for bat species capable of foraging along the forest/grassland interface, and using flyways along quiet roads. Potential roosts occur in hollow-bearing trees and limited accumulation of decorticating bark in Forest Red Gums and Blackbutts.	Little and Eastern Bent-wing Bats, East-coast Freetail Bat, Greater Broad-nosed Bat considered low to highly likely to use site as minute to minor portion of their wider local foraging range. Generic potential for roosting in tree hollows.
Fruiting species	Limited to Cheese Trees and exotic palms and fruit trees.	Not preferred vegetation type for potential foraging habitat for Wompoo Fruit-dove, Rose-crowned Fruit-Dove and Barred Cuckoo Shrike. Some low value as potential forage habitat for Grey-headed Flying Fox.
Flowering canopy trees.	Forest Red Gum flowers in autumn-early winter hence is important to nectar dependent species, some of which range interstate. Other species are spring-summer to early autumn flowers.	Species present preferred by Squirrel Glider, Grey Headed Flying Fox, Yellow-bellied Glider, Little Lorikeet, Swift Parrot plus passerine birds which offer potential prey to diurnal raptors.
Sap sources	Forest Red Gum, Pink Bloodwood, Sydney Blue Gum and Grey Gum are preferred sap sources for the Yellow-Bellied Glider and Squirrel Glider (Lindenmayer 2002, NPWS 1999, Smith et al 1995, NPWS 2002c, Gibbons 2002). These are overall very common on site.	Very good potential sap source range for gliders, but no sap incisions noted suggesting Yellow-bellied Gliders absent and medium sized gliders unlikely to occur.
Allocasuarinas	Very rare – few senescent Forest Oak in Eriksson Lane.	These oaks generally provide nesting material for birds, and useful quantities of leaf litter, but their

Habitat attribute	On-site values	Significance
		greatest value is to the Glossy Black Cockatoo, whose diet in this region is primarily based on Black She-oak and Forest Oak (NPWS 1999, OEH 2017b, Clout 1989, Birds Australia 2017, pers. obs.). The site does not offer any potential value to this bird.
Tree hollows	Limited to 8 trees in Eriksson Lane road reserve (see Figure 3). Most are in very large senescent trees, but have only small (<5cm diameter opening) to medium large (<15cm) hollows, hence no likely nest sites for large forest owls or the Glossy Black Cockatoo. If retained, many of these trees will develop hollows in the medium term due to senescence. Some have major structural defects however eg. basal fire scars.	Major constraint on hollow-obligate fauna in terms of spatial distribution and size range of hollows on site. Hollows noted uncommon on land to south of Lot 2 DP573214. Forest east of Lot 50 also appears fairly even-aged and immature.
Prey species	Likely presence of rabbits/hares, House Mouse, Black Rat, possums and probably bandicoot and antechinus for forest owls. Passerine birds in low diversity and abundance – dominance by medium sized woodland species at time of survey but would vary with season.	Moderate chance for infrequent visitation by local pair of forest owls which are known to use fragmented rural habitats on the fringe of their territory eg. Masked Owl. Likely to form part of range for locally recorded threatened raptors such as the Square-tailed Kite and Little Eagle, with site only forming minute part of a large area of potential foraging habitat within these species very large foraging range. Poor habitat values for quoll.

4.2 Potential Occurrence Assessment

The following species have been determined from review of local records and the opinion of the consultant (eg. records in similar habitat in the LGA) to have potential to occur on site or in the study area. Most of these species are species credit species, hence requiring targeted survey in future if the BAM applies to reduce credit obligations via confirming absence.

Table 4: Threatened fauna requiring targeted survey

Species	Legal Status	Location of potential habitat	Potential to occur
Powerful Owl (*Ninox strenua*)	V-BCA	Lot 20, north of Lot 2 DP573214	Low – foraging. Unlikely to nest as no suitable hollows. Formal survey required to confirm nesting habitat absent.
Barking Owl (*Ninox connivens*	V-BCA	Lot 20, north of Lot 2 DP573214, Lot 2 DP827097	Low – foraging. Unlikely to nest as no suitable hollows. Formal survey

Species	Legal Status	Location of potential habitat	Potential to occur
			required to confirm nesting habitat absent.
Masked Owl (*Tyto novaehollandiae*)	V-BCA	Lot 20, north of Lot 2 DP573214, Lot 2 DP827097	Low – foraging. Unlikely to nest as no suitable hollows. Formal survey required to confirm nesting habitat absent.
Square-tailed Kite (*Lophoictinia isura*)	V-BCA	All woodland and forest on site.	Unlikely to nest – no raptor nests observed. Formal survey required to confirm nesting habitat absent.
Little Eagle (*Hieraaetus morphnoides*)	V-BCA	All woodland and forest on site.	Unlikely to nest – no raptor nests observed. Formal survey required to confirm nesting habitat absent.
Regent Honeyeater (*Anthochaera phrygia*)	CE-BCA E-EPBCA	Forest Reds Gums on Lot 20, Lot 2 DP573214, and Lot 2 DP827097	Unlikely to very low chance of occurrence as rare vagrant. Formal survey required.
Swift Parrot (*Lathamus discolour*)	CE-BCA E-EPBCA	Forest Reds Gums on Lot 20, Lot 2 DP573214, and Lot 2 DP827097	Unlikely to very low chance of occurrence as rare vagrant. Formal survey required.
Bush Stone Curlew (*Burchinus grallaris*)	E-BCA	Lot 2 DP573214 and Lot 2 DP827097	Very low to unlikely to occur. Formal survey required.
Spotted-tail Quoll (*Dasyurus maculatus*)	V-BCA E-EPBCA	Lot 20 and perhaps lantana patches on Lot 2 DP573214 if hollow logs present.	Unlikely to very low chance of transient occurrence as part of wider foraging range. Formal survey required.
Brushtailed Phascogale (*Phascogale tapoatafa*)	V-BCA	Lot 20, marginally on Lot 55, Lot 2 DP573214 and Lot 2 DP827097	Low potential occurrence. Formal survey required.
Common Planigale (*Planigale maculata*)	V-BCA	Tall grassland on Lot 2 DP573214 has some generic potential.	Isolation suggests very low to unlikely to occur. Formal survey required.
Eastern Pygmy Possum (*Cercartetus nanus*)	V-BCA	Marginal potential perhaps on Lot 20	High edge effects, marginal habitat and lack of local records suggest unlikely to very low potential to occur. Formal survey required.
Squirrel Glider (*Petaurus norfolcensis*)	V-BCA	Lot 20, marginally on Lot 55, Lot 2 DP573214 and Lot 2 DP827097	Low potential. Formal survey required.
Yellow-bellied Glider (*Petaurus australis*)	V-BCA	Lot 20, marginally on Lot 55, Lot 2 DP573214 and Lot 2 DP827097	Low potential. Formal survey required.

Species	Legal Status	Location of potential habitat	Potential to occur
Koala (*Phascolarctos cinereus*)	V-BCA V-EPCA	All Lots, varying (Lot 50 only has few KFTs on fringes).	Recorded – needs further survey to confirm if Core Koala Habitat for SEPP 44. Koala credits required.
Grey-headed Fruit-bat/Flying Fox (*Pteropus poliocephalus*)	V-BCA V-EPBCA	All Lots, varying (Lot 50 only has few trees which may offer forage).	Highly likely to forage but standard survey to confirm no breeding habitat (camp).
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)	V-BCA	All Lots, varying with structure. Foraging only as no potential breeding habitat (caves).	Moderately likely. May need survey to confirm no breeding habitat, only foraging.
Little Bent-wing Bat (*M. australis*)	V-BCA		
Eastern Cave Bat (*Vespadelus troughtoni*)	V-BCA	All Lots, varying with structure. Foraging only as no potential breeding habitat (caves).	Very low probability occurrence. May need survey to confirm no breeding habitat, only foraging.
Southern Myotis (*Myotis macropus*)	V-BCA	Lot 20 potentially roosting in hollows but no potential foraging habitat.	Very low chance of roosting on Lot 20 but distance from potential foraging habitat limits this. Survey required to confirm roosting during breeding season.
Green and Golden Bell Frog (*Litoria aurea*)	E-BCA V-EPBCA	Dams and drainage lines offer generic potential on Lot 2 DP DP827097	Unlikely to occur on site due to isolation from any known records, limited over-wintering habitat and vulnerable to local extinction. However survey required to confirm.

Assessment under the Biodiversity Assessment Method (BAM) as part of future Development Applications may identify additional species needing survey, depending on the final PCTs

Figure 3: Hollow-bearing trees

5 STATUTORY FRAMEWORK OVERVIEW

5.1 EPBC Act

5.1.1 Overview

The provisions of the EPBC Act require determination of whether the proposal has, will or is likely to have a significant impact on a "*matter of national environmental significance*". These matters are listed and addressed as follows:

1. **World Heritage Properties**: The site/study area is not listed as a World Heritage area nor does the proposal affect any such area.

2. **Ramsar Wetlands of International Significance**: No Ramsar wetland occurs on or adjacent to the site, nor does the proposal affect a Ramsar Wetland.

3. **EPBC Act listed Threatened Species and Communities**: The Koala (Vulnerable) is known to occur, the Grey Headed Flying Fox (Vulnerable) is highly likely and the Green and Golden Bell Frog (Vulnerable) is a very low potential occurrence in the study area. The Grey-Headed Flying Fox is not at risk of a significant impact. The Koala has its own assessment process, but unless the proposal were to see loss of all habitat and this would lead to a decline of an important population, it is unlikely to see referral. If the Green and Golden Bell Frog is recorded breeding within 100m of the site, a referral will automatically be required.

4. **Migratory Species Protected under International Agreements**: A few commonly occurring migratory species may occur in the forest habitats, but only for foraging as non-core part of their range and would not breed due to limited resources, edge effects or the site does not meet breeding habitat requirements. No species is thus likely to be significantly affected by the proposal, as detailed below.

5. **Nuclear Actions**: The proposal is not a nuclear action.

6. **The Commonwealth Marine Environment (CME)**: Listed as relevant to the site though is not within the CME nor does it affect such.

7. **The Great Barrier Reef Marine Park:** The proposal does not affect the Great Barrier Reef Marine Park.

8. **National Heritage**: The site does not contain an item of National Heritage.

9. **A water resource, in relation to coal seam gas development and large coal mining development**: The proposal is not a mining development.

5.2 Biodiversity Conservation Act 2016

5.2.1 Overview

As of August 25th 2017, the *Threatened Species Conservation Act 1995* was superseded by the NSW *Biodiversity Conservation Act 2016* (BC Act) and the associated *Biodiversity Conservation Regulation 2017*.

For Development Applications (DAs) under Part 4 of the *Environmental Planning and Assessment Act* (EP&A) *1979*, there are now several triggers for an assessment under the Biodiversity Assessment Methodology (BAM) and hence the need to secure offset credits via the Biodiversity Offset Scheme (BOS). These are:

- Clearing of a prescribed area limit of native vegetation designated for the minimum lot size for the LEP zoning of the subject land.
- Clearing of land mapped as having Sensitive Biodiversity Values Land (SBVL).
- Determined as likely to have a significant after assessment under the Five Part Tests.

The SBVL trigger does not apply as the land is not mapped as such (see Figure 4).

If the area threshold is not triggered, the relevant future DA will be assessed under the Five Part Tests.

The Biodiversity Offset Scheme (BOS) is expected to apply to each of the following lots in future DAs as follows:

- Lot 50: Possibly, depending on composition of the pasture. Native species dominate >50% of the western side but may not be sufficient in area to trigger the threshold. Recent slashing of most of the grassland rendered confident preliminary assessment of the remainder as predominantly native or exotic as impossible. This vegetation will need to be assessed to see if it meets the composition threshold when it recovers.

- Lot 2 DP573214: Definitely as the groundcover is predominantly native, and then the tree cover is also predominantly native.

- Lot 2 DP827097: Possibly, only if the EEC vegetation was to be removed or the clump of forest adjacent to the northern dwelling. The remainder of the site is essentially exotic pasture hence the clearing threshold won’t apply.

- Lot 20: As this is a road reserve and <1ha, it is difficult to determine how the area threshold may apply. If the road reserve’s development is to widen the road, it is assumed that MCC would be the proponent, and the action would be assessed under Part 5 of the Act. In this situation, the BOS would not apply unless the Five Part Test determined a significant impact. The latter also applies to widening of Glenthorne Rd which could see loss of vegetation from Lot 55 DP863972.

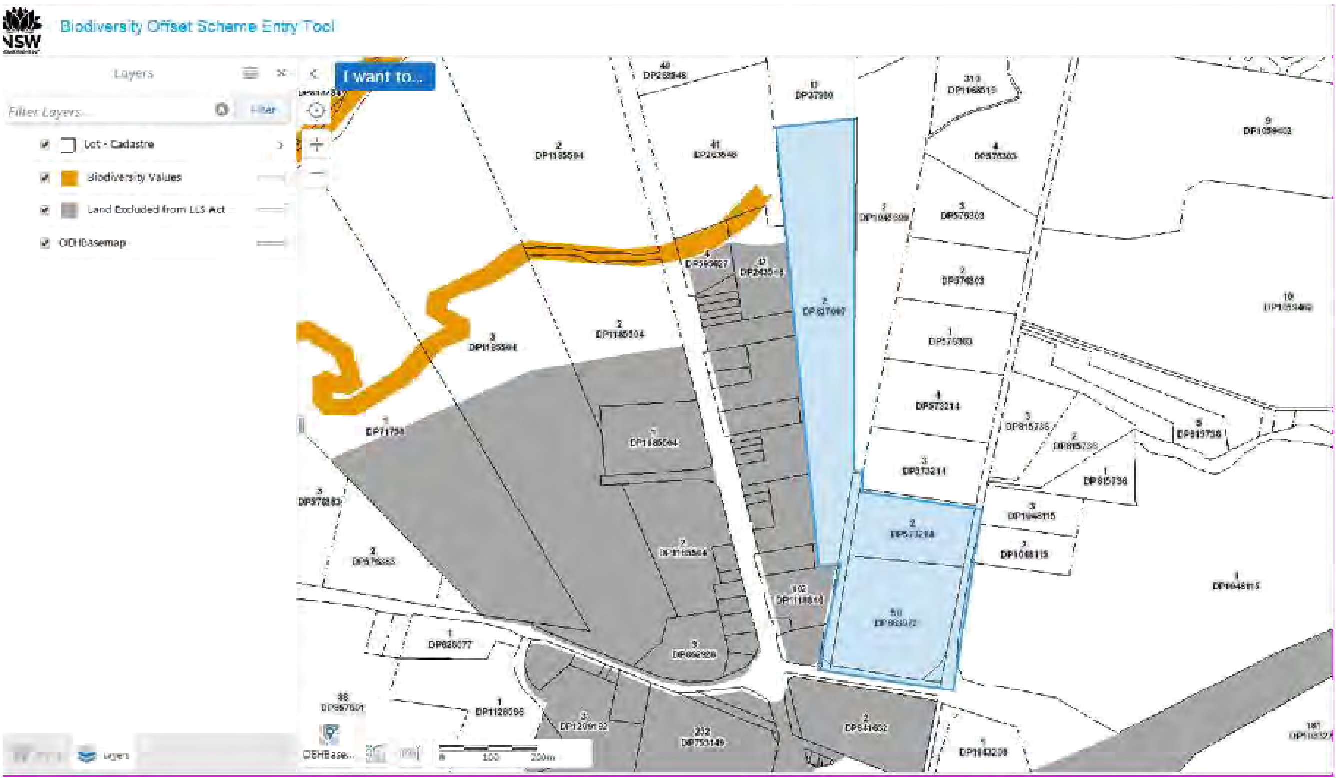
5.2.2 Serious and Irreversible Impacts

Serious and Irreversible Impacts (SaIIs) are a new consideration which predominantly applies to species and ecological communities listed as Critically Endangered or otherwise very sensitive to further decline.

Council cannot approve a DA where a SaII is significantly impacted.

The only relevant SaII species is the Pale Yellow Doubletail (*Diuris flavescens*), which has been recorded in the locality. If this species where to be found on site, it would need to be avoided.

Figure 4: SBVL mapping of the study area.
(https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap)



5.2.3 Biodiversity Offset Scheme

When the Biodiversity Offset Scheme (BOS) is triggered by one or more of the thresholds above, a development must be assessed under the Biodiversity Assessment Methodology (BAM).

If the rezoning in this situation is approved under a Biocertification, the BAM will be applied with a Biodiversity Certification Assessment Report (BCAR).

Assuming a DA will be lodged by future proponents for their respective properties post-rezoning, a Biodiversity Development Assessment Report (BDAR) will be required, which will detail the following:

1. Assessment of the biodiversity values (as defined in s1.5 of the BC Act) of the land the subject of the proposed DA, in accordance with the BAM,
2. Assessment of the impact of the proposed DA, proposed activity or proposed clearing on the biodiversity values of that land,
3. Measures the proponent proposes has or will take to avoid or minimise the impact,

4. Specifies the number and classes of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values of actions to which the BOS applies.

The proponent will be required to retire the necessary biodiversity credits (ecosystem credits, species credits and dual credits if relevant). Credits are divided into either ecosystem credits (where a number of species associated with that specific Plant Community Type (PCT) can be addressed under one type of credit) or species credits (species for which ecosystems are not adequate surrogates).

The BAM Calculator (BAMC) will identify species with potential to occur which are addressed under ecosystem credits or which require species credits (generally comprising those species listed in Table 2). Species credit species nominated by the BAM as having potential to occur may be subject to targeted survey or an expert report to discount their occurrence and hence negate the need for species credits.

There are a number of ways credits requirements can be met, including:

- Retiring biodiversity credits through establishing your own Biodiversity Stewardship (offset) site.
- Purchasing credits on the open market.
- Funding biodiversity actions for individual species or communities (limited opportunities).
- Making a payment to the Biodiversity Conservation Trust (BCT) as prescribed by the Biodiversity Offsets Payment Calculator.

The DA consent will specify the offset requirements, and the credits must be retired before commencement of the activity.

6 RECOMMENDATIONS

6.1 Stage 2 Investigations

If the proposal is supported by Council to be assessed under Stage 2, further detailed investigations will need to be undertaken to assess statutory obligations and inform the development of a future Development Control Plan (DCP). These are summarised in overview as follows.

6.1.1 Biodiversity Conservation Act 2016

As a DCP will need to be developed for the area, and that some zonings will initiate expectations of future development that may require removal of native vegetation, such development may trigger off the BOS as detailed above.

Under the new Act, there appears to be no formal requirement to prepare a Biodiversity Development Assessment Report (BDAR) at this stage as no Development Application (DA) is being lodged. However, economic viability of such future development may be impacted by offset requirements and the Act also requires Council to consider the principles of avoid, minimise and offset.

To inform Council of the conservation values of the land, is recommended that Stage 1 of the Biodiversity Assessment Method (BAM) be undertaken. The BAM will identify the Plant Community Types (PCTs), their relative value in terms of vegetation integrity, and the species credit species which may be present. With this data, a preliminary masterplan can be 'tested' against the BAM Calculator (BAMC) to determine the number and type of credits which may be required, and if low value vegetation can be zoned for development. A viable masterplan can be developed thus with minimum offset requirements.

This stage may also identify species credit species which can be surveyed to eliminate them from the credit calculations (eg. *Pterostylis chaetophora*) and hence improve economic viability; or confirmed to be present and the masterplan designed to avoid or minimise impacts eg. Koala.

6.1.2 SEPP 44

The status of the site as Core Koala Habitat will need to be formally determined by a targeted Koala survey.

This will consist of a combination of scat searches with call playback and direct searches over the Koala breeding season. This period is preferred as the local population may be low density and hence only use the study site as part of its range. Activity is greatest in this season and hence detectability is also maximised.

This will also assist with the Koala assessment under the EPBC Act.

6.2 Development Design

Based on this preliminary investigation, the following preliminary recommendations are made.

1. **Maximise retention of the vegetation in the road reserve of Eriksson Lane via using Glenthorne Road as the primary access**.

Justification:

Development of Eriksson Lane will require removal of most if not all existing vegetation due to the narrow existing roadway, root zones, structural limitations of the senescent trees, services, etc.

Lot 20 contains all the site's hollow-bearing trees, and this key habitat component appears to be locally uncommon. It also contains most of the Forest Red Gums and numerous Tallowwoods, and evidences use by Koalas. Forest Red Gum is a key species both for its KFT value but also to arboreal mammals and seasonal migrant threatened species. Forest Red Gum is relatively less common in the landscape due to extensive loss of former habitat on the floodplain in the EEC – *Subtropical Floodplain Forest on Coastal Floodplains*.

2. **Maximise retention of hollow-bearing trees in Eriksson Lane.**

Justification:

As above.

In addition, *Loss of hollow-bearing trees* is listed as a Key Threatening Process under the BC Act and EPBC Act both due to the very slow natural recruitment of this key habitat component, and the broad range of threatened species directly and indirectly dependant on them.

3. **Maximise retention of mature Koala food trees, especially Forest Red Gum due to its dual value as a nectar source during seasonal shortages for several nomadic threatened species.**

Justification:

As above.

Lot 2 DP573214 was formerly cleared for a prolonged period but lapse in suppression of regrowth now sees the young tree component dominated by Koala Food Trees. Conservation of this Lot as a stewardship site could generate credits which may be used by other local development and allow this habitat to mature and potentially support Koalas.

Under the transition provisions of the amended *Local Land Services Act 2013*, most of the tree cover on Lot 2 DP573214 could possibly be removed as unprotected regrowth under the former *Native Vegetation Act 2003*.

The Native Vegetation Regulatory Map does not map this land as excluded from the Act or as Vulnerable Regulated Land or Sensitive Regulated Land. The mapping is however incomplete, and the mapping of the land as Excluded, Category 1 Exempt or Category 2 Regulated Land has not been completed (see Figure 5). Hence it is uncertain what controls on clearing will exist if Lot 2 DP573214 remains zoned Rural.

4. **Retain and rehabilitate the EECs, and establish an appropriate fully vegetated buffer with due consideration of stormwater management, upper catchment condition and bushfire constraints.**

Justification:

Edge effects are a key threat to the integrity of a Coastal Floodplain EEC, as identified in the Final Determinations (2004a, 2004b, 2004c). Standard practice is to establish a fully vegetated buffer to filter nutrients, reduce penetration by weeds, and enhance the carrying capacity of remnant EEC habitat for fauna which contribute to the ecological processes which define the EEC. However the effectiveness of such buffers can be limited by a lack of such buffers or effective stormwater controls upstream or consistently over the catchment eg. constant input of weeds and nutrients from uncontrolled areas.

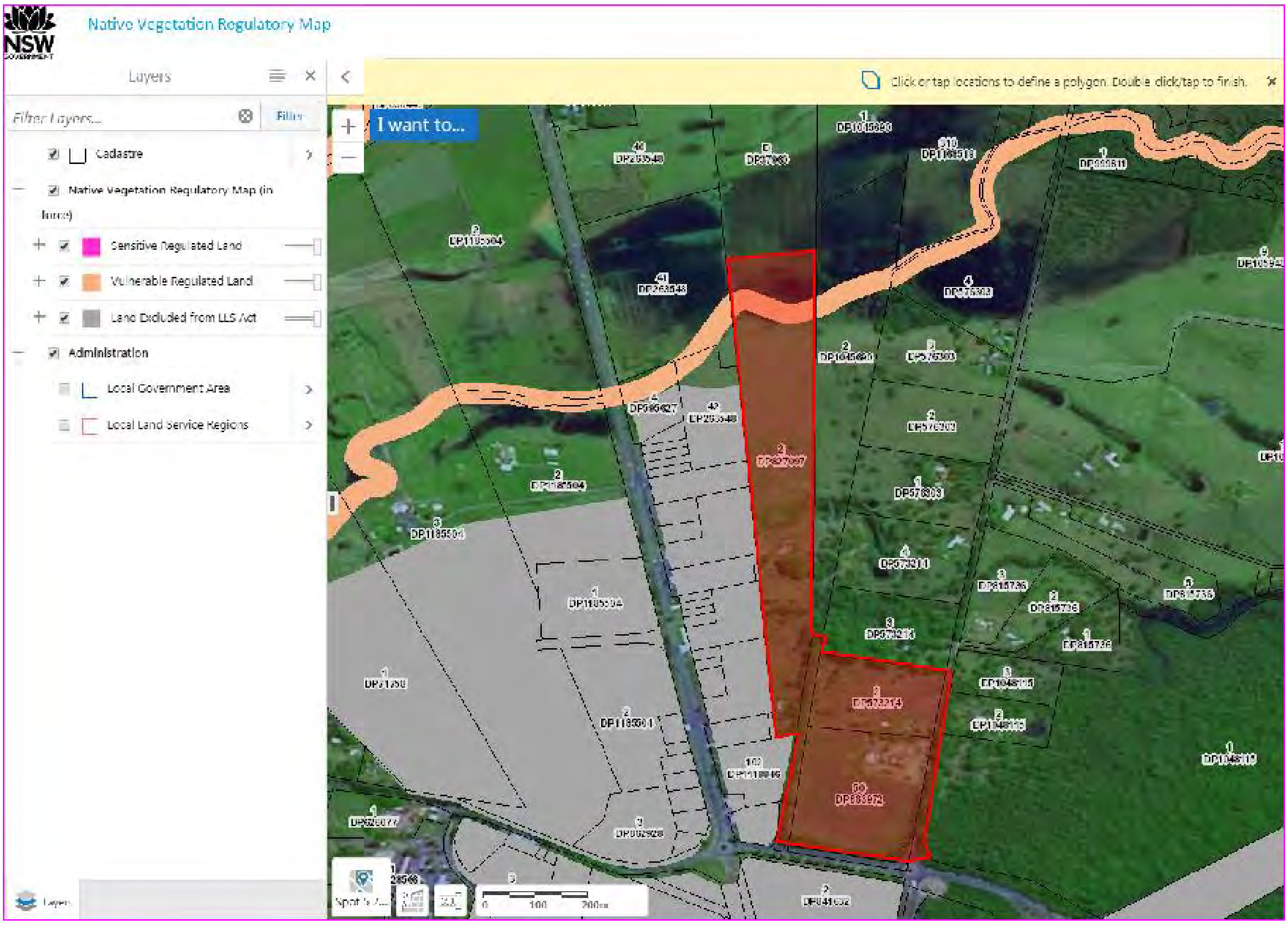
The EEC stands on site are degraded by historical and current landuses, and currently subject to nutrient and weed inputs from upstream sources (ie existing industrial development). The improvement of the intrinsic condition and hence value of the EECs is probably best achievable via rehabilitating the EEC and implementing best practice stormwater management on site, with a final vegetated buffer width determined in line with other constraints (eg. bushfire).

5. **Stormwater management in the catchments of the EECs must demonstrate maintaining or improving current water quality.**

Justification:

As above, this will assist in minimising edge effects and determining the final vegetation buffer width, and also maintain or improve habitat for frogs eg. via minimising nutrient input for weeds.

Figure 5: Native Vegetation Regulatory Map
(https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=NVRMap)



7 Conclusion

This preliminary assessment has identified key constraints on the property at a macro scale, with lower probability constraints requiring appropriate further investigations to clarify their relevance.

The study site has potential for industrial development which can be planned to utilise the areas of least conservation value, with appropriate mitigation measures to further reduce long term impacts associated with the development.

Yours faithfully,

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MECANSW, MRZSNSW, MABS, MAHS, MAPCN

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Troedson, A.L. and Hashimoto (2005). *NSW coastal Quaternary geology data package. NSW Department of Primary Industries, Mineral Resources, Geological Survey of NSW*. Prepared for NSW Coastal Council and managed by the NSW Dept of Planning, Infrastructure and Natural Resources.

APPENDIX 1: POTENTIAL THREATENED SPECIES OCCURRENCE

Searches of relevant literature and databases (OEH 2018a) found records of the following threatened flora species in the locality. In the table below, these species are evaluated for their potential to occur on the site.

Table 5: Potential occurrence – Flora

Species	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
Trailing Woodruff *(Asperula asthenes)*	V-BCA, V-EPBCA	3	An herb found in damp sites along riverbanks and similar areas.	Some generic potential habitat in billabong and dam. No close proximity records but recorded on same floodplain. Low potential to occur.	**Yes**
White-flowered Wax Plant (*Cynanchum elegans*)	E-BCA E-EPBCA	1	A twiner occurring predominately in dry rainforest, littoral rainforest and the ecotone between dry rainforest and open forest, however it has been found in the Manning Valley and Hastings in Open Forest types on specific geologies e.g limestone and serpentine respectively (Garry Germon pers. comm. 2004, personal observations). It occurs on a variety of lithology's and soil types. It has been found between the altitudinal ranges of 0 to 600 metres ASL and rainfall >760mm annually (NPWS 1999). Common associated species include *Geijera parviflora, Notelaea microcarpa, Banksia integrifolia, Ficus spp., Guioa semiglauca, Melia azedarach, Streblus brunonianus* and *Pittosporum revolutum*	No suitable habitat on site. Unlikely to occur	No.
Pale Yellow Doubletail (*Diuris flavescens*)	E-BCA CE-EPBCA	2	Only known to occur in the Tinonee-Wingham area. Grows in grassy tall eucalypt forest with Kangaroo Grass and Bladey Grass on brown clay soil. Flowers September to October	Some marginal generic potential habitat derived from previous clearing on Lot 2 DP573214, and less so on Lot 20, however not in known locality. Very low potential to occur.	**Yes** to confirm absence as is a SaII species.

Species	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
Slaty Red Gum *(Eucalyptus glaucina)*	E-BCA	6	A tall tree to 30m in height. Grows in woodland and open forest on deep moderately fertile soils.	Site may qualify as suitable habitat, however *E. tereticornis* appears to be dominant. No proximate records. Unlikely to very low potential to occur but targeted survey required to confirm.	**Yes** – to confirm absence.
Craven Grey Box *(Eucalyptus largeana)*	E-BCA	3	Tree to 40m high, considered confined to Gloucester-Craven district – records outside this range unconfirmed. Recorded to west-southwest in Kiwarrak State Forest.	No suitable habitat on site as outside of range. Unlikely to occur	No.
Eucalyptus seeana population in the Greater Taree local government area	EP-BCA	3	Tree to 40m similar to *E. tereticornis*, occurring most often on swampy, sandy soils.	Generic potential habitat in swamp forest on site but appears most if not all of the Red Gums are *E. tereticornis*. Unlikely to very low at best given lack of close proximity records	**Yes** – confirmation of each Red Gum.
Taree Rustyhood *(Pterostylis chaetophora)*	V-BCA	3	Terrestrial orchid found in scattered locations from Taree to Kurri Kurri, south-east to Tea Gardens and upper Hunter, and also near Denman and Wingen. Recorded in seasonally moist dry sclerophyll forest with grass to shrub understorey. Flowers Sept-Nov unless dry conditions. Deciduous, with rosettes emerging prior to flowering in autumn to winter after soaking rain.	Some generic potential on Lot 2 DP57314 and possibly road reserve on Lot 20. Unlikely to very low at best given lack of close proximity records and disturbances.	**Yes** – to confirm absence.

A significant number of threatened fauna have been recorded in the locality, and a number of others are considered potential occurrences by the consultant. In the table below, these species (excluding marine species due to obvious lack of habitat) are evaluated for their potential to occur on the site.

Table 6: Potential occurrence – Fauna

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
Powerful Owl (*Ninox strenua*)	V-BCA	10	Wet and dry sclerophyll forests. Nests in tree hollows. Requires high diversity and abundance of medium-sized arboreal prey. Very large territory (500-5000ha).	Habitat in the study area comprises fringe of a larger detached remnant with prey potential but no suitable potential nesting hollows. May at most comprise marginal fringe of larger territory. Only low potential to occur as rare foraging foray utilising it as minute fraction of wider territory.	**Yes** – to confirm no breeding habitat.
Barking Owl (*Ninox connivens*)	V-BCA	1	Well-forested hills and flats, eucalypt savannah (especially), and riverine woodland in coastal and subcoastal areas. Prefers hunting in more open country for mammals (rabbits, rats, mice, small bats and small marsupials) and birds (small up to Frogmouths and Magpies). Large territories. Nest in hollows.	Habitat in the study area comprises fringe of a larger detached remnant with prey potential but no suitable potential nesting hollows. May at most comprise marginal fringe of larger territory. Only low potential to occur as rare foraging foray utilising it as minute fraction of wider territory.	**Yes** – to confirm no breeding habitat.
Masked Owl (*Tyto novaehollandiae*)	V-BCA	1	Eucalypt forest and woodlands with sparse understorey. Nests in tree hollows. Requires high diversity and abundance of prey 200-600g weight. Large territory.	Habitat in the study area comprises fringe of a larger detached remnant with prey potential but no suitable potential nesting hollows. May at most comprise marginal fringe of larger territory. Only low potential to occur as rare foraging foray utilising it as minute fraction of wider territory.	**Yes** – to confirm no breeding habitat.
Sooty Owl (*Tyto tenebricosa*)	V-BCA	3	Rainforest and tall, moist, diverse eucalypt forest. Roosts in dense foliage, tree hollows & caves/overhangs. Nests in hollow in tall forest tree. Requires high diversity and abundance of medium-sized arboreal and/or terrestrial prey. Large	No – not suitable habitat. Unlikely to occur.	No.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			territory.		
Square-tailed Kite (*Lophoictinia isura*)	V-BCA	0	Open forests and woodlands in coastal and subcoastal areas. Forages low over, or in, canopy for eggs, nestlings, passerines, small vertebrates and invertebrates. Large home range (>100km²). Observed foraging in residential areas of Port Macquarie. Large stick nest in high fork of living tree. Breeds July-December. Probably migrates to northern Australia in winter. (Debus 1998, NSW NPWS 2000).	Site provides potential foraging habitat. No nests found on or adjacent to the site and it was not detected by the survey. Not recorded in locality. Low to moderate chance of occurrence as part of a larger foraging range. Unlikely to nest – no raptor nests observed.	**Yes** – to confirm no breeding habitat.
Little Eagle (*Hieraaetus morphnoides*)	V-BCA	0	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe (e.g. chenopods) (Marchant and Higgins 1993; Aumann 2001a). It is found mostly commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. The species builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Diet includes terrestrial mammals, birds and reptiles, occasionally large insects and rarely carrion (Marchant and Higgins 1993; Aumann 2001b). Many of the remaining key prey species (e.g. terrestrial grassland birds such as quail, button-quail, pipits, larks and songlarks) require ground cover and are sensitive to habitat degradation from grazing (Marchant and Higgins 1993).	Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland, sheoak or acacia woodlands and riparian woodlands of interior NSW are also used (Marchant and Higgins 1993; Aumann 2001a). For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring. It eats birds, reptiles and mammals, occasionally adding large insects and carrion (Marchant and Higgins 1993; Aumann 2001b; Debus et al. 2007). It is distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment (Marchant and Higgins 1993). It occurs as a single population throughout NSW.	**Yes** – to confirm no breeding habitat.
Regent Honeyeater (*Anthochaera phrygia*)	CE-BCA E-EPBCA	0	Nomadic. Inhabits temperate eucalypt woodlands and open forest, including forest edges, woodland remnants on farmland and urban areas. Also uses *Casuarina cunninghamiana* gallery forests. Requires reliable and ample nectar supplies to	No preferred species – may perhaps as best occur as a chance vagrant. No records in locality - this species makes very rare visits to the LGA in non-breeding migratory visits.	**Yes** – only to confirm absence.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			support semi-permanent (core breeding) habitat. Favoured nectar sources are *E. sideroxylon, E. albens, E. melliodora, E. leucoxylon, E. robusta, E. planchoniana*, and heavy infestations of mistletoe. Also take insects and orchard fruits. Breeds in pairs or small colonies in open woodland/forest and occasionally more disturbed woodland near housing and farmland, depending on food availability, from August-January. Breeding less likely to occur if nectar flows are low or unreliable, or heavy competition with more aggressive honeyeaters eg Noisy Miner, Red Wattlebirds and Noisy Friarbirds.		
Swift Parrot (*Lathamus discolour*)	CE-BCA E-EPBCA	0	Breeds in Tasmania and winters in Victoria with some dispersal northwards. Feeds mostly on pollen and nectar of winter flowering eucalypts, but also feeds on fruit, seeds, lerps and insect larvae (Schodde and Tideman 1990). Also favours profusely flowering banksias. Favoured species are *E. robusta*, *Corymbia gummifera*, *E. globulus, E. sideroxylon, E. leucoxylon, E. labens, E. ovata, C. maculata, Banksia serrata* and *B. integrifolia.* Also recorded in *E. tereticornis*.	*E. tereticornis* present but localised abundance suggests probability of this very rare bird is very low – at most a chance vagrant.	**Yes** – only to confirm absence.
Varied Sittella (*Daphoenositta chrysoptera*)	V-BCA	2	Sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Higgins and Peter 2002; Barrett et al. 2003). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It	Suitable potential habitat on site and in study area.	No – not a species credit species.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.		
Red-backed Button-quail (*Turnix maculosus*)	V-BCA	2	Red-backed Button-quail inhabit grasslands, open and savannah woodlands with grassy ground layer, pastures and crops of warm temperate areas, typically only in regions subject to annual summer rainfall greater than 400 mm. In NSW, said to occur in grasslands, heath and crops. Said to prefer sites close to water, especially when breeding. The species has been observed associated with the following grasses (in various vegetation formations): speargrass *Heteropogon*, Blady Grass *Imperata cylindrica*, *Triodia*, *Sorghum*, and Buffel Grass *Cenchrus ciliaris*.	Some marginal general potential perhaps on Lot 2 DP573214, but this habitat is an isolate with no nearby habitat. Unlikely to occur.	No.
Speckled Warbler (*Pyrrholaemus sagittata*)	V-BCA	1	Inhabits mostly inland woodlands (some drier coastal areas) with grassy understorey often on ridges and gullies. Sedentary in pairs or trios, and nests on ground in grass tussocks, dense litter and fallen branches. Forages on ground or understorey for arthropods and seeds within home range of 6-12ha. Remnants <100ha not suitable.	Not likely habitat as more of a hinterland species and not true habitat type. Unlikely to occur.	No
Bush Stone Curlew (*Burchinus grallaris*)	E-BCA	0	Nocturnal, sedentary and territorial (when breeding) species generally inhabiting open grassy woodlands with few or no shrubs. Abundant leaf litter and fallen debris such as tree branches required for foraging and roosting. Nests in more open areas with very little groundcover (even recorded on mown lawns and golf courses). Coastally, often associated with Swamp Oak groves, saltmarsh, mangroves, *Melaleuca quinquenervia* woodlands and even golf courses, etc. May travel as far as 3km from roost site to	Some broadly generic potential habitat perhaps in lawns and swamp forest but no local records. Very low to unlikely to occur.	**Yes** – species credit species hence confirmation required.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			foraging grounds.		
Glossy Black Cockatoo (*Calyptorhynchus lathami*)	V-BCA	6	Dry sclerophyll forest and woodland containing Allocasuarina and Casuarina, and large tree hollows. Preferred regional forage species are A. littoralis and A. torulosa. Requires sufficient extent of forage within home range to support breeding. Breeds Mar-Aug, takes 90 days to hatch and fledge (Lindsey 1992).	Very few potential food and no nest trees. Unlikely to occur.	No – no potential to nest on site.
Osprey (*Pandion cristatus*)	V-BCA	8	Fish (mostly Mullet) and carrion eater. Forages along coastal rivers, lakes, beaches, creeks and inlets. Tall, dead tree for staging or feeding roost. Nests on exposed tree within 2km of water, but rarely adjacent, and with access to Paperbark or Swamp Oak for nest material. Breeds April-Sept. (Clancy, 1991)	No foraging, roosting or nesting habitat on or adjacent to site. Recorded in locality but not during survey. Unlikely to occur (possibly only flying over).	No – no potential to nest on site.
White-bellied Sea Eagle *(Haliaeetus leucogaster)*	V-BCA	0	Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas. Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia.	No foraging, roosting or nesting habitat on or adjacent to site. Recorded in locality but not during survey. Unlikely to occur (possibly only flying over).	No – no potential to nest on site.
Black-Necked Stork/Jabiru (*Ephippiorhynchus asiaticus*)	E-BCA	8	Wetlands, mudflats, mangroves, floodplains, irrigated fields, farm dams. Forages in shallow water for small vertebrates. Shuns cover, prefers extensive open shallows. Nests in a tree, often above water in a secluded swamp. Eggs laid Aug-Nov in NSW. Adults resident, juveniles dispersive (DEC 2005a, Lindsey 1992).	Low value potential foraging habitat on Lot 2 DPX. No roosting or nesting habitat on or adjacent to site (avoids forest). Recorded in locality. Unlikely to very low potential to occur (possibly only flying over).	No
Australasian Bittern	E-BCA E-EPBCA	0	Wetlands, preferably with dense sedges, rushes, reeds. Prefers freshwater, but also uses densely vegetated saltmarsh and flooded grasslands.	Habitats too small and isolated from other habitat. Not recorded in locality. Unlikely to	No suitable habitat affected. No risk of

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
(*Botaurus poiciloptilus*)			Roosts on the ground, forages in shallow water from a platform of trampled vegetation, nests above water on similar platform. Single or groups to 12. Usually sedentary, but nomadic in response to flood, drought. (DEC 2007b)	occur (possibly only flying over).	significant impact.
Spotted-tail Quoll (*Dasyurus maculatus*)	V-BCA E-EPBCA	3	Various forested habitats with preference for dense forests. Requires tree hollows, hollow logs or caves for nesting. Large home range (>500ha) and may move over several kilometres in a few days. Tends to follow drainage lines.	Limited forest on site and study area, and isolated by major roads. Limited potential den sites in few trees on Lot 20. Predator species (eg foxes, feral cats, etc) are likely to be present in the general area. Recorded in the locality. Unlikely to very low chance of transient occurrence as part of wider foraging range.	**Yes** – to confirm absence as species credit species.
Brushtailed Phascogale (*Phascogale tapoatafa*)	V-BCA	9	Range of forest habitats but prefers drier sclerophyll forest with sparse ground cover. Forages on large rough-barked trees for small fauna, also utilises eucalypt nectar. Rests in tree hollows, stumps, bird nests. Requires tree hollows for nesting. (NSW NPWS, 2000) Breeds May-July. Occupies territory of 20-100ha.	Preferred forest type on site and in study area with suitable tree hollows for shelter/denning. Predator species (eg foxes, feral cats, etc) are likely to be present in the general area. Not recorded on site, but recorded in the locality. Low potential occurrence.	**Yes** – to confirm absence as species credit species.
Common Planigale (*Planigale maculata*)	V-BCA	1	Wide variety of habitats. Preference for areas of dense groundcover due to heat/dehydration problems. May prefer ecotones of dry/wet habitats (Denny 1982). Preys on arthropods, small vertebrates, shelters in nest under/in fallen timber or rock (Strahan 1995). Home range about 0.5ha. Breeds Oct-Jan (NSW NPWS 2000).	Virtually all of site is too disturbed or lacks sufficient cover. The tall grassland on Lot 2 DP573214 has some generic potential but isolation suggests very low to unlikely to occur.	**Yes** – to confirm absence as species credit species.
Long-Nosed Potoroo (*Potorous tridactylous*)	E-BCA, V-EPBCA		Coastal heath and shrublands; paperbark forest; woodland with dry heathy understorey; dry and wet sclerophyll forests; high elevation rainforest or moist hardwood forest; moist shrublands with dense or moderately dense understoreys and	No suitable habitat. No local records. Unlikely to occur.	No.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			sedge-dominated groundcover; wet or dry sclerophyll forests where average annual precipitation exceeds 760mm. Requires thick groundcover for refuge, while foraging in open areas on ridges, slopes or gullies, typically on ecotones, and prefers sandy soils for digging. Eats roots, tubers, fungi, fleshy fruits, leaves, insects and other soil invertebrates. Optimum habitat generally considered a mosaic of regenerating dense understorey vegetation as result of patchwork of periodic low to medium intensity fires. Home range 2-5ha (NSW NPWS 2000).		
Eastern Pygmy Possum (*Cercartetus nanus*)	V-BCA	0	Found in rainforest, sclerophyll forest, woodland and tree heath. Predominantly nectarivorous (opportunistically insectivorous and also eats fruits during flowering lulls) feeding on Banksias, Leptospermum, Melaleucas, Eucalypts and Callistemons. Nest in very small hollows, or within bark/leaf nests in tree forks (eg Melaleucas and Banksias), Myrtaceous shrubs, abandoned bird nests or under loose eucalypt bark. Often Winters in torpor	Some marginal potential perhaps on Lot 20 but Lot 2 DP573214 is considered too immature. High edge effects, marginal habitat and lack of local records suggest unlikely to very low potential to occur.	**Yes** – to confirm absence as species credit species.
New Holland Mouse (*Pseudomys novaehollandiae*)	V-EPBCA	3	Swamp forest, heath, open forest on sand. Most often found in heath dominated by leguminous shrubs <1m high with sparse groundcover. Depends on a specific fire regime – prefers early stages of post-fire recovery. Diet varies with season. Seeds preferred in spring-summer, with insects and invertebrates in winter, plus leaves, flowers and fungi. Nocturnal with burrows in sandy soil, temporary to up to 5m long with nest chamber and various residences, and expected to be occupied by family groups. Home range of breeding females overlap but not males. Breeds in late winter	No suitable habitat and no local records. Unlikely to occur.	No

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			to early summer, with peak breeding in 2nd year (only live for about 2 years), with peak size in 2nd year. Population peaks in autumn, lowest in spring, with peak density of 17/ha in ideal conditions.		
Squirrel Glider (*Petaurus norfolcensis*)	V-BCA	5	Dry, open forest and woodland, and occasionally wet eucalypt and rainforest. Most common in floriferous sub-coastal and coastal forests with abundant winter flowering trees and shrubs (coastal populations apparently rely heavily on *Acacia* sap and flowering Banksias	Low value potential habitat on Lot 20, with potential den sites in tree hollows. Low potential to occur – comprising a colony on edge of larger area of suitable habitat.	**Yes** – to confirm absence as species credit species.
Yellow-Bellied Glider (*Petaurus australis*)	V-BCA	1	Moist and dry mature eucalypt forest and woodland. Tree hollows, diversity of winter-flowering and suitable sap-feeding eucalypt species required. Large territory.	Low value potential habitat on Lot 20, with potential den sites in tree hollows. Low potential to occur – comprising a colony on edge of larger area of suitable habitat.	**Yes** – to confirm absence as species credit species.
Greater Glider (*Petauroides volans*)	V-EPBCA	1	Restricted to eucalypt forests and woodlands of eastern Australia. Its diet is mostly eucalypt leaves and occasional flowers and is found in highest abundance in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows. The distribution may be patchy even in suitable habitat. Forests with a diversity of eucalypt species, due to seasonal variation, is its preferred tree species.	Low value potential habitat on Lot 20, with potential den sites in tree hollows. Low potential to occur – comprising a colony on edge of larger area of suitable habitat.	No.
Koala (*Phascolarctos cinereus*)	V-BCA V-EPCA	105	Areas where preferred food species occur in sufficient concentrations and diversity With suitable edaphic conditions and presence of other Koalas.	**Recorded via scats.**	**Yes** – to confirm if Core Koala Habitat, but as recorded, species credits required.
Grey-Headed Fruit-Bat/Flying Fox (*Pteropus poliocephalus*)	V-BCA V-EPBCA	14	Nomadic frugivore and nectarivore on rainforest, eucalypt, melaleuca and banksia. Recorded flying up to 45km from roost (generally max. of 20km). Roosts colonially with short term individual or small groups, mostly near watercourses. Spring or	Site contains potential nectar and pollen and fruit sources, and is considered highly likely to form a small part of the species wider foraging range. No roosting habitat on/adjacent to the site.	**Yes** – to confirm site is not a camp as species credits apply in that situation.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			Summer roosts are maternity sites. Dependant on Winter flowering species eg *E. robusta* and *E. tereticornis.*		
Greater Broad Nosed Bat (*Scoteanax rueppellii*)	V-BCA	0	Forages over range of habitats including rainforests and moist forests, but prefers ecotones between riparian forest, woodland and cleared land. Requires sparse understorey and will forage over water. Roosts in tree hollows. Feeds on larger insects, small vertebrates and perhaps other bats.	Site's vegetation is considered potentially suitable as foraging habitat. Some potential roosting habitat. Considered a fair potential occurrence at some stage.	No – not a species credit species.
East-coast Freetail Bat (*Micronomus norfolkensis*)	V-BCA	5	Specific habitat requirements of this species are poorly known. Has been recorded in habitats ranging from rainforest to dry sclerophyll and woodland, with most recorded in the latter (State Forests 1994). Roosts in small colonies under tree hollows and under loose bark; has been found under house eaves, in roofs and metal caps on telegraph poles. Recorded roosting in roof in Hat Head village. Probably forages above forest or woodland canopy, and in clearings adjacent to forest. Most records are of single individuals, and is likely to occur at low densities over its range.	Site's vegetation is considered potentially suitable as foraging habitat. Some potential roosting habitat. Considered a fair potential occurrence at some stage.	No – not a species credit species.
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)	V-BCA	9	Habitat generalist - forages above well-forested areas. Roosts in old buildings, caves, mines etc. Dependent on nursery caves and communal roosts.	Site's vegetation is considered potentially suitable as foraging habitat. Tree hollows and trees with crevices/notches may provide marginal temporary non-breeding roosting opportunities, though such substrate is limited. Not recorded during survey, though recorded in the locality. Considered a moderate potential occurrence at some stage.	**Yes** – to confirm no breeding habitat as species credit species.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
Little Bent-wing Bat (*M. australis*)	V-BCA	9	As for Eastern Bent-wing Bat.	**Recorded on site**. As for Eastern Bent-wing Bat.	**Yes** – to confirm no breeding habitat as species credit species.
Dwyer's Bat/Large Eared Pied Bat (*Chalinobus dwyeri*)	V-BCA	0	Found in moderately wooded habitats such as dry sclerophyll forest, tall open eucalypt forests, woodlands, sub-alpine woodlands, edge of rainforest and wet sclerophyll forest. Roosts in caves, mines and abandoned bottle-shaped mud nests of Fairy Martins. In caves and mines, tend to roost in twilight sections near entrance. Insectivorous but habits poorly known. Fly relatively slowly, direct and maneuverable, low to ground or 6-10m above ground.	General foraging preferences of this poorly known species suggests locality potentially generically structurally suitable foraging habitat. No cave, mines, etc on or near site for roosting. Not recorded within 10km radius of site (or LGA, and very few regional records). Likelihood to occur on site considered unlikely.	To be confirmed.
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	V-BCA	0	Occupies sclerophyll forest from the Great Dividing Range to the coast, typically wet tall forest at high elevations and is more common in northern NSW. It may migrate to coastal areas in Winter. Roosts typically in tree hollows, but also in caves, buildings. Roosts as single sex colonies of 3-36 bats. Forages in and below tree canopy on moths, beetles, bugs, flies & ants, up to 12km from roost site. Breeds in Summer (Churchill 2009, Smith *et al* 1995). Recently recorded at Thrumster west of Port Macquarie.	Site's vegetation is considered marginally potentially suitable as foraging habitat. No potential roosting habitat. Recorded in the locality, though records at low elevations are scant. Overall considered a very low potential occurrence.	No – not a species credit species.
Yellow-Bellied Sheathtail Bat (*Saccolaimus flaviventris*)	V-BCA	0	Ecology poorly known. Found in almost all habitats, particularly wet and dry sclerophyll forests and woodlands below 500m altitude, and also open woodland, Acacia shrubland, mallee, grasslands and desert. Roosts mainly in tree hollows, but also under bark, under roof eaves and in other artificial structures. Fast flying species, believed to forage	Forest on site offers potential foraging habitat. Potential roosts in hollow-bearing trees. Not recorded in locality. Low to fair chance of occasional occurrence.	No – not a species credit species.

Name	Legal Status	Records	Habitat Requirements	Likelihood Of Occurrence	Survey required?
			above the canopy or closer to the ground in open areas. Insectivorous. May be Summer migrant.		
Eastern Cave Bat (*Vespadelus troughtoni*)	V-BCA	0	Rare and poorly known bat. Cave dwelling bat roosting in small (5) to large (500) groups in sandstone overhang caves, boulder piles, mines, tunnels and sometimes buildings. Tend to roost in well lit portions of caves in avons, domes, cracks and crevices. Inhabits tropical mixed woodland and wet sclerophyll forest on the coast and dividing range, but extend into drier forest on western slopes and inland areas.	Site and general area may be marginally structurally suitable as foraging habitat. No nearby roosts unless using nearby overpas. Overall considered a very low probability occurrence.	**Yes** – to confirm absence of breeding roosts as species credit species
Southern Myotis (*Myotis macropus*)	V-BCA	3	Tunnel, cave, bridges, old buildings, tree hollow and dense foliage roosting bat which prefers riparian habitat over 500m long with nearby roosting habitat. Key habitats are streams, rivers, creeks, lagoons, lakes and other water bodies. Feeds on aquatic insects and small fish. Has recently been observed foraging in small bodies of water.	Watercourses and waterbodies considered two densely vegetated. Recorded in locality. Very low chance of roosting on Lot 20 but distance from potential foraging habitat limits this.	**Yes** – to confirm absence of breeding roosts as species credit species.
Green and Golden Bell Frog (*Litoria aurea*)	E-BCA V-EPBCA	3	Found in permanent swamps and ponds. Prefers water bodies which are: still; shallow; unshaded; ephemeral; unpolluted; generally isolated; and free of native fish species or Plague Minnow (*Gambusia holbrooki)* and little macro-algae. Requires emergent vegetation, grass tussocks or rocks for shelter. May use disturbed sites opportunistically. Eats insects and other frogs. Spring-autumn breeder.	No suitable breeding or refugia habitat on site Recorded in locality but unlikely to occur on site due to isolation from any known records, limited over-wintering habitat and vulnerable to local extinction.	**Yes** – to confirm absence as species credit species.

Appendix E – Aboriginal Heritage Impact Assessment

Blue Sky Planning and Environment

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Taree South re-zoning

LGA: MidCoast Council

Aboriginal Heritage Impact Assessment

22 August 2018

McCARDLE CULTURAL HERITAGE PTY LTD

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	Report No: J18044
Approved by:	Penny McCardle
Position:	Director
Signed:	
Date:	22 August 2018

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EXECUTIVE SUMMARY

MCH have been engaged by Blue Sky Planning and Environment to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for an amendment to Greater Taree LEP 2010 (GTLEP 2010) which would increase the area of employment-related land in the Manning River Drive Employment Precinct, south of Taree, generally in accordance with Mid Coast Council's Draft Manning Valley Local Strategy. The project area includes 50 Eriksson Lane (Lot 2 DP 827097), 51 Glenthorne Road (Lot 50 DP 863972) and 55 Glenthorne Road, Taree South (Lot 2 DP 573214).

The project area is located on Quaternary sand, silt, mud and gravel and consists of very gentle slopes that form flats towards the northern end of the project area. One 3rd order creek (Stitts Creek) is located through the far northern portion of the project area, one 2nd order creek is located in the southern half of the project area and one 1st order roughly through the centre of the project area. The closest reliable water source is Manning River located approximately 900 metres to the north of the project area. Thus, the project area may be considered reasonable resourced in terms of water availability during wet seasons or after continuous heavy rain when water was available. However, it is the Manning River that would have been the main focus of past Aboriginal land use due to its abundance of reliable subsistence and medicinal resources, whilst the surrounding area would have provided for small groups of people, such as areas along Stitts Creek.

The project area has been cleared and primarily used for pastoral purposes (grazing), involving the wholesale clearance of native vegetation, the introduction of pasture grass, the construction of dams, housing, fencing, numerous tracks and associated infrastructure (water, electricity, telephone). Such land uses can be expected to have had low to moderate impacts on the archaeological record.

A search of the OEH AHIMS register has shown that 26 known Aboriginal sites are currently recorded within five kilometres of the project area and include artefacts, scar trees, Aboriginal Ceremonial and dreaming, shell middens, burials and PADs. Within the project area, the landscape would have provided some subsistence resources during times of heavy rain, which was likely suited to small scale camping by small groups of people over short periods of time as well as hunting and gathering and travel to the more reliable Manning River. It is possible that isolated finds and small density artefacts scatters maybe located along and within 50 metres of Stitts Creek and the 2nd order creek in the south of the project area.

The survey confirmed the past land uses and additional disturbances along the 2nd order creek that included a dam. The effective coverage for project area illustrates that overall effective coverage was low at 13.39% with grass being the limiting factor and erosion across the project area is minimal. No sites were identified during the survey. Given the known extent and content of sites typically situated on elevated land in close proximity to reliable water sources, the very gentle slope overlooking Stitts Creek and flood plain is likely to have been utilised for small to moderate groups of people for camping. Identified as TS/PAD1, this area of archaeological potential is located in the eastern end of the project area and includes the very gentle slope on the western side of Stitts Creek. The eastern side consists of flood plains and would not have been suitable for camping. The PAD extends from the upper flood plain reaches and for approximately 50 metres. This PAD appears to have been subject to minimal disturbances and is an elevated landform overlooking the Creek (3rd order) and as such has potential to contain in situ cultural materials.

The results of the assessment indicate that the identified ST/PAD1 will be impacted on by any future development. As the nature of the PAD remains unknown at this time, the impacts from any future development on the archaeological record remain unknown.

Based on the environmental and archaeological contexts as well as the survey results, the following recommendations are provided:

1) The persons responsible for the management of onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974;

2) Should any Aboriginal objects be uncovered during works, all work will cease in that location immediately and the Environmental Line contacted; and

3) If the identified PAD will be impacted upon by any future development an archaeological subsurface investigation will be required in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW.

GLOSSARY

Aboriginal Cultural Heritage Values: traditional values of Aboriginal people, handed down in spiritual beliefs, stories and community practices and may include local plant and animal species, places that are important and ways of showing respect for other people.

Aboriginal Place: are locations that have been recognised by the Minister for Climate Change and the Environment (and gazetted under the *National Parks and Wildlife Act 1974*) as having special cultural significance to the Aboriginal community. An Aboriginal Place may or may not include archaeological materials.

Aboriginal Site: an Aboriginal site is the location of one or more Aboriginal archaeological objects, including flaked stone artefacts, midden shell, grinding grooves, archaeological deposits, scarred trees etc.

Artefact: any object that is physically modified by humans.

Assemblage: a collection of artefacts associated by a particular place or time, assumed generated by a single group of people, and can comprise different artefact types.

Axe: a stone-headed axe usually having two ground surfaces that meet at a bevel.

Backed artefact: a stone tool where the margin of a flake is retouched at a steep angle and that margin is opposite a sharp edge.

Background scatter: a term used to describe low density scatter of isolated finds that are distributed across the landscape without any obvious focal point.

Blade: a flake that is at least twice as long as it is wide.

Bondi point: a small asymmetrical backed artefact with a point at one end and backing retouch.

Core: a chunk of stone from which flakes are removed and will have one or more negative flake scars but no positive flake scars. The core itself can be shaped into a tool or used as a source of flakes to be formed into tools.

Debitage: small pieces of stone debris that break off during the manufacturing of stone tools. These are usually considered waste and are the by-product of production (also referred to as flake piece).

Flake: any piece of stone struck off a core and has a number of characteristics including ring cracks showing where the hammer hit the core and a bulb of percussion. May be used as a tool with no further working, may be retouched or serve as a platform for further reduction.

Flaked piece/waste flake: an unmodified and unused flake, usually the by-product of tool manufacture or core preparation (also referred to as debitage).

Formation processes: human caused (land uses etc) or natural processes (geological, animal, plant growth etc) by which an archaeological site is modified during or after occupation and abandonment. These processes have a large effect on the provenience of artefacts or features.

Grinding stone: an abrasive stone used to abrade another artefact or to process food.

Hammer stone: a stone that has been used to strike a core to remove a flake, often causing pitting or other wear on the stone's surface.

Harm: is defined as an act that may destroy, deface or damage an Aboriginal object or place. In relation to an object, this means the movement or removal of an object from the land in which it has been situated

Holocene: the post-glacial period, beginning about 10,000 B.P.

In situ: archaeological items are said to be "in situ" when they are found in the location where they were last deposited.

Pleistocene: the latest major geological epoch, colloquially known as the "Ice Age" due to the multiple expansion and retreat of glaciers. Ca. 3.000, 000-10,000 years B.P.

Retouched flake: a flake that has been flaked again in a manner that modified the edge for the purpose of resharpening that edge.

Stratified Archaeological Deposits: Aboriginal archaeological objects may be observed in soil deposits and within rock shelters or caves. Where layers can be detected within the soil or sediments, which are attributable to separate depositional events in the past, the deposit is said to be stratified. The integrity of sediments and soils are usually affected by 200 years of European settlement and activities such as land clearing, cultivation and construction of industrial, commercial and residential developments.

Taphonomy: the study of processes which have affected organic materials such as bone after death; it also involves the microscopic analysis of tooth-marks or cut marks to assess the effects of butchery or scavenging activities.

Traditional Aboriginal Owners: Aboriginal people who are listed in the Register of Aboriginal owners pursuant to Division 3 of the *Aboriginal Land Register Act (1983)*. The Registrar must give priority to registering Aboriginal people for lands listed in Schedule 14 of the *National Parks and Wildlife Act 1974* or land subject to a claim under 36A of the *Aboriginal Land Rights Act 1983*.

Traditional Knowledge: Information about the roles, responsibilities and practices set out in the cultural beliefs of the Aboriginal community. Only certain individuals have traditional knowledge and different aspects of traditional knowledge may be known by different people, e.g. information about men's initiation sites and practices, women's sites, special pathways, proper responsibilities of people fishing or gathering food for the community, ways of sharing and looking after others, etc.

Typology: the systematic organization of artefacts into types on the basis of shared attributes.

Use wear: the wear displayed on an artefact as a result of use.

ACRONYMS

ACHMP	Aboriginal Cultural Heritage Management Plan
AHIMS	Aboriginal Heritage Information Management System. Data base of recorded sites across NSW managed by OEH
OEH	Office of Environment and Heritage

OEH AHIMS SITE ACRONYMS

ACD	Aboriginal ceremonial and dreaming
AFT	Artefact (stone, bone, shell, glass, ceramic and metal)
ARG	Aboriginal resource and gathering
ART	Art (pigment or engraving)
BOM	Non-human bone and organic material
BUR	Burial
CFT	Conflict site
CMR	Ceremonial ring (stone or earth)
ETM	Earth mound
FSH	Fish trap
GDG	Grinding groove
HAB	Habitation structure
HTH	Hearth
OCQ	Ochre quarry
PAD	Potential archaeological Deposit. Used to define an area of the landscape that is believed to contain subsurface archaeological deposits.
SHL	Shell
STA	Stone arrangement
STQ	Stone quarry
TRE	Modified tree (carved or scarred)
WTR	Water hole

1 INTRODUCTION

1.1 INTRODUCTION

MCH have been engaged by Blue Sky Planning and Environment to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for an amendment to Greater Taree LEP 2010 (GTLEP 2010) which would increase the area of employment-related land in the Manning River Drive Employment Precinct, south of Taree, generally in accordance with Mid Coast Council's Draft Manning Valley Local Strategy.

The assessment has been undertaken to meet the NSW Office of Environment and Heritage (OEH), Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010), the OEH Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), the DECCW Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b) and the brief.

1.2 PROPONENT DETAILS

Mulgrave Trust and Jasbe Glenthorne Pty Ltd

1.3 THE PROJECT AREA

The project area is defined by the proponent and includes 50 Eriksson Lane (Lot 2 DP 827097), 51 Glenthorne Road (Lot 50 DP 863972) and 55 Glenthorne Road, Taree South (Lot 2 DP 573214). The location and extent of the project area is illustrated in Figures 1.1 to 1.3.

Figure 1.1 Regional location of the project area

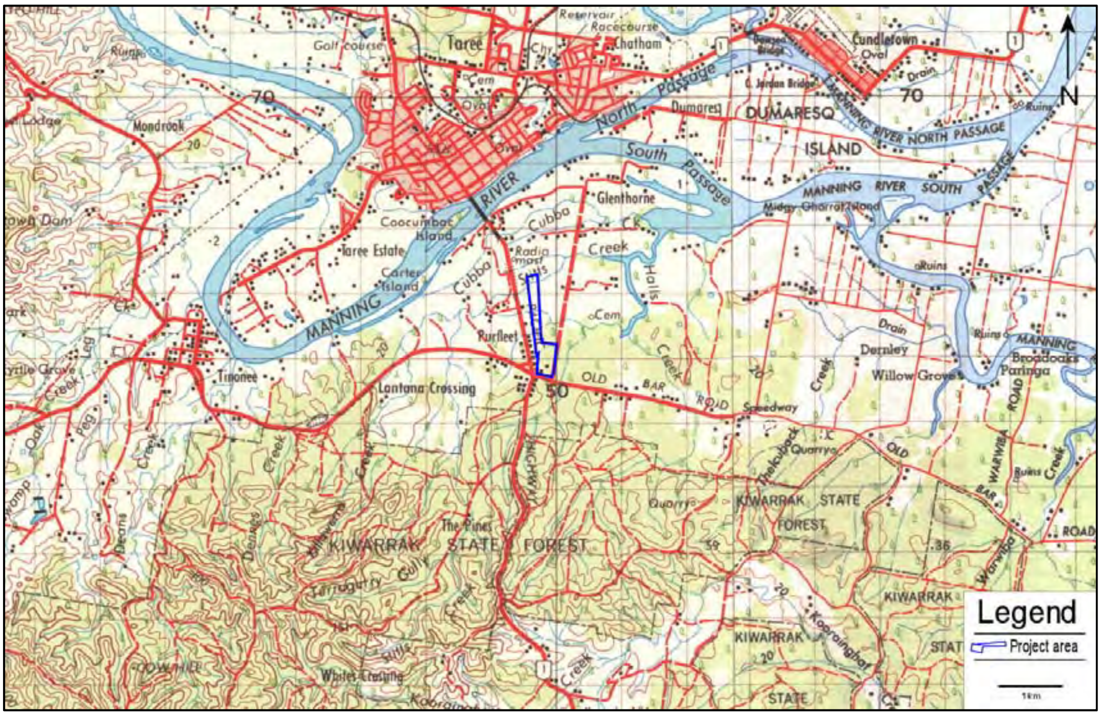


Figure 1.2 Local location of the project area

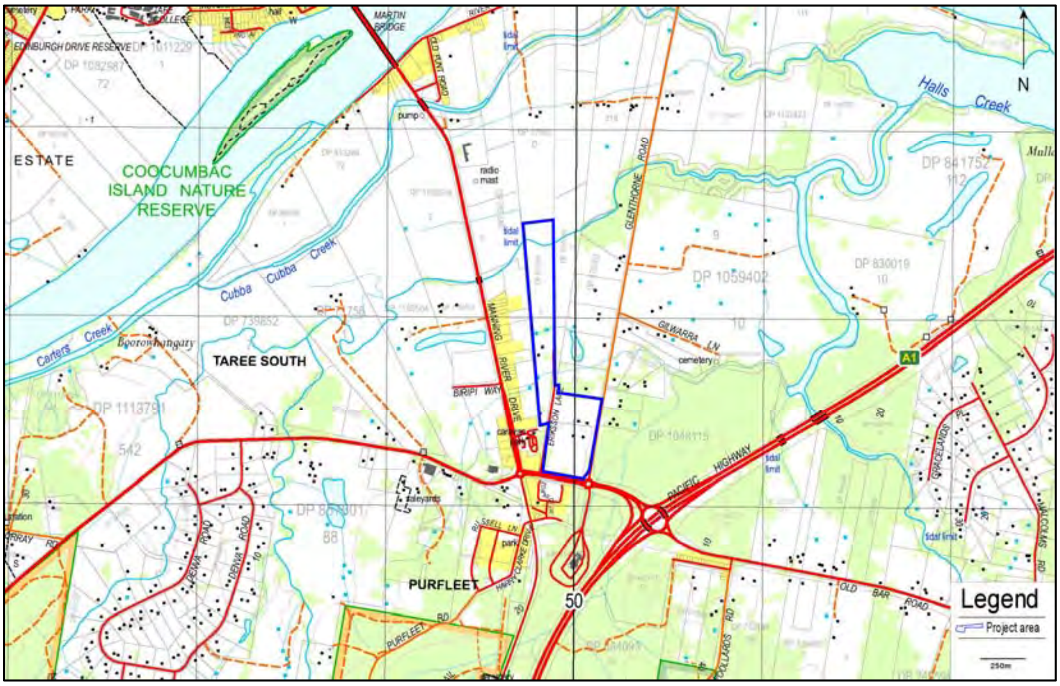


Figure 1.3 Aerial location of the project area

1.4 DESCRIPTION OF THE PROPOSED DEVELOPPMENT

The project is only in the rezoning stage and as such there is no development or impacts at this stage. The proponent confirms that every effort will be made with this development to avoid impacting on any Aboriginal objects.

The objective of the Planning Proposal is to facilitate an amendment to Greater Taree LEP 2010 (GTLEP 2010) which would increase the area of employment-related land in the Manning River

Drive Employment Precinct, south of Taree, generally in accordance with MidCoast Council's Draft Manning Valley Local Strategy.

It is likely that Lot 2 DP 827097 and Lot 2 DP 573214 will be subdivided into industrial lots and would include factories, warehouses, automotive uses, manufacturing etc. It is intended that Lot 50 would be rezoned to a B6 (Enterprise Corridor) zone, and Lot 2 DP 573214 and Lot 2 DP 827097 would be rezoned to IN1 (General Industrial). Eriksson Lane will be included in the adjacent zones. In the latter stages of the development, it is likely that a connecting road would be constructed between Manning River Drive northbound and Lot 2 DP 827097.

We note that detailed design plans have not been prepared at this early stage but where feasible and practical any future development application for the subdivision of the site will have regard to the requirements and provision of the National Parks and Wildlife Act 1974.

1.5 PURPOSE OF THE ARCAHEOLOGICAL ASSESSMENT

The purpose of the assessment is to assess any archaeological constraints to support the rezoning application and to provide opportunities and options to ensure any cultural materials present are protected and managed in an appropriate manner.

1.6 OBJECTIVE OF THE ASSESSMENT

The objective of the assessment is to identify areas of indigenous cultural heritage value, to determine possible impacts on any indigenous cultural heritage identified (including potential subsurface evidence) and to develop management recommendations where appropriate. The assessment employs a regional approach, taking into consideration both the landscape of the project area (landforms, water resources, soils, geology etc) and the regional archaeological patterning identified by past studies.

1.7 PROJECT BRIEF/SCOPE OF WORK

The following tasks were carried out:

- a review of relevant statutory registers and inventories for indigenous cultural heritage including the NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) for known archaeological sites, the State Heritage Register, the Australian Heritage Database (includes data from the World Heritage List UNESCO, National Heritage List, Commonwealth Heritage List, Register of the National Estate) and the MidCoast Local Environmental Plan;
- a review of local environmental information (topographic, geological, soil, geomorphological and vegetation descriptions) to determine the likelihood of archaeological sites and specific site types, prior and existing land uses and site disturbance that may affect site integrity;
- a review of previous cultural heritage investigations to determine the extent of archaeological investigations in the area and any archaeological patterns;
- the development of a predictive archaeological statement based on the data searches and literature review;
- identification of human and natural impacts in relation to the known and any new archaeological sites archaeological potential of the project area;

- consultation with the Aboriginal stakeholders as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010);
- undertake a site inspection with the participation of the registered Aboriginal stakeholders, and
- the development of mitigation and conservation measures in consultation with the registered Aboriginal stakeholders.

1.8 LEGISLATIVE CONTEXT

The following overview of the legislative framework, is provided solely for information purposes for the client, and should not be interpreted as legal advice. MCH will not be liable for any actions taken by any person, body or group as a result of this general overview and MCH recommends that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the general summary below.

Land managers are required to consider the affects of their activities or proposed development on the environment under several pieces of legislation. Although there are a number of Acts and regulations protecting Aboriginal heritage, including places, sites and objects, within NSW, the three main ones include:

- National Parks and Wildlife Act (1974, as amended)
- National Parks and Wildlife Regulation (2009)
- Environmental Planning and Assessment Act (1979)

1.8.1 NATIONAL PARKS AND WILDLIFE ACT (1974, AS AMENDED)

The National Parks and Wildlife Act (1974), Amended 2010, is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales. The NPW Act protects Aboriginal heritage (places, sites and objects) within NSW and the Protection of Aboriginal heritage is outlined in s86 of the Act, as follows:

- "A person must not harm or desecrate an object that the person knows is an Aboriginal object" s86(1)
- "A person must not harm an Aboriginal object" s86(2)
- "A person must not harm or desecrate an Aboriginal place" s86(4)

Penalties apply for harming an Aboriginal object, site or place. The penalty for knowingly harming an Aboriginal object (s86[1]) and/or an Aboriginal place (s86[4]) is up to $550,000 for an individual and/or imprisonment for 2 years; and in the case of a corporation the penalty is up to $1.1 million. The penalty for a strict liability offence (s86[2]) is up to $110,000 for an individual and $220,000 for a corporation.

Harm under the National Parks and Wildlife Act (1974, as amended) is defined as any act that; destroys defaces or damages the object, moves the object from the land on which it has been situated, causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate that;

1) harm was authorised under an Aboriginal Heritage Impact Permit (AHIP) (and the permit was properly followed), or

2) the proponent exercised due diligence in respect to Aboriginal heritage.

The 'due diligence' defence (s87[2]), states that if a person or company has applied due diligence to determine that no Aboriginal object, site or place was likely to be harmed as a result of the activities proposed for the Project Area, then liability from prosecution under the NPW Act 1974 will be removed or mitigated if it later transpires that an Aboriginal object, site or place was harmed. If any Aboriginal objects are identified during the activity, then works should cease in that area and OEH notified (DECCW 2010:13). The due diligence defence does not authorise continuing harm.

The archaeological due diligence assessment and report has been carried out in compliance with the NSW DECCW 2010 Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW.

1.8.2 NATIONAL PARKS AND WILDLIFE REGULATION (2009)

The National Parks and Wildlife Regulation 2009 provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The Regulation (2009) recognises various due diligence codes of practice, including the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW which is pertinent to this report, but it also outlines procedures for Aboriginal Heritage Impact Permit (AHIP) applications and Aboriginal Cultural Heritage Consultation Requirements (ACHCRs); amongst other regulatory processes.

1.8.3 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A ACT)

EP&A Act establishes the statutory framework for planning and environmental assessment in NSW and the implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. The EP&A Act contains three parts which impose requirements for planning approval:

- Part 3 of the EP&A Act relates to the preparation and making of Environmental Planning Instruments (EPIs), State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).
- Part 4 of the EP&A Act establishes the framework for assessing development under an EPI. The consent authority for Part 4 development is generally the local council, however the consent authority may by the Minister, the Planning Assessment Commission or a joint regional planning panel depending upon the nature of the development.
- Part 4, Division 4.1 of the EP&A Act establishes the assessment pathway for State significant development (**SSD**) declared by the State Environmental Planning Policy (State and Regional Development) 2011 (NSW). Once a development is declared as SSD, the Director-General will issue Director-General Requirements (DGRs) outlining what issues must be considered in the EIS.
- Part 5 of the EP&A Act provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority. Development under Part 5 that are likely to significantly affect the environment is required to have an EIS prepared for the proposed activity.
- Part 5.1 of the EP&A Act establishes the assessment pathways for State significant infrastructure (**SSI**). Development applications made for SSI can only be approved by the Minister. Once a development is declared as SSI, the Director-General will issue DGRs outlining what issues must be addressed in the EIS.

The applicable approval process is determined by reference to the relevant environmental planning instruments and other controls, LEPs and State Environmental Planning Policies (SEPPs).

This project falls under Part 4.

1.9 QUALIFICATIONS OF THE INVESTIGATOR

Penny McCardle: Principal Archaeologist & Forensic Anthropologist has 10 years experience in Indigenous archaeological assessments, excavation, research, reporting, analysis and consultation. Six years in skeletal identification, biological profiling and skeletal trauma identification.

- BA (Archaeology and Palaeoanthropology, University of New England 1999
- Hons (Archaeology and Palaeoanthropology): Physical Anthropology), University of New England 2001
- Forensic Anthropology Course, University of New England 2003
- Armed Forces Institute of Pathology Forensic Anthropology Course, Ashburn, VA 2008
- Analysis of Bone trauma and Pseudo-Trauma in Suspected Violent Death Course, Erie College, Pennsylvania, 2009
- Documenting Scenes of War and Human Rights Violations. Institute for International Criminal Investigations, 2018
- Completed PhD, University of Newcastle, 2018

1.10 REPORT STRUCTURE

The report includes Section 1 which outlines the project, Section 2 provides the consultation, Section 3 presents the environmental context, Section 4 presents ethno historic context, Section 5 provides the archaeological background, Section 6 provides the results of the fieldwork, analysis and discussion; Section 7 presents the development impact assessment, Section 8 presents the mitigation strategies and Section 9 presents the management recommendations.

2 CONSULTATION

As per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010), MCH followed the four stages of consultation as set out below. All correspondences for each stage are provided in Annex A.

In relation to cultural significance, MCH recognises and supports the indigenous system of knowledge. That is, that knowledge is not 'open' in the sense that everyone has access and an equal right to it. Knowledge is not always definitive (in the sense that there is only one right answer) and knowledge is often restricted. As access to this knowledge is power, it must be controlled by people with the appropriate qualifications (usually based on age seniority but may be based on other factors). Thus, it is important to obtain information from the correct people: those that hold the appropriate knowledge of those sites and/or areas relevant to the project. It is noted that only the Aboriginal community can identify and determine the accepted knowledge holder(s) may be not archaeologists or proponents. If knowledge is shared, that information must be used correctly and per the wishes of the knowledge holder. Whilst an archaeologist may view this information as data, a custodian may view this information as highly sensitive, secret/sacred information and may place restrictions on its use. Thus, it is important for MCH to engage in affective and long-term consultation to ensure knowledge is shared and managed in a suitable manner that will allow for the appropriate management of that site/area. MCH also know that archaeologists do not have the capability nor the right to adjudicate on the spirituality of a particular location or site as this is the exclusive right of the traditional owners who have the cultural and hereditary association with the land of their own ancestors. For these reasons, consultation forms an integral component of all projects and this information is sought form the registered stakeholders to be included in the report in the appropriate manner that is stipulated by those with the information.

2.1 STAGE 1: NOTIFICATION & REGISTRATION OF INTEREST

The aim of this stage is to identify, notify and register Aboriginal people and/or groups who hold cultural knowledge that is relevant to the project area, and who can determine the cultural significance of any Aboriginal objects and/or places within the proposed project area. In order to do this, the sources identified by OEH (2010:10) and listed in Table 2.1, to provide the names of people who may hold cultural knowledge that is relevant to determining the significance of Aboriginal objects and/or places were contacted by letter on 11 April 2018. A reply was requested by the 24 April 2018 and it was stipulated that if no response was received, the project and consultation will proceed. Information included in the correspondence to the sources listed in Table 2.1 included the name and contact details of the proponent, an overview of the proposed project including the location and a map showing the location.

Table 2.1 Sources contacted

Organisations contacted	Response
Office of Environment and Heritage	17 groups
FLALC	no response
MIdCoast City Council	9 groups
Registrar Aboriginal Land Rights Act 1983	PLALC
National Native Title Tribunal	no groups
Native Title Services Corporation Limited	no response
Hunter Local Land Services	no response

Following this, MCH compiled a list of people/groups to contact (Refer to Annex A). As per the Aboriginal cultural heritage consultation requirements for proponents (April 2010), archaeologists and proponents must write to all those groups provided asking if they would like to register their interest in the project. Unfortunately some Government departments written to requesting a list of groups to consult with do not differentiate groups from different traditional boundaries and provide an exhaustive list of groups from across the region including those outside their traditional boundaries.

MCH wrote to all parties identified on 24 April 2018, and an advertisement was placed in the Manning River Times on 126 April 2018. The correspondence and advertisement included the required information as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010) and requested to nominate the preferred option for the presentation of information about the proposed project: an information packet or a meeting and information packet (Refer to Stage 2). The Rregistered Aboriginal Parties (RAPs) are listed in Table 2.2.

Table 2.2 Registered Aboriginal Parties

RAP	Contact
Tide Ltd	Mick Leon
NA	Lee Davison

2.2 STAGE 2: PRESENTATION OF INFORMATION

The aim of this stage is to provide the RAPs with information regarding the scope of the proposed project and the cultural heritage assessment process.

An information packet was sent to all RAPs and included the required information as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010). The pack included the required information as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010). A written response to the methods and the preferred method of sharing traditional knowledge was due no later than 11 June 2018.

The information pack also stipulated that consultation was not employment, and requested that in order to assist the proponent in the engagement of field workers, that the groups provide information that will assit in the selection of field staff who may be paid on a contractual basis). This included, but was not limited to, experience in field work and in providing cultural heritage advice (asked to nominate at least two individuals who will be available and fit for work) and their relevant experience; and to provide a CV and insurance details.

The information pack also noted that failure to provide the required information by the date provided will result in a missed opportunity for the RAPs to contribute to their cultural heritage and the project will proceed.

2.3 STAGE 3: GATHERING INFORMATION ABOUT CULTURAL SIGNIFICANCE

The aim of this stage is to facilitate a process whereby the RAPs can contribute to culturally appropriate information gathering and the research methodology, provide information that will enable the cultural significance of any Aboriginal objects and or/places within the proposed project area to be determined and have input into the development of any cultural heritage management options and mitigation measures. In order to do his, included in the information pack sent for Stage

2, was information pertaining to the gathering of cultural knowledge. This included the following information;

- MCH noted that information provided by RAPs may be sensitive and MCH and the proponent will not share that information with all RAPs or others without the express permission of the individual. MCH and the proponent extended an invitation to develop and implement appropriate protocols for sourcing and holding cultural information including any restrictions to place on information, as well as the preferred method of providing information;
- request for traditional/cultural knowledge or information associated with ceremonial, spiritual, mythological beliefs, traditions and known sites from the pre-contact period;
- request for traditional/cultural knowledge or information regarding sites or places with historical associations and/or cultural significance which date from the post-contact period and that are remembered by people today (e.g. plant and animal resource use areas, known camp sites); and
- request for traditional/cultural knowledge or information in relation to any sites or places of contemporary cultural significance (apart from the above) which has acquired significance recently.

During this process, the RAPs did not disclose any specific traditional/cultural knowledge or information of sites or places associated with spiritual, mythological, ceremonies or beliefs from the pre contact period within the project area or surrounding area. The stakeholders did not disclose any information pertaining to sites or places of cultural significance associated with the historic or contemporary periods within the project area or surrounding area. However, it must be noted that traditional/cultural knowledge and/or information regarding sites and/or places of cultural significance may exist that were not divulged to MCH by those consulted.

2.4 SURVEY

All RAPs were invited to participate in the survey on 13 July 2018. Unfortunately, no RAPs attended and the survey proceeded.

2.5 STAGE 4: REVIEW OF DRAFT CULTURAL HERITAGE ASSESSMENT

Copies of the DRAFT report were forwarded to all RAPs for their review and were asked to provide a written or verbal response no later than 16th August 2018. MCH received no responses form the RAPs.

All comments received from the RAPs were considered in the final report, all submissions responded to and the draft report altered to include their comments. All RAPs were provided a copy of the final report. All documentation regarding the consultation process is provided in Appendix A.

3 LANDSCAPE AND ENVIRONMENTAL CONTEXT

3.1 INTRODUCTION

The nature and distribution of Aboriginal cultural materials in a landscape are strongly influenced by environmental factors such as topography, geology, landforms, climate, geomorphology, hydrology and the associated soils and vegetation (Hughes and Sullivan 1984). These factors influence the availability of plants, animals, water, raw materials, the location of suitable camping places, ceremonial grounds, burials, and suitable surfaces for the application of rock art. As site locations may differ between landforms due to differing environmental constraints that result in the physical manifestation of different spatial distributions and forms of archaeological evidence, these environmental factors are used in constructing predictive models of Aboriginal site locations.

Environmental factors also effect the degree to which cultural materials have survived in the face of both natural and human influences and affect the likelihood of sites being detected during ground surface survey. Site detection is dependent on a number of environmental factors including surface visibility (which is determined by the nature and extent of ground cover including grass and leaf litter etc) and the survival of the original land surface and associated cultural materials (by flood alluvium and slope wash materials). It is also dependant on the exposure of the original landscape and associated cultural materials (by water, sheet and gully erosion, ploughing, vehicle tracks etc), (Hughes and Sullivan 1984). Combined, these processes and activities are used in determining the likelihood of both surface and subsurface cultural materials surviving and being detected.

It is therefore necessary to have an understanding of the environmental factors, processes and activities, all of which affect site location, preservation, detection during surface survey and the likelihood of in situ subsurface cultural materials being present. The environmental factors, processes and disturbances of the surrounding environment and specific project area are discussed below.

3.2 TOPOGRAPHY

The topographical context is important to identify potential factors relating to past Aboriginal land use patterns. The project consists of very gentle slopes that form flats towards the northern end of the project area that also includes Stitts Creek, and two lower order drainage lines through the centre of the project area.

3.3 GEOLOGY

The underlying regional geology plays a major role in the structure of the surrounding environment (landforms, topography, geomorphology, vegetation, climate etc), and also influences patterns of past occupation and their manifestation in the archaeological record. This is primarily relevant to past Aboriginal land use in regard to the location of stone resources or raw materials and their procurement for the manufacturing and modification of stone tools. The project area is located on Quaternary sand, silt, mud and gravel (Hastings 1:100,000 geological map sheet).

3.4 SOILS

The nature of the surrounding soil landscape also has implications for Aboriginal land use and site preservation, mainly relating to supporting vegetation and the preservation of organic materials and burials. The deposit of alluvial and aeolian sediments and colluvium movement of fine sediments (including artefacts) results in the movement and burying of archaeological materials. The increased movement in soils by this erosion is likely to impact upon cultural materials through the post-depositional movement of materials, specifically small portable materials such as stone tools, contained within the soil profiles. The project area consists of an A horizon of fine clay loam that overlays a B Horizon of fine clay loam sand (NSW Soil and Land Information Ststem).

3.5 CLIMATE

Climatic conditions would also have played a part in past occupation of an area as well as impacted upon the soils and vegetation and associated cultural materials. The is characterised by temperatures ranging from an average minimum of below 5°C to an average maximum of 28°C. Winter rainfall levels are somewhat variable and generally average 30 millimetres per month. Summer rainfalls are more stable at approximately 55-60 millimetres per month, giving a mean annual rainfall of 740 millimetres. During summer, the increased rainfall rate and reduced ground cover is reflected in a proportionately higher risk of erosion.

3.6 WATERWAYS

One of the major environmental factors influencing human behaviour is water as it is essential for survival and as such people will not travel far from reliable water sources. In those situations where people did travel far from reliable water, this indicates a different behaviour such as travelling to obtain rare or prized resources and/or trade. Proximity to water not only influences the number of sites likely to be found but also artefact densities. The highest number of sites and the highest density are usually found in close proximity to water and usually on an elevated landform. This assertion is undisputedly supported by the regional archaeological investigations carried out in the region where by such patterns are typically within 50 metres of a reliable water source.

The main types of water sources include permanent (rivers and soaks), semi-permanent (large streams, swamps and billabongs), ephemeral (small stream and creeks) and underground (artesian). Stream order assessment is one way of determining the reliability of streams as a water source. Stream order is determined by applying the Strahler method to 1:25 000 topographic maps. Based on the climatic analysis (see Section 2.5), the project area will typically experience comparatively reliable rainfalls under normal conditions and thus it is assumed that any streams above a third order classification will constitute a relatively permanent water source.

The Strahler method dictates that upper tributaries do not exhibit flow permanence and are defined as first order streams. When two first order streams meet they form a second order stream. Where two-second order streams converge, a third order stream is formed and so on. When a stream of lower order joins a stream of higher order, the downstream section of the stream will retain the order of the higher order upstream section (Anon 2003; Wheeling Jesuit University 2002).

One 3rd order creek (Stitts Creek) is located through the far northern portion of the project area, one 2nd order creek is located in the southern half of the project area and one 1st order roughly through the centre of the project area (Refer to Figure 1.2). The closest reliable water source is Manning River located approximately 900 metres to the north of the project area.

Thus, the project area may be considered reasonable resourced in terms of water availability during wet seasons or after continuous heavy rain when water was available. However, it is the Manning River that would have been the main focus of past Aboriginal land use due to its abundance of reliable subsistence and medicinal resources, whilst the surrounding area would have provided for small groups of people, such as areas along Stitts Creek.

3.7 FLORA AND FAUNA

The availability of flora and associated water sources affect fauna resources, all of which are primary factors influencing patterns of past Aboriginal land use and occupation. The assessment of flora has two factors that assist in an assessment including a guide to the range of plant resources used for food and medicine and to manufacture objects including nets, string bags, shields and canoes which would have been available to Indigenous people in the past. The second is what it may imply about current and past land uses and to affect survey conditions such as visibility, access and disturbances.

European settlers extensively cleared the original native vegetation in the 1800's and the present vegetation within the investigation area is primarily covered in grasses with open woodlands towards the south and scattered areas of trees throughout. The drainage throughout the project area would have supported a limited range of faunal populations including kangaroo, wallaby, goanna, snakes and a variety of birds.

3.8 LAND USES AND DISTURBANCES

Based upon archaeological evidence, the occupation of Australia extends back some 40,000 years (Mulvaney and Kamminga 1999). Although the impact of past Aboriginal occupation on the natural landscape is thought to have been relatively minimal, it cannot simply be assumed that 20,000 years of land use have passed without affecting various environmental variables. The practice of 'firestick farming' whereby the cautious setting of fires served to drive game from cover, provide protection and alter vegetation communities significantly influenced seed germination, thus increasing diversity within the floral community.

Following European settlement of the area in the 1820s, the landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, agricultural cultivation (ploughing), pastoral grazing, residential developments and mining (Turner 1985). The associated high degree of landscape disturbance has resulted in the alteration of large tracts of land and the cultural materials contained within these areas. The specific project area has been cleared and primarily used for pastoral purposes (grazing), involving the wholesale clearance of native vegetation, the introduction of pasture grass, the construction of dams, housing, fencing, numerous tracks and associated infrastructure (water, electricity, telephone).

Although pastoralism is a comparatively low impact activity, it does result in disturbances due to vegetation clearance and the trampling and compaction of grazed areas. These factors accelerate the natural processes of sheet and gully erosion, which in turn can cause the horizontal and lateral displacement of artefacts. Furthermore, grazing by hoofed animals can affect the archaeological record due to the displacement and breakage of artefacts resulting from trampling (Yorston et al 1990). Pastoral land uses are also closely linked to alterations in the landscape due to the construction of dams, fence lines and associated structures. As a sub-set of agricultural land use, ploughing typically disturbs the top 10-12 centimetres of topsoil (Koettig 1986) depending on the method and machinery used during the process. Ploughing increases the occurrence of erosion and can also result in the direct horizontal and vertical movement of artefacts, thus causing artificial changes in artefact densities and distributions. In fact, studies undertaken on artefact movement due to ploughing (e.g. Roper 1976; Odell and Cowan 1987) has shown that artefact move between one centimetre up to 18 metres laterally depending on the equipment used and horizontal movement. Ploughing may also interfere with other features and disrupt soil stratigraphy (Lewarch and O'Brien 1981). Ploughing activities are typically evidenced through 'ridges and furrows' however a lengthy cessation in ploughing activities dictates that these features may no longer be apparent on the surface.

Whilst the impacts of vehicular movements on sites have not been well documented, based on general observations it is expected that the creation of dirt tracks for vehicle access would result in the loss of vegetation and therefore will enhance erosion and the associated relocation of cultural materials. Dumping of rubbish would have impacted on site through vehicular access (tracks) and movement of surface artefacts through the actual 'dumping' of rubbish.

Excavation works required for dam construction and the laying of infrastructure (water, telephone) would require the removal of soils thus displacing and destroying any cultural materials that may have been present. As fence construction and the erection of telegraph poles require the removal of sols for the holes, this would also have resulted in the disturbance and possible destruction of any cultural materials. All of which result in loss of vegetation and erosion to some extent.

3.9 NATURAL DISTURBANCES

It must be recognised that the disturbance of cultural materials can also be a result of natural processes. The patterns of deposition and erosion within a locality can influence the formation and/or destruction of archaeological sites. Within an environment where the rate of sediment accumulation is generally very high, artefacts deposited in such an environment will be buried shortly after being abandoned. Frequent and lengthy depositional events will also increase the likelihood of the presence of well-stratified cultural deposits (Waters 2000:538,540).

In a stable landscape with few episodes of deposition and minimal to moderate erosion, soils will form and cultural materials will remain on the surface until they are buried. Repeated and extended periods of stability will result in the compression of the archaeological record with multiple occupational episodes being located on one surface prior to burial (Waters 2000:538-539). Within the duplex soils artefacts typically stay within the A horizon on the interface between the A and B horizons.

If erosion occurs after cultural material is deposited, it will disturb or destroy sections of archaeological sites even if they were initially in a good state of preservation. The more frequent and severe the episodes of erosional events the more likely it is that the archaeological record in that area will be disturbed or destroyed (Waters 2000:539; Waters and Kuehn 1996:484). Regional erosional events may entirely remove older sediments, soils and cultural deposits so that archaeological material or deposits of a certain time interval no longer exist within a region (Waters and Kuehn 1996:484-485).

The role of bioturbation is another significant factor in the formation of the archaeological record. Post-depositional processes can disturb and destroy artefacts and sites as well as preserve cultural materials. Redistribution and mixing of cultural deposits occurs as a result of burrowing and mounding by earthworms, ants and other species of burrowing animals. Artefacts can move downwards through root holes as well as through sorting and settling due to gravity. Translocation can also occur as a result of tree falls (Balek 2002:41-42; Peacock and Fant 2002:92). Depth of artefact burial and movement as a result of bioturbation corresponds to the limit of major biologic activity (Balek 2002:43). Artefacts may also be moved as a result of an oscillating water table causing alternate drying and wetting of sediments, and by percolating rainwater (Villa 1982:279).

Experiments to assess the degree that bioturbation can affect material have been undertaken. In abandoned cultivated fields in South Carolina, Michie (summarised in Balek 2002:42-43) found that over a 100-year period 35% of shell fragments that had been previously used to fertilise the fields were found between 15 and 60 centimetres below the surface, inferred to be as a result of bioturbation and gravity. Earthworms have been known to completely destroy stratification within 450 years (Balek 2002:48). At sites in Africa, conjoined artefacts have been found over a metre apart within the soil profile. The vertical distribution of artefacts from reconstructed cores did not follow the order in which they were struck off (Cahen and Moeyersons 1977:813). These kinds of variations in the depths of conjoined artefacts can occur without any other visible trace of disturbance (Villa 1982:287).

However, bioturbation does not always destroy the stratigraphy of cultural deposits. In upland sites in America, temporally-distinct cultural horizons were found to move downwards through the soil as a layer within minimal mixing of artefacts (Balek 2002:48).

3.10 DISCUSSION

Within the project area, one 3rd order creek (Stitts Creek) is located through the far northern portion of the project area, one 2nd order creek is located in the southern half of the project area and one 1st order in the north half of the project area, thus providing some resources suitable for hunting and gathering and/or short-term camping by small numbers of people during times of heavy rain.

In relation to modern alterations to the landscape, the previous large-scale clearing and used of the project area for farming purposes can be expected to have had moderate impacts upon the archaeological record. European land uses such as clearing, grazing and the construction of dams, housing and fences may have displaced cultural materials, however in less disturbed areas, it is likely that archaeological deposits may remain relatively intact.

Vegetation cover across the project area consists of grasses with open woodlands towards the south and scattered areas of trees throughout. This will affect visibility and thereby reduce the potential for identifying archaeological evidence. Typically, due to vegetation cover, most artefacts identified through surface inspection are identified when they are visible on exposures created by erosion or ground surface disturbances (Kuskie and Kamminga 2000).

4 ETHNO-HISTORIC BACKGROUND

Unfortunately, due to European settlement and associated destruction of past Aboriginal communities, their culture, social structure, activities and beliefs, little information with regards to the early traditional way of life of past Aboriginal societies remains.

4.1 USING ETHNO-HISTORIC DATA

Anthropologists and ethnographers have attempted to piece together a picture of past Aboriginal societies throughout the Hunter Valley. Although providing a glimpse into the past, one must be aware that information obtained on cultural and social practices were commonly biased and generally obtained from informants including white settlers, bureaucrats, officials and explorers. Problems encountered with such sources are well documented (e.g. Barwick 1984; L'Oste-Brown et al 1998). There is little information about who collected information or their skills. There were language barrier and interpretation issues, and the degree of interest and attitudes towards Aboriginal people varied in light of the violent settlement history. Access to view certain ceremonies was limited. Cultural practices (such as initiation ceremonies and burial practices) were commonly only viewed once by an informant who would then interpret what he saw based on his own understanding and then generalise about those practices.

4.2 TAREE ETHNO-HISTORIC ACCOUNTS

The Taree area was within the bounds of the Biripi language group (also spelt Birpai). It ranged from just to the north of Forster-Tuncurry at its southern-most extent, to past Port Macquarie at its northern extent. From the coastline it reached west to the Glenrock area. This traditional language area was bordered to the north by the Dainggatti and Nganyaywana language groups, to the west by the Kamilaroi and Geawegal, and to the south by the Worimi language group. Close to the border of the Biripi traditional language group area, Forster-Tuncurry was defined as being at the northern extent of the Worimi area, which stretched to Port Stephens in the south and Gloucester in the west (Horton, 1996). Having the coast along its eastern border was a boon for both the Worimi and Biripi groups, as it provided rich marine resources for those who lived there. Canoes were used for fishing, with woven nets and lines with shell and bone fish hooks as part of the traditional tool kit (Byrne and Nugent, 2004: 18). Quartz flakes were also used to fashion points for fishing spears (Byrne and Nugent, 2004:35). Fish traps were constructed in the river areas to provide a regular source of food. The bags and nets that were regularly used were made from such resources as spun bark fibre and the hair of small marsupials, spun by a small wooden spindle with a hook at one end (Klaver and Heffernan, 1991).

The Biripi traditional country covered a number of different landforms, each with its own resources. As well as undulating bush areas and open woodland plain, there were also bands of rainforest along the Manning River, which was a major water source and an important cultural element within the Biripi landscape. Major creeks flowing from the Manning River were utilised as pathways and resource gathering areas. Vegetation along the Manning River included cedars, fig trees, tamarind trees, ferns, vines and shrubs. Swamps areas close to the Manning River and along the eastern coastline were also resource rich areas that were regularly utilised. Ethnographic recordings refer to the islands located in the estuary being frequented, with known camps present on Oxley Island (Byrne and Nugent, 2004: 16).

Registered sites across the Biripi area attest to the use of the wider landscape, both inland and coastal, in the Aboriginal past. Site types predominantly include artefact scatters across the wider area and shell middens along the coast. The middens attest to the use of coastal resources such as oysters for food, with the refuse deposited following meals accumulating over long periods of time into the remnant deposits. Artefact scatters attest to both the production and use of stone tools, with uses including hunting and preparing animals for food as well as preparing their skins for clothing. Stone tools were hafted to wood and were also often used to shape other wooden implements, such as clubs, spears, spear throwers and boomerangs. Other tools included tomahawks, nulla nullas and shields (Klaver and Heffernan, 1991; Byrne and Nugent, 2004: 35).

One site previously identified as a traditional camping area at Saltwater, to the south of Old Bar, was noted as a place of continuity for the local Aboriginal community, as it was used over thousands of years, with recordings of contemporary community use as well within the same ancient space (Byrne & Nugent, 2004: 6). Access to traditional Dreaming locations became restricted, as did access to resources, due to encroaching settlement. Other elements within the landscape were imbued with cultural significance on into contemporary times, as local resident Ella Simon described of her experiences growing up in the area in the early 1900s. She noted that she was told that a rock in Wallis Lake was the embodiment of a clever woman, known as 'Granny Rock', and that heavy rain would result from touching a forbidden mangrove tree on the beach, an isolated growth near Blackhead (Simon, 1987).

Some information was recorded about the ceremonial life of the Biripi people by early settlers, describing totemic beliefs and practices. This included a description of a cabra ground used for male initiation, an area that consisted of two rings surrounding carved trees. The bark of the trees was described as especially carved for such ceremonies with the ritual musical instrument known as a bull roarer used during the initiation. Corroborees were also known to occur, with fires and dancing described, prior to 1900 (Byrne and Nugent, 2004: 33-34). Male initiation rites in pre-contact times included body scarification and the knocking out of a boy's front tooth (Byrne & Nugent, 2004: 46). Women were described as wearing cloaks made from animal skins, while men wore waist bands. Other cultural decoration included tattoos, nose piercings with bone adornments, body painting, hair styling and headdresses (Klaver and Heffernan, 1991).

The Dreaming was understood in traditional Biripi culture as the time when Ancestral Beings shaped the landscape. Totems were used by the Biripi as classifications that tied people to the plants and animals of the natural world. Some totems that were used included the crab, shark, eagle, stingray, kangaroo, bass and porpoise. Those people belonging to a particular totem were forbidden to hunt or eat that animal and performed ceremonies related to its protection. Totemic groups also defined lineage and family history, as well as how different totemic groups interacted with each other (Robinson, 2011).

Burial practices varied over time and from location to location, with burial grounds having been described along waterways such as Koala Creek, between the Cross and Bully Mountains, in dunes, and later in historic cemeteries. Oral history described a burial ground in Wingham where Aboriginal warriors and elders were buried in a sitting position (Klaver & Heffernan, 1991). Grave robbing is known to have occurred in the area, perpetrated by early settlers and explorers claiming ethnographic research as their motivation (Byrne and Nugent, 2004).

The first white explorers moved through Biripi country in 1818, with settlement following soon after. Radical changes to Aboriginal life started around 1826 in the Manning Valley, accelerating from the 1830s to the 1860s. Steel fish hooks were an early commodity of trade, adopted readily by Aboriginal people across the area (Byrne and Nugent, 2004: 17). Tobacco, tea, rum and steel hatchets were other items traded between the settlers and the Biripi people (Byrne and Nugent, 2004: 24). As contact increased conflict also resulted, with at least two massacres in the area, the first in 1835 at Belbora, where damper laced with dingo poison was given to Aboriginal people, the second in the same year, when a group of Aboriginal people were driven off a cliff at Mount McKenzie, near the headwaters of the Gloucester River, now part of the Barrington Tops National Park (Byrne & Nugent, 2004: 22).

By the 1880s access to traditional resource areas had been restricted by the settlers and Aboriginal people became increasingly dependent on work from the invading economy, working as labourers for farmers and cedar getters. At the same time segregation became institutionalised and reserves were set up where Aboriginal people were forced to reside, such as the one at Purfleet established in 1900.

The Biripi area holds numerous post-contact sites, including missions, fringe camp areas at the edges of Taree and Wingham and the reserve at Purfleet. These locations are an important reflection of the changed lifestyles in the historical period as Aboriginal people were excluded both from the majority of their former country and from the settler community. Aboriginal community focus was instead contained within new areas that were defined by the invaders rather than being attached to cultural significance (Byrne and Nugent, 2004: 6). Oral history records demonstrate that these camps and settlements were still surrounded by circles used as traditional country, defined in one study as "backyard zones" and regarded as extensions of the camps and settlements (Byrne and Nugent, 2004: 123). Despite the impact that settlers had on traditional culture, it has continued to survive through the Aboriginal people that still live in the area today.

5 ARCHAEOLOGICAL CONTEXT

A review of the archaeological literature of the region, and more specifically the Branxton area and the results of an OEH AHIMS search provide essential contextual information for the current assessment. Thus, it is possible to obtain a broader picture of the wider cultural landscape highlighting the range of site types throughout the region, frequency and distribution patterns and the presence of any sites within the project area. It is then possible to use the archaeological context in combination with the review of environmental conditions to establish an archaeological predictive model for the project area.

5.1 REGIONAL ARCHAEOLOGICAL CONTEXT

No regional based archaeological assessments were available and as such a general broad based regional archaeological context and summary is provided. In summary, despite the recognised limitations of utilising previous studies as the basis for generalisations regarding archaeological patterning, the following broad predictions can be made for the region:

- a wide variety of site types are represented in the project area with open campsites and isolated artefacts by far the most common;
- lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions;
- sites in proximity to ephemeral water sources or located in the vicinity of headwaters of upper tributaries (1st order streams) have a sparse distribution and density and contain little more than a background scatter;
- sites located in the vicinity of the upper reaches of minor tributaries (2nd order streams) also have a relatively sparse distribution and density and may represent evidence of localised one-off behaviour;
- sites located in the vicinity of the lower reaches of tributaries (3rd order creeks) have an increased distribution and density and contain evidence that may represent repeated occupation or concentration of activity;
- sites located in the vicinity of major tributaries (4th and 5th order streams/rivers) have the highest distribution and densities. These sites tend to be extensive and complex in landscapes with permanent and reliable water and contain evidence representative of concentrated activity; and
- sites located within close vicinity at the confluence of any order stream may be a focus of activity and may contain a relatively higher artefact distribution and density.

Within the region, a broad range of site types are represented including artefact scatters, isolated artefacts, scar trees, grinding grooves and water holes. Within the areas covered by the regional studies, the range of available landforms has been sampled. In regional terms, site distribution is extremely closely linked to topography, with elevated landforms with access to reliable water exhibiting the highest concentrations of sites.

However, it must be emphasised that the vast majority of the areas assessed by the afore-mentioned regional studies are in a variety of topographic and geological contexts and some vary considerably from the specific project area which is located in an alluvial context. Thus, whilst a number of trends have been identified, the relevance of these patterns for the specific project area is limited.

There are a number of factors which affect site location and that are beyond human control. Shelter sites, grinding grooves and engravings are site types typical of the "sandstone country" however, their presence is limited to areas containing suitable sandstone outcrops and therefore such sites are not expected within an alluvial context such as the project area

5.2 OEH ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM

MCH note that there are many limitations with an AHIMS search. Firstly, site coordinates are not always correct due to errors and changing of computer systems at OEH over the years that failed to correctly translate old coordinate systems to new systems. Secondly, OEH will only provide up to 110 sites per search, thus limiting the search area surrounding the project area and enabling a more comprehensive analysis and finally, few sites have been updated on the OEH AHIMS register to notify if they have been subject to a s87 or s90 and as such what sites remain in the local area and what sites have been destroyed, to assist in determining the cumulative impacts, is unknown.

In addition to this, other limitations include the number of studies in the local area. Fewer studies suggest that sites have not been recorded, ground surface visibility also hinders site identification and the geomorphology of the majority of NSW soils and high levels of erosion have proven to disturb sites and site contents, and the extent of those disturbances is unknown (i.e. we do not know if a site identified at the base of an eroded slope derived from the upper crest, was washed along the bottom etc: thus, altering our predictive modelling in an unknown way). Thus, the OEH AHIMS search is limited and provides a basis only that aids in predictive modelling.

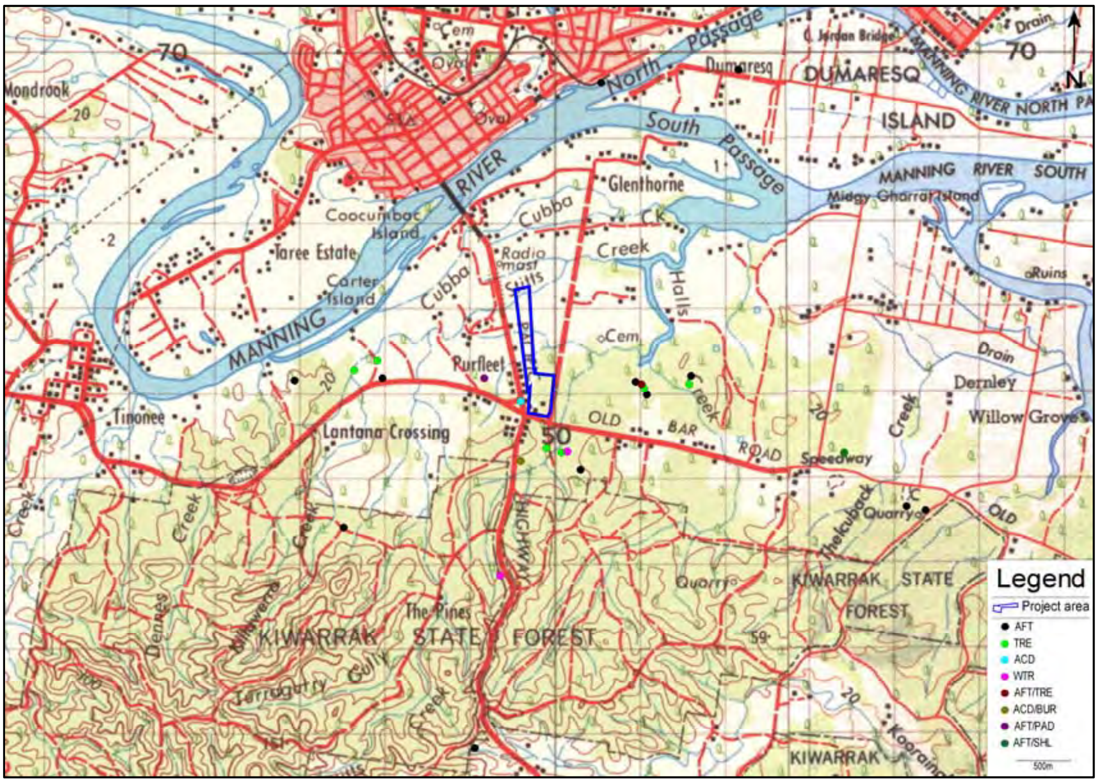
The new terminology for site names including (amongst many) an 'artefact' site encompasses stone, bone, shell, glass, ceramic and/or metal and combines both open camps and isolated finds into the one site name. Unfortunately, this greatly hinders in the predictive modelling as different sites types grouped under one name provided inaccurate data.

A search of the OEH AHIMS register has shown that 26 known Aboriginal sites are currently recorded within five kilometres of the project area. The AHIMs results are summarised in Table 5.1 (provided in full in Appendix B*)* and the location of sites is shown in Figure 5.1.

Table 5.1 Summary of AHIMS sites

Site type	Frequency	Percent
SHL/AFT	1	3.8%
TRE	7	26.9%
AFT/TRE	1	3.8%
AFT	12	46.2%
ACD	1	3.8%
ACD/BUR	1	3.8%
WTR	2	7.7%
AFT/PAD	1	3.8%
Subtotal	**26**	**100.0%**

Figure 5.1 Known sites



5.3 LOCAL ARCHAEOLOGICAL CONTEXT

The previous archaeological assessments pertaining to the local area have been undertaken in relation to environmental assessments for developments. The investigations indicate differing results and observations based on surface visibility and exposure, alterations to the landscape (including farming, residential development, roadworks and flooding), proximity to water sources and geomorphology. The reports available from OEH are discussed below.

Rich (1990a) undertook a management study of Aboriginal historic sites located in north east NSW. The resulting report clarified that the work was intended as an early step in coming to terms with the nature, scope and significance rather than being a definitive study of all sites. The study area, defined as being north east NSW, was divided into six smaller sub regions, being the Hunter Valley, the Tamworth – Quirindi region, the North West Slopes, the Northern Tablelands, the Mid North Coast and the Far North Coast. The work of identifying sites was undertaken via literature review, reference to the NPWS sites register, historic research of secondary sources and consultation with Aboriginal people. The focus was on historic Aboriginal sites, including such site types as contact, mission, massacre, reserve, station and cemetery. This research resulted in the identification of 311 potential historic Aboriginal sites in the study area. The potential sites that were identified included six first contact sites, nine food places, one quarry, three belief sites, 30 ceremonial sites, eight tribal battle sites, seven traditional style burials, 20 Aboriginal burial grounds, four Aboriginal burials in white cemeteries, four Aborigines killed sites, 38 Aborigines massacred sites, 26 whites killed sites, three whites massacred sites, five warfare structure sites, 14 contact and invasion period camp sites, 45 fringe and station camp sites, two house sites, three pre 1880 reserve and mission sites, 14 managed station sites, 66 pre 1950 reserve sites, 32 post 1950 reserve sites, 26 rural employment sites, three industrial employment sites, one courthouse, five homes/orphanages, two Native Police depot sites, one Police Tracker station, 15 schools and two other institution sites. Rich stated that the site labels used to categorise these locations was suggestive only. Rich noted that the number of potential site features added up to 389, but many of these features were grouped within a single location, making the total number of site locations 311. Rich noted that there had been no previous discussion on assessing the significance of historic Aboriginal sites and based discussion on factors including the significance to Aboriginal people, representativeness, potential for research, creative or technical accomplishment, landscape setting and public significance. Significance assessments varied across the types of sites, as did site registration since some locations had physical remains whereas others were locations of past events without tangible physical links. It was concluded that there were places where Aboriginal people had modified and altered their culture to adapt to white invasion, but that their culture continued to be distinct from White Australia with considerable scope for further research on Aboriginal culture, history and associated sites. Rich recommended that if new legislation were adopted that the definition of an Aboriginal site should be amended to include Aboriginal places of special significance, resource places, cultural heritage items reported in literature or by Aboriginal people and deposits, objects or material evidence relating to Aboriginal habitation. It was recommended that handicrafts made for sale that were more than 50 years old should be given protection along with resource places and sites without any apparent physical remains but which had been identified by literature references or by Aboriginal people. It was further recommended that appropriate indexing within the NPWS sites database, inclusion of sites in environmental impact studies and planning studies be undertaken.

Rich (1990b) undertook an archaeological survey of a proposed road alignment known as the Taree Traffic Relief Route. The road deviation was proposed to be undertaken off the existing Old Bar Road located to the north of Purfleet. The purpose of the road deviation was to allow traffic on the Pacific Highway to bypass Taree. The design had also been undertaken to increase safety by removing some of the sharp bends which were present in the existing section of the Pacific Highway. The study area comprised a section of road alignment located to the south-east of Taree on the mid-north coast of NSW, assessed to a width of 400 metres along its extent.

The topography of the study area included ranges, low hills and floodplain. It also included Dumaresq Island, situated within the Manning River. The underlying geology consisted of the Koorainghat Beds and the Belbora Beds, which included sandstone, shale, laminite, greywacke and tuff. The proposed route crossed over the Manning River and Ghinni Ghinni Creek. It was also located in proximity to Halls Creek (but did not cross its extent). Swamp land and unnamed tributaries were also present. Although vegetation had been cleared throughout the larger area, with logging a known past activity, there were a variety of species and extant mature vegetation present at the time of this assessment. These included stringybarks and casuarinas as well an understorey of geebung shrubs and grasses.

A search of the AHIMS register identified 36 sites from an area of approximately 110 square kilometres, stretching from Nabiac and Diamond Beach in the south to Diamond Head and South Brother in the north. The identified sites included modified trees, stone arrangements, burials and middens as well as ceremonial and mythological sites. No previously recorded sites were present within the bounds of the study area.

The survey identified 12 sites (Table 5.2) and two European historic sites were also noted (two timber getter tree stumps and the old Ghinni Ghinni post office). It was noted that vegetation cover had limited the ground surface visibility during the survey and that it was likely that other sites could occur within the study area.

Table 5.2 Summary of sites (Rich 1990b)

Site	Site type	Landform	Distance to water	Stream order	Artefacts /features	Disturbance	Subsurface potential
Site 1: Blue Hole	waterhole and washing area	spur slope	0 m	not provided	swimming/ washing hole	fire trail and quarrying	no
Site 2: Purfleet Cemetery	burials	flat	80 m	unnamed creek	cemetery	burials	no
Site 3	modified tree and water hole	not provided	40 m	unnamed tributary of Halls Creek	1 scar on bloodwood tree and water hole 10 m away	not provided	no
Site 4	modified tree	hillslope	100 m	unnamed tributary of Halls Creek	1 scar on grey gum	white ants	no
Site 5: Gillawarra Campsite and Corroboree Ground	ceremonial	Foot slope	5 m	Halls Creek estuary	ampsite and corroboree ground	not provided	no
Site 6	artefact scatter and modified tree	creek bank	immediately adjacent	Halls Creek	13 artefacts & 1 scar on bloodwood tree	vegetation clearance	yes
Site 7	modified trees	low lying swamp	0 m	swamp associated with Halls Creek	3 paperbark modified trees	not provided	no
Site 8	artefact scatter	spur	5-250 m	Halls Creek	18	track	yes
Site 9	artefact scatter	ridge	0-200 m	Halls Creek	25	vegetation clearance & track	yes
Site 10	modified tree	ridge	300 m	Halls Creek	2 scars	not provided	no
Isolated Find Kiwarrak Rest Area	isolated artefact	ridge	1.8 km	Kooranghat Creek	1 mudstone flake with use wear & retouch	roadway	no
Possible Canoe Tree	possible modified tree	not provided	250 m	Ghinni Ghinni Creek	1 x 3m long scar	vegetation clearance	not provided

Site 2 (Purfleet cemetery), Site 5 (Gillawarra historic campsite) and Site 9 (especially the section of it on the spur north of the survey line) were assessed as being of high significance. Site 1 (Blue Hole), Site 3 (modified tree with possible historical association), Site 6 (artefact scatter with modified tree) and Site 7 (modified trees) were defined as having moderate significance. Modified tree Sites 4 and 10 and artefact scatter Site 8 were defined as being of low significance.

Based on the findings Rich recommended that the Traffic Relief Route should be redesigned and repositioned to the west of Site 1 (Blue Hole), east of Site 2 (Purfleet cemetery), east of Site 3 (modified tree), and south of the slashed survey line from 40 metres to the south of Halls Creek to 900 metres north of Halls Creek in order to protect Sites 5, 6, 7 and the densest part of Site 9. It was recommended that if possible Sites 4 and 10 should be avoided. An application for a permit to destroy the remainder of sites was stated as required prior to works commencing, with such mitigation measures as monitoring and the surface collection of the isolated artefact site to be considered. It was further recommended that if any further sites were found during monitoring they should be salvaged.

Collins (1998) undertook an archaeological survey of a study area proposed for impacts associated with a realignment of the Pacific Highway. The realignment was proposed to bypass the village of Coopernook and create a new crossing of the Lansdowne River approximately 21 kilometres to the north of Taree on the NSW mid-north coast. A large quantity of fill was needed to form the planned dual carriageway embankments and it was proposed that these should come from the cut batters on the Taree Bypass to the south of Purfleet. The topography of the study area consisted of a moderate to steep ridge system with slopes, crests and a ridgeline which formed the watershed between creeks flowing northward into the Manning River and creeks flowing south into Khappinghat Creek. The underlying geology consisted of Carboniferous sedimentary rocks of the Koorainghat Beds which contained lithic sandstone, greywacke, laminite, tuff and shale. Vegetation in the study area included regenerated grassland and open dry sclerophyll forest dominated by grey gum, grey ironbark, forest oak, spotted gum, white mahogany, blady grass, bracken fern and introduced species like lantana and paspalum. A search of the AHIMS register identified 13 sites within a five-kilometre radius of the study area. These included artefact scatters, modified trees, an isolated artefact and post-contact sites. One unregistered isolated artefact was identified within the study area, but outside the proposed area of impact. It was predicted that sites likely to occur in the study area included quarries (due to the presence of raw material outcrops), artefact scatters and isolated artefacts. Although no quarries were identified the prediction about site likelihood being artefact based proved to be correct. One mudstone core was identified on an upper slope 250 metres form reliable water during the survey and was located outside the project area. As no sites were found within the study area, no site-specific recommendations were necessary. No further survey work or subsurface investigation were considered to be warranted, but it was noted that isolated artefacts could occur in areas where the topsoil was still present, particularly on crests and upper slope landforms. It was recommended that the proposed fill extraction proceed without heritage constraint, with all relevant contractors and employees to be advised of their legal obligations with regard to Aboriginal cultural materials. Stop work procedures were recommended to be instigated should unexpected finds be identified during works.

Leon, Maskin and Donovan (2004) were commissioned to undertake an archaeological investigation of a proposed water main replacement on Old Bar Road between Taree and Old Bar in the mid North Coast region of NSW. The topography of the study area included modified areas, such as existing road corridors, a recreational motor vehicle speedway, a cemetery and residential areas. Vegetation had been cleared in the study area, but examples of open forest system were present in the surrounding region. A search of the AHIMS register identified 22 sites within five kilometres of the study area and included artefact scatters and middens. It was predicted that site types such as artefact scatters, middens, modified trees and ceremonial areas could be present in the study area.

Two new sites were identified, conforming to aspects of the predictive model. The survey results are summarised below in Table 5.3.

Table 5.3 Summary of sites (Leon, Maskin and Donovan 2004)

Site	Site type	Landform	Distance to water	Stream order	Artefacts /features	Disturbance	Subsurface potential
WMR Old Bar 1	isolated artefact	slope	not provided	not provided	1	road & cemetery	no
WMR Old Bar 2	isolated artefact	slope	not provided	not provided	1	road & cemetery	no

It was recommended that the identified sites be protected, with permits required if any impacts to them were proposed to occur. Stop work procedures were recommended should any unexpected finds be identified during works.

Irish (2006) undertook an Aboriginal archaeological survey and heritage impact assessment for a study area totalling 11 hectares in size. This study area was proposed for the development of a highway service centre. The study area was located adjacent to the Pacific Highway Interchange approximately four kilometres to the south-southeast of Taree on the mid-north coast of NSW. The topography consisted of floodplain to the north and a broadly east-west tending ridge to the south. The study area was in the northern foothills of this ridge, on the western side of a low spur separating the course of two tributaries of Halls Creek, flowing north into the Manning River. The closest watercourse was the western tributary known as Wollards Creek, with Kooringhat Creek also in the vicinity. The underlying geology consisted of the Carboniferous Period sediments of the Kooringhat Beds which included lithic sandstone, greywacke, tuff, laminite and shale as well as Belbora Beds which included lithic sandstone, tuff, laminite and agglomerate. Vegetation had been cleared across the study area but was likely to have previously contained eucalypt species, blackbutt, tallowwood, ironbark, mahogany, spotted gum, stringybark, bloodwood, casuarina and acacia. A search of the AHIMS register identified 17 sites within a 10-kilometre radius of the study area. These comprised of eight artefact scatters, five modified trees, two waterholes/wells, one mythological site and one historical cemetery. One site, a post-contact well, was identified as occurring within the bounds of the study area. It was noted that the overall lack of archaeological data made it premature to make predictions about likely Aboriginal site distribution. It was stated that it was unlikely that the subject land was intensively used by Aboriginal people and predicted that only artefact scatter and isolated artefact sites were likely to occur. The survey identified high levels of disturbance across much of the study area from past vegetation clearance, track use, limited earthworks and the natural erosion of soil deposits. Erosion meant that in situ subsurface deposits were unlikely to be extant. One isolated artefact site was identified outside the study area and beyond the proposed area of impact. It was recommended that the previously recorded post-contact well site should be protected from impacts by the retention of a five-metre radius buffer zone. No other archaeological constraints were identified. Purfleet-Taree Local Aboriginal Land Council produced a separate cultural report which further called for avoidance and protection of the isolated artefact identified outside the study area. Stop work procedures and further consultative work were recommended to be undertaken should unexpected finds be identified during works.

5.4 LOCAL & REGIONAL CHARACTER OF ABORIGINAL LAND USE & ITS MATERIAL TRACES

The following is a summary and discussion of previous investigations detailed in Section 5.3. It must be remembered, however, that there are various factors which will have skewed the results as they are in a regional assessment. Therefore, the summary provides an indication of what may be expected in terms of site location and distribution.

- the majority of sites are located within 50 metres of a reliable water source and reduce with distance from water;
- artefact densities are highest within 50 metres of a water source and decrease with distance from water;
- the likelihood of finding sites of any size increases with proximity to water and the likelihood of finding large artefact scatters also increases markedly with proximity to water;
- the main site types are artefact scatters and isolated finds
- the data suggests that elevated landforms in close proximity to water sources were the preferred location for camping, followed by slopes. However, this does not account for vertical movement of artefacts or sites being moved from flooding, flowing creeks etc.
- mudstone, silcrete, chert and tuff are by far the most common raw material types represented at sites in the region. Quartz is the next most frequently in artefact assemblages followed by volcanic materials, porphyry and petrified wood. Siltstone, rhyolite and porcellanite are relatively rare.
- flakes, broken flakes and flaked pieces are the most common artefact types recorded
- the vast majority of artefactual material in the region was observed on exposures with good to excellent ground surface visibility. The likelihood of finding artefacts surrounding these exposures is reduced due to poor visibility. The site area is often given as the area of exposure. Hence, it is inappropriate to attempt to draw any conclusions regarding site extent based on current information; and
- the majority of sites have been impacted by past land uses, some with significant impacts to the archaeological record (i.e. excavation works), others minimal impact (tracks).

Based on information gained from previous studies within a five kilometre radius of the project area, it can be expected that:

- the likelihood of locating sites increases with proximity to water;
- the likelihood of finding large sites increases markedly with proximity to water;
- a variety of raw materials will be represented though the majority of sites will be predominated by mudstone and silcrete;
- a variety of artefact types will be located though the majority will be flakes, flaked pieces and debitage;
- grinding grooves will be located along or near water sources;
- the likelihood of finding scarred trees is dependent on the level of clearing in an area' and
- the majority of sites will be subject to disturbances including human and natural.

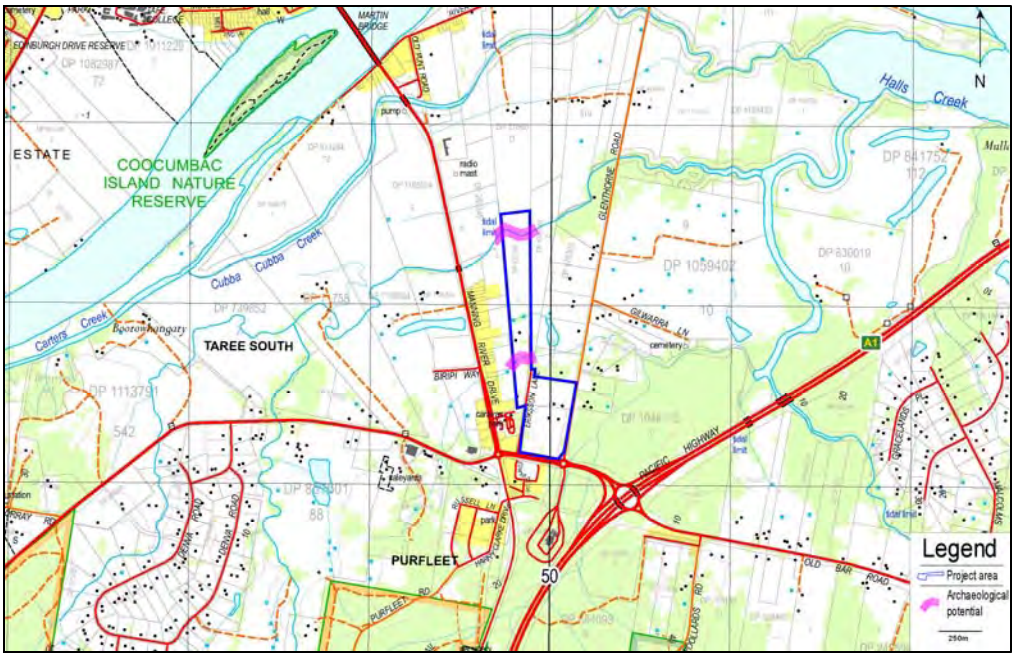
These findings are consistent with models developed for the area.

5.5 PREDICTIVE MODEL FOR THE PROJECT AREA

Due to issues surrounding ground surface visibility and the fact that the distribution of surface archaeological material does not necessarily reflect that of sub-surface deposits, it is essential to establish a predictive model.

Previous archaeological studies undertaken throughout the region, the OEH AHIMS register and the environmental context provide a good indication of site types and site patterning in the area. This research has shown that occupation sites (artefact scatters and isolated finds) are the most frequently recorded site type and are commonly located along or adjacent to watercourses, and on relatively flat to gently sloping topography in close proximity to reliable water. Sites with higher artefact densities are similarly concentrated within fifty metres of watercourses. Within the local area, previous assessments within a similar environmental context indicate that, within a well-watered context, there is high potential for archaeological material to be present on level, typically well-elevated landforms that provide ready access to low-lying waterlogged areas and the associated resources. Within the specific project area, the landscape would have provided some subsistence resources during times of heavy rain, which was likely suited to small scale camping by small groups of people over short periods of time as well as hunting and gathering and travel to the more reliable Manning River. It is possible that isolated finds and small density artefacts scatters maybe located along and within 50 metres of Stitts Creek and the 2nd order creek in the south of the project area (Refer to Figure 5.2). The refinement of this predictive model will be dependent upon an investigation of the range of landforms and the occurrence of modern disturbances within the project area.

Figure 5.2 Archaeological potential



5.6 ARCHAEOLOGICAL POTENTIAL IN THE PROJECT AREA

Based on archaeological sites registered in the region and the results of past archaeological studies, two sites types are likely to occur throughout the project area:

- **Artefact scatters**

Also described as open campsites, artefact scatters and open sites, these deposits have been defined at two or more stone artefacts within 50 metres of each other and will include archaeological remains such as stone artefacts and may be found in association with camping where other evidence may be present such as shell, hearths, stone lined fire places and/or heat treatment pits. These sites are usually identified as surface scatters of artefacts in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing, grazing) and access ways can also expose surface campsites. Artefact scatters may represent evidence of;

- Large camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of such tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- Medium/small camp sites, where activities such as minimal tool manufacturing occurred;
- Hunting and/or gathering events;
- Other events spatially separated from a camp site, or
- Transitory movement through the landscape.

Artefact scatters are a common site type in the locality and the broader region. There is potential for artefact scatters to occur within the project area within 50 metres of Stitts Creek and the 2nd order creek in the southern half of the project area.

There is also the potential for such sites to be impacted on through past impacts including previous clearing and flooding.

- **Isolated finds**

Isolated artefacts are usually identified in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing) and access ways can also expose surface artefacts. Isolated finds may represent evidence of;

- Hunting and/or gathering events; or
- Transitory movement through the landscape.

Isolated finds are a common site type in the locality and the broader region. There is potential for isolated artefacts to occur across the project area and across all landforms. There is also the potential for such sites to be impacted on through past impacts including previous clearing and flooding.

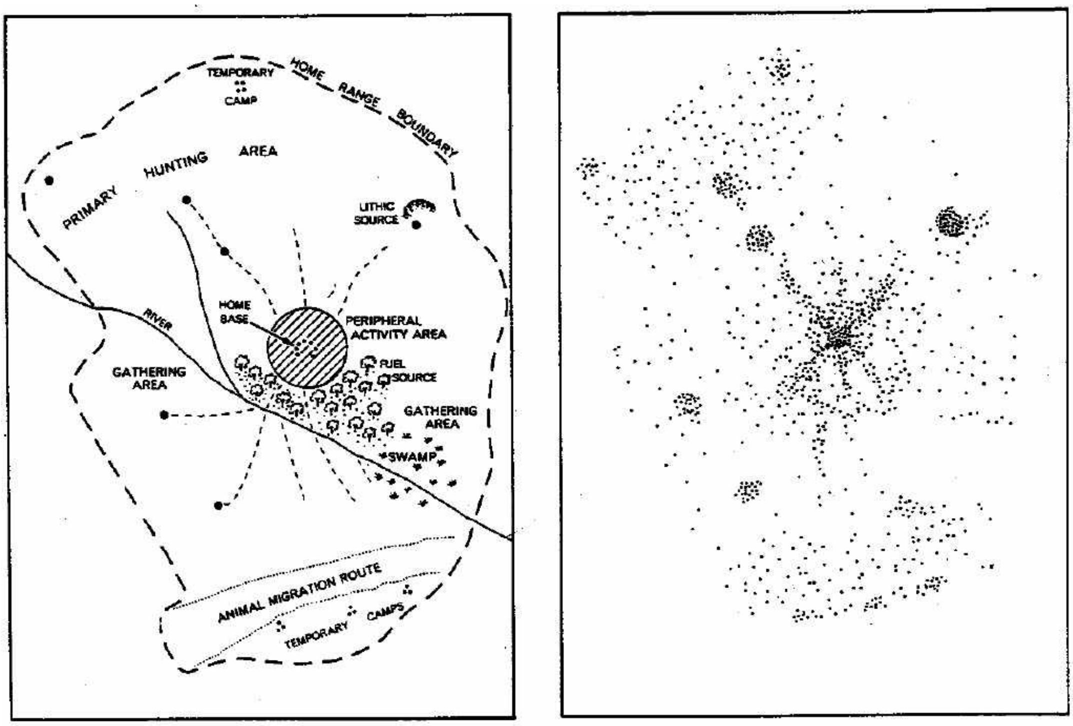
5.7 HERITAGE REGISTER LISTINGS

The State Heritage Register, the Australian Heritage Database (includes data from the World Heritage List UNESCO, National Heritage List, Commonwealth Heritage List, Register of the National Estate) and the MidCoast Local Environmental Plan have no sites listed. However, not all indigenous places are listed, and the Heritage Commission is consulting with Traditional Owners to gradually include indigenous information.

5.8 MODELS OF PAST ABORIGINAL LAND USE

The main aim of this project is to attempt to define both the nature and extent of occupation across the area. As a result, the nature of the analysis will focus on both the landform units and sites. The purpose of this strategy is to highlight any variations between sites and associated assemblages, landforms and resources across the area treating assemblages as a continuous scatter of cultural material across the landscape. In doing this, it is possible to identify variation across the landscape, landforms and assemblages that correspond with variation in the general patterns of landscape use and occupation. Thus, the nature of activities and occupation can be identified through the analysis of stone artefact distributions across a landscape. A general model of forager settlement patterning in the archaeological record has been established by Foley (1981). This model distinguishes the residential 'home base' site with peripheral 'activity locations'. Basically, the home base is the focus of attention and many activities and the activity locations are situated away from the home base and are the focus of specific activities (such as tool manufacturing). This pattern is illustrated in Figure 5.3. Home base sites generally occur in areas with good access to a wide range of resources (reliable water, raw materials etc). The degree of environmental reliability, such as reliable water and subsistence resources, may influence the rate of return to sites and hence the complexity of evidence. Home base sites generally show a greater diversity of artefacts and raw material types (which represent a greater array of activities performed at the site and immediate area). Activity locations occur within the foraging radius of a home base camp (approximately 10 km); (Renfrew and Bahn 1991). Based on the premise that these sites served as a focus of a specific activity, they will show a low diversity in artefacts and are not likely to contain features reflecting a base camp (such as hearths). However, it is also possible that the location of certain activities cannot be predicted or identified, adding to the increased dispersal of cultural material across the landscape. If people were opting to carry stone tools during hunting and gathering journeys throughout the area rather than manufacturing tools at task locations, an increased number of used tools should be recovered from low density and dispersed assemblages.

Figure 5.3 Foley's model (L) and its manifestation in the archaeological record (R), (Foley 1981).



6 RESULTS

6.1 METHODOLOGY

The survey areas were surveyed on foot by the in accordance with the proposed methodology provided to the stakeholders for review and approved. The survey included transects at approximately 2 metres apart walked in an east/west direction across the entire project area and focused on areas of high ground surface visibility and exposures (erosional features, creek banks, tracks, cleared areas).

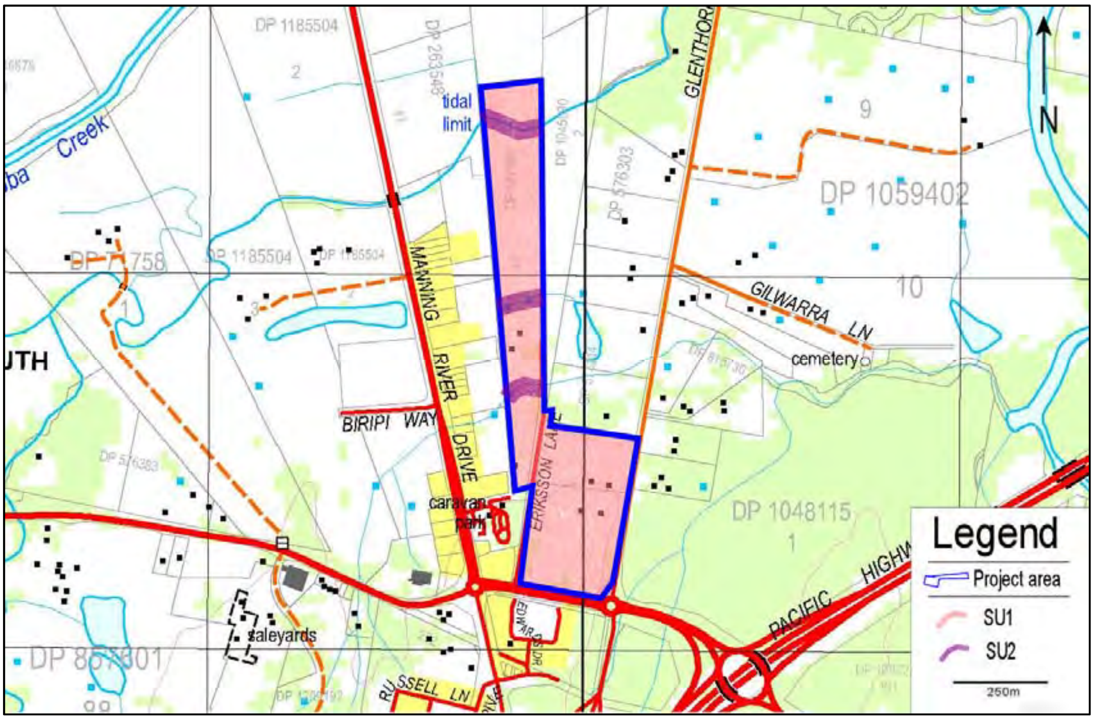
6.2 LANDFORMS

McDonald et al (1998) describes the categories of landform divisions. This is a two layered division involving treating the landscape as a series of 'mosaics'. The mosaics are described as two distinct sizes: the larger categories are referred to as landform patterns and the smaller being landform elements within these patterns. Landform patterns are large-scale landscape units, and landform elements are the individual features contained within these broader landscape patterns. There are forty landform pattern units and over seventy landform elements. However, of all the landform element units, ten are morphological types. For archaeological investigations they divide the landscape into standardised elements that can be used for comparative purposes and predictive modelling. As outlined in Section 3, the project area includes two landforms: gentle slopes and drainage lines.

6.3 SURVEY UNITS

For ease of management, the project area was divided into 2 Survey Units (SUs) that were based on landforms (Refer to Figure 6.1).

Figure 6.1 Survey Units



Survey Unit 1 Slopes

The slopes of the project area had been subject to previous large-scale clearing, grazing and agricultural practices as evident by deteriorated ridges and furrows. Currently used for grazing, there are residential houses, and associated infrastructure and utilities. A large dam is located roughly through the centre of the project area and additional disturbances include tracks and fencing. Vegetation is predominantly pasture grass with few trees in some areas which contributed to reduced ground surface visibility. Exposures were low to moderate and no raw materials usually transported into the area and utilised for stone tool manufacture were present or visible. Examples of this survey unit are provided in Figure 6.2.

Figure 6.2 Examples of vegetation and disturbances

Survey Unit 2 drainage lines

This drainage lines included up to 10 metres both sides of all drainage lines. The 1st order drainage line located roughly through the centre of the project area has been significantly impacted by the dam construction, clearing and grazing and the 2nd order located towards the south has been impacted by clearing, grazing, road and dam construction. The northern Stitts Creek appears to remain relatively undisturbed ad forms part of a flood plain. Examples of this survey unit are provided in Figure 6.2.

6.4 EFFECTIVE COVERAGE

Effective coverage is an estimate of the amount of ground observed taking into account local constraints on site discovery such as vegetation and soil cover. There are two components to determining the effective coverage: visibility and exposure.

Visibility is the amount of bare ground on the exposures which may reveal artefacts or other cultural materials, or visibility refers to 'what conceals'. Visibility is hampered by vegetation, plant or leaf litter, loose sand, stony ground or introduced materials (such as rubbish) On its own, visibility is not a reliable factor in determining the detectability of subsurface cultural materials (DECCW 2010/783:39).

The second component in establishing effective coverage is exposure. Exposure refers to 'what reveals'. It estimates the area with a likelihood of revealing subsurface cultural materials rather than just an observation of the amount of bare ground. Exposure is the percentage of land for which erosion and exposure is sufficient to reveal cultural materials on the surface (DECCW 2010/783:37). The effective coverage for the project area was determined for both visibility and exposure ratings and Table 6.1 details the visibility rating system used.

Table 6.1 Ground surface visibility rating

Description	**GSV rating %**
Very Poor – heavy vegetation, scrub foliage or debris cover, dense tree of scrub cover. Soil surface of the ground very difficult to see.	0-9%
Poor – moderate level of vegetation, scrub, and / or tree cover. Some small patches of soil surface visible in the form of animal tracks, erosion, scalds, blowouts etc, in isolated patches. Soil surface visible in random patches.	10-29%
Fair – moderate levels of vegetation, scrub and / or tree cover. Moderate sized patches of soil surface visible, possibly associated with animal, stock tracks, unsealed walking tracks, erosion, blow outs etc, soil surface visible as moderate to small patches, across a larger section of the project area.	30-49%
Good – moderate to low level of vegetation, tree or scrub cover. Greater amount of areas of soil surface visible in the form of erosion, scalds, blowouts, recent ploughing, grading or clearing.	50-59%
Very Good – low levels of vegetation / scrub cover. Higher incidence of soil surface visible due to recent or past land-use practices such as ploughing, mining etc.	60-79%
Excellent – very low to non-existent levels of vegetation/scrub cover. High incidence of soil surface visible due to past or recent land use practices, such as ploughing, grading, mining etc.	80-100%
Note: this process is purely subjective and can vary between field specialists, however, consistency is achieved by the same field specialist providing the assessment for the one project area/subject site.	

As indicated in *Table 6.2*, the effective coverage for project area illustrates that overall effective coverage was low at 13.39% with grass being the limiting factor and erosion across the project area is minimal. The disturbances included clearing, fences, grazing, past ploughing, residential and associated infrastructure and utilities, all of which have impacted upon the landscape and associated cultural materials.

Table 6.2 Effective coverage for the investigation area

SU	**Landform**	**Area (m2)**	**Vis. %**	**Exp. %**	**Exposure type**	**Previous disturbances**	**Present disturbances**	**Limiting visibility factors**	**Effective coverage (m2)**
1	slope	207,810	15%	90%	erosion, tracks	clearing, ploughing, residential, grazing	residential, grazing, dam	grass	28,054
2	drainage	4,390	10%	80%	erosion, tracks	clearing, dam, grazing	grazing, dam	grass	351
Totals		**212,200**							**28,406**
								Effective coverage %	**13.39%**

The level and nature of the effective survey coverage is considered satisfactory to provide an effective assessment of the Aboriginal sites identified and those potentially present within the investigation area. The coverage was comprehensive for obtrusive site types (e.g. grinding grooves and scarred trees) but somewhat limited for the less obtrusive surface stone artefact sites by surface visibility constraints that included vegetation cover and minimal exposures.

In view of the predictive modelling (Section 5) and the results obtained from the effective coverage, it is concluded that the survey provides a valid basis for determining the probable impacts of the proposal and formulating recommendations for the management of the identified sites and potential Aboriginal sites.

6.5 ARCHAEOLOGICAL SITES

Sites were labelled according to the project title, e.g. TS/1 where TS represents Taree South, and 1 indicates the site number allocated consecutively.

6.5.1 DEFINITION OF A SITE

A 'site' can be defined by various factors. For this study a 'site' was defined on the combination of the following inter-related factors:

- landform;
- exposure and visibility;
- visible boundaries of artefacts; and
- a feature identified by the Aboriginal community on the basis of their own cultural knowledge and significance.

The 'site area' was defined as the area in which artefacts were observed on a landform, though it must be remembered that this may not represent an accurate picture of site size. Visibility of artefacts is affected by differences in vegetation cover and hence ground surface visibility, as well as the degree of natural and human-induced disturbance.

6.5.2 DEFINITION OF SITE COMPLEX

Site complex refers to sites that occur in groups. For example, complexes may consist of burial grounds and carved trees, artefact scatters that represent different stages of procurement and manufacture or artefact scatters and shell middens. Complexes may also consist of artefact scatters that are connected across a landscape with the scatters being either specific activity centres (such as tool manufacturing sites) or larger base camp areas (with more artefacts and a variety of artefacts).

6.5.3 MAPPING IDENTIFIED SITES

MCH use topographic maps with MGA system 1994 (unless they are new maps produced after 1999 that have used the MG94 system) and our hand held Global Positioning System (GPS) units use MGA. It is important to note that the Global Positioning System is operated by the United States and is subject to changes that may affect the accuracy and performance of all GPS equipment. At present, the hand-held unit operated by MCH have an estimated error of approximately 5-10 metres though this is also dependant on the number of satellites available and detected and other factors such as tree coverage/interference.

6.5.4 SITES IDENTIFIED

No sites were identified during the survey.

6.6 POTENTIAL ARCHAEOLOGICAL DEPOSIT (PAD)

The terms 'Potential Archaeological Deposit (PAD)' and 'area(s) of archaeological sensitivity' are used to describe areas that are likely to contain sub-surface cultural deposits. These sensitive landforms or areas are identified based upon the results of fieldwork, the knowledge gained from previous studies in or around the subject area and the resultant predictive models. Any or all of these attributes may be used in combination to define a PAD.

The likelihood of a landscape having been used by past Aboriginal societies and hence containing archaeologically sensitive areas is primarily based on the availability of local natural resources for subsistence, artefact manufacture and ceremonial purposes. The likelihood of surface and subsurface cultural materials surviving in the landscape is primarily based on past land uses and preservation factors.

Given the known extent and content of sites typically situated on elevated land in close proximity to reliable water sources, the very gentle slope overlooking Stitts Creek and flood plain is likely to have been utilised for small to moderate groups of people for camping. One PAD has been identified and described below.

6.6.1 TS/PAD1

TS/PAD (Figure 6.3) is located in the eastern end of the project area and includes the very gentle slope on the western side of Stitts Creek. The eastern side consists of flood plains and would not have been suitable for camping. The PAD extends from the upper flood plain reaches and for approximately 50 metres. This PAD appears to have been subject to minimal disturbances and is an elevated landform overlooking the Creek (3rd order) and as such has potential to contain in situ cultural materials.

Figure 6.3 ST/PAD 1 location

6.7 DISCUSSION

As no sites have been identified, the results of the investigation are discussed below in terms of overall site integrity, local and regional contexts, and predictive modeling.

6.7.1 INTEGRITY

The integrity of the study area can be assessed only for surface integrity through the consideration of past and present land uses and their impacts. Subsurface integrity can only be assessed through controlled excavation that allows for the examination of both the horizontal and vertical distribution of cultural materials (caused by natural and/or human impacts) and by conjoining artefacts. Land uses and their impacts (clearing, ploughing, building construction, grazing), as well as natural impacts (bioturbation, erosion, flooding), within the project area are considered to range from moderate to high and due to such disturbances, the integrity of the deposits in the project area are disturbed and any sites that may have been present would have been disturbed.

6.8 INTERPRETATION & OCCUPATION MODEL

Given the fact that no sites identified, it is not possible to discuss site interpretation or occupation models.

6.9 REGIONAL & LOCAL CONTEXT

Given the fact that no sites identified, it is not possible to discuss the regional or local archaeological contexts.

6.10 REASSESSMENT OF THE PREDICTIVE MODEL

In view of the survey results, the predictive model of site location can be reassessed for the project area. The potential for artefacts to occur within the project area are is assessed as low or negligible due to the location from reliable water and associated subsistence resources and the impacts from the various land uses.

6.11 CONCLUSION

Sites provide valuable information about past occupation, use of the environment and its specific resources including diet, raw material transportation, stone tool manufacture, and movement of groups throughout the landscape. Previous research has shown that proximity to water was an important factor in past occupation of the area, with sites reducing in number significantly away from water. This research has also shown that occupation sites (artefact scatters and isolated finds) are the most frequently recorded site type and are commonly located along or adjacent to reliable watercourses, and on relatively flat to gently sloping topography in close proximity to reliable fresh water. Sites with higher artefact densities are similarly concentrated within fifty metres of watercourses and decrease with distance from the reliable water source. This is represented in the archaeological record through the lower density of sites and site contents with distance from the water source.

Given that Manning River being approximately 900 metres to the north, it is highly unlikely that the project area would have been favoured for large scale past Aboriginal occupation. Rather, the use of Stitts Creek and associated resources during time of heavy rain was likely to have been suitable for small scale camping en route to the Manning River and this is expressed in the archaeological record as low-density artefact scatters within 50mmetres of reliable water. Additionally, the area may have been utilised as hunting and gathering grounds as well as travel on the way to the Manning River and this type of land use is manifest in the archaeological record as a background scatter, which in this case would have been disturbed through past land uses. The identified PAD may reveal evidence of past Aboriginal land use along Stitts Creek.

7 SIGNIFICANCE ASSESSMENT

7.1 THE SIGNIFICANCE ASSESSMENT PROCESS

One of the key steps in the process of cultural heritage management is the assessment of significance. Not all sites are equally significant and not all are worthy of equal consideration and management (Sullivan and Bowdler 1984; Pearson and Sullivan 1995: 7). The assessment of significance of archaeological sites and resources is defined in most cases by what these entities can contribute to our understanding or knowledge of a place or site. In most cases, it is not possible to fully articulate or comprehend the extent of the archaeological resource at the outset, let alone its value. Therefore, the evaluation of the significance of archaeological material is based on the potential this resource has to contribute to our understanding of the past and the contribution that it can make to our understanding of a place or a cultural landscape.

7.2 BASIS FOR EVALUATION

The significance of archaeological sites or cultural places can be assessed on the criteria of the Burra Charter, the Australian Heritage Commission Criteria of the National Estate, and the OEH guidelines that are derived from the former two. There are two realms of significance assessment:

- Aboriginal cultural significance
- Archaeological (scientific) significance

The Aboriginal cultural significance of the sites or landscape is assessed by the RAPs and the archaeological significance by a qualified archaeologist.

7.3 ARCHAEOLOGICAL (SCIENTIFIC) SIGNIFICANCE

Scientific significance is assessed according to the contents of a site, state of preservation, integrity of deposits, representativeness/rarity of the site type, and potential to answer research questions on past human behaviour (NPWS 1997). For open campsites, evidence required to adequately assess significance includes information about the presence of sub-surface deposits, the integrity of these deposits, the nature of site's contents and extent of the site. A review of information pertaining to previously recorded sites within the local area and region enables the rarity and representativeness of a site to be assessed. High significance is usually attributed to sites that are so rare or unique that the loss of the site would affect our ability to understand an aspect of past Aboriginal use/occupation of an area. In some cases a site may be considered highly significant because its type is now rare due to destruction of the archaeological record through development. Medium significance can be attributed to sites that provide information on an established research question. Low significance is attributed to sites that cannot contribute new information about past Aboriginal use/occupation of an area. This may be due to site disturbance or the nature of the site's contents. In order to clarify the significance assessment, the criteria used are explained below.

7.3.1 RESEARCH POTENTIAL

Research potential refers to the potential for information gained from further investigations of the evidence to be used in answering research questions. Research questions can relate to any number of issues concerning past human material culture and associated behaviour (including cultural, social, spiritual etc) and/or use of the environment. Several inter-related factors to take into consideration include the intactness or integrity of the site, the connectedness of the site to other sites, and the potential for a site to provide a chronology extending back in the past. Several questions are posed for each site or area containing evidence of past occupation:

- Can the evidence contribute information not available from any other resource?
- Can the evidence contribute information not available from any other location or environmental setting?
- Is this information relevant to questions of past human occupation (including cultural, social and/or spiritual behaviour) and/or environments or other subjects?

Assessing research potential therefore relies on comparisons with other evidence both within the local and regional context. The criteria used for assessing research potential include:

- potential to address specific local research questions;
- potential to address specific regional questions;
- potential to address general methodological and theoretical questions;
- potential sub-surface deposits; and
- potential to address future research questions.

The particular questions asked of the available evidence should be able to contribute information that is not available from other resources or evidence and are relevant to questions about past human societies and their material culture. Levels for defining research potential are as follows:

High	Has the potential to provide new information not obtained from any other resource to answer current and/or future research questions.
Medium	Has the potential to contribute significant additional information to answer current and/or future research questions.
Low	Has no potential to contribute significant information to answer current or future research questions.

7.3.2 REPRESENTATIVENESS AND RARITY

Representativeness and rarity are assessed at a local, regional and national level (although assessing at a national level is difficult and commonly not possible due to a lack of national reports and available database). As the primary goal of cultural resource management is to afford the greatest protection to a representative sample of Aboriginal heritage throughout a region, this is an important criterion. The more unique or rare the evidence is, the greater its value as being representative within a regional context.

The main criteria used for assessing representativeness and rarity include:

- the extent to which the evidence occurs throughout the region;
- the extent to which this type of evidence is subject to existing and potential future impacts in the region;
- the integrity of the evidence compared to that at other locations within the region;
- whether the evidence represents a primary example of its type within the region; and

- whether the evidence has greater potential for educational purposes than at other similar locations within the region.

7.3.3 NATURE OF THE EVIDENCE

The nature of the evidence is related to representativeness and research potential. For example, the less common the type of evidence, the more likely it is to have representative value. The nature of the evidence is directly related to its potential to be used in addressing current and/or future research questions. Criteria used in assessing the nature of the evidence include:

- presence, range and frequency of artefacts and artefact types; and
- presence and types of other features.

7.3.4 INTEGRITY

The state of preservation and disturbances of the evidence (integrity) is also related to representativeness and research potential. The higher the integrity (well preserved and not disturbed) of the evidence, the greater the level of information that is likely to be obtained from further study. This translates to greater importance for the evidence within a local and regional context, as it may be a suitable example for preservation/ conservation. The criteria used in assessing integrity include:

- horizontal and vertical spatial distribution of artefacts;
- preservation of intact features such as hearths or knapping floors;
- preservation of site contents such as charcoal which may enable direct dating providing a reliable date of occupation of a given area;
- preservation of artefacts which may enable use-wear/residue analysis to determine tool use and possibly diet; and
- preservation of other cultural materials that may enable interpretation of the evidence in relation to cultural/social behaviour (e.g. burial types and associated mortuary practices may have been based on cultural, social, age, and/or gender distinctions).

Many of these criteria can only be obtained through controlled excavation. Generally high levels of ground disturbance (such as erosion, tracks, dams etc) limit the possibility that an area would unlikely contain intact spatial distributions, intact features, in situ charcoal et cetera.Definitions for defining levels of site integrity and condition have been derived from Witter (1992) and HLA (2002) and are as follows:

Excellent	Disturbance, erosion or development is minimal.
Good	Relatively undisturbed deposits or partially disturbed with an obvious in situ deposit.
Fair	Some disturbance but the degree of disturbance is difficult to assess.
Poor	Clearly mostly destroyed or disturbed by erosion or development.
Very Poor	Sites totally disturbed or clearly not in situ.
Destroyed	A known site that is clearly no longer there.

7.3.5 SCIENTIFIC EVALUATION

The following is an evaluation of the scientific significance of the individual archaeological sites identified within the project area. Table 7.1 presents the archaeological significance assessment for the sites identified.

Table 7.1 Significance assessment

Site	Site Type	Representativeness	Integrity	Res. Pot	Sci. Sig
ST/PAD	PAD	unknown	unknown	unknown	unknown

7.4 CULTURAL SIGNIFICANCE

While Aboriginal sites and places may have scientific significance, they also have cultural/social significance to the Aboriginal people from that area. Determining cultural/social significance can only be determined by the Aboriginal people from the area in which the sites and/or places were identified. Consultation with the Aboriginal community has been undertaken in order to document cultural/social significance and are discussed below.

7.4.1 AESTHETIC SIGNIFICANCE

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use (Australia ICOMOS 1999:11). Table 7.2 provides information relating to the aesthetic value of the project area and PAD by the RAPs.

Table 7.2 RAPs: Aesthetic values

RAP	
Mick Leon	has not assigned any specific or general aesthetic significance to the project area or PAD
Lee Davison	has not assigned any specific or general aesthetic significance to the project area or PAD

7.4.2 HISTORIC SIGNIFICANCE

The historic value encompasses the history of aesthetics, science and society. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS 1999:11). Table 7.3 provides information relating to the historic value of the project area and PAD by the RAPs.

Table 7.3 RAPs: Historic values

RAP	
Mick Leon	has not assigned any specific or general historic significance to the project area or PAD
Lee Davison	has not assigned any specific or general historic significance to the project area or PAD

7.4.3 SCIENTIFIC SIGNIFICANCE

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS 1999:11). Table 7.4 provides information relating to the scientific value of the project area and PAD by the RAPs.

Table 7.4 RAPs: Scientific values

RAP	
Mick Leon	has not assigned any specific or general scientific significance to the project area or PAD
Lee Davison	has not assigned any specific or general scientific significance to the project area or PAD

7.4.4 SOCIAL/SPIRITUAL SIGNIFICANCE

Social value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group (Australia ICOMOS 1999:11). Table 7.5 provides information relating to the social/spiritual value of the project area and PAD by the RAPs.

Table 7.5 RAPs: Social/spiritual values

RAP	
Mick Leon	has not assigned any specific or general social/spiritual significance to the project area or PAD
Lee Davison	has not assigned any specific or general social/spiritual significance to the project area or PAD

8 ASSESSMENT OF IMPACTS

The archaeological record is a non-renewable resource that is affected by many processes and activities. As outlined in Section 3 and 6, the various natural processes and human activities would have impacted on archaeological deposits through both site formation and taphonomic processes. Chapter 4 describes the impacts within the project area, showing how these processes and activities have disturbed the landscape and associated cultural materials in varying degrees.

8.1 IMPACTS

Detailed descriptions of the impacts are provided in Section 1.5 and the results of the survey in Section 6. The OEH Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (2010:21) describes impacts to be rated as follows:

1) Type of harm: is either direct, indirect or none

2) Degree of harm is defined as either total, partial or none

3) Consequence of harm is defined as either total loss, partial loss, or no loss of value

Table 8.1 Impact summary

Site	Site type	Type of harm	Degree of harm	Consequence of harm	Rep.	Integ.	Res. Pot	Sci. Sig
PAD	PAD	direct	total	total	unknown	unknown	unknown	unknown

The results of the assessment indicate that the identified ST/PAD1 will be impacted on by any future development. As the nature of the PAD remains unknown at this time, the impacts from any future development on the archaeological record remain unknown.

8.2 CUMULATIVE IMPACTS

The cumulative impact to Aboriginal heritage in the area appears to be limited given that:

- the net development footprint (i.e. the area of direct impact) is small and does not affect a high proportion of any particular landform present within the region; and
- a comparable suite of landforms (simple slopes) that are expected to and do contain a similar archaeological resource occur in multiple contexts both within the local area and throughout the region.

However, the nature of the PAD remains unknown at this time and as such the cumulative impacts to the archaeological record remain unknown.

Mitigation measures to minimise these impacts are outlined in the following chapter.

9 MITIGATION AND MANAGEMENT STRATEGIES

Specific strategies, as outlined through the DECCW (2010b) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b), the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), and the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010c), are considered below for the management of the identified site within the project area.

One of the most important considerations in selecting the most suitable and appropriate strategy is the recognition that Aboriginal cultural heritage is very important to the local Aboriginal community. Decisions about the management of sites and potential archaeological deposits should be made in consultation with the appropriate local Aboriginal community.

9.1 CONSERVATION/PROTECTION

The OEH is responsible for the conservation/protection of Indigenous sites and they therefore require good reason for any impact on an indigenous site. Conservation is the first avenue and is suitable for all sites, especially those considered high archaeological significance and/or cultural significance. Conservation includes the processes of looking after an indigenous site or place so as to retain its cultural significance and are managed in a way that is consistent with the nature of peoples' attachment to them.

There is an opportunity for the proposed development to protect the PAD identified if the development can be altered.

9.2 FURTHER INVESTIGATION

An Aboriginal Heritage Impact Permit (AHIP) is no longer required to undertake test excavations (providing the excavations are in accordance with the Code of Practice for Archaeological Investigations in NSW). Subsurface testing is appropriate when a Potential Archaeological Deposit (PAD) has been identified, and it can be demonstrated that sub-surface Aboriginal objects with potential conservation value have a high probability of being present, and that the area cannot be substantially avoided by the proposed activity. However, testing may only be undertaken as per the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2011) and discussions/consultation with the local Aboriginal community.

If the identified PAD will be impacted upon, test excavations will be required for the PAD prior to any works.

9.3 AHIP

If harm will occur to an Aboriginal object or Place, then an AHIP is required form the OEH. If a systematic excavation of the known site could provide benefits and information for the Aboriginal community and/or archaeological study of past Aboriginal occupation, a salvage program may be an appropriate strategy to enable the salvage of cultural objects. The AHIP may also include surface collection of artefacts.

As no site shave been identified and AHIP is not required.

10 RECOMMENDATIONS

10.1 GENERAL

1) The persons responsible for the management of onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974;

2) Should any Aboriginal objects be uncovered during works, all work will cease in that location immediately and the Environmental Line contacted; and

10.2 ST/PAD1

3) If the identified PAD will be impacted upon by any future development an archaeological subsurface investigation will be required in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW.

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APPENDIX A

Aboriginal Stakeholder Consultation

APPENDIX B

AHIMS search results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Taree

Client Service ID : 338363

Penny Mccardle

Date: 11 April 2018

Po Box 166
Adamstown New South Wales 2289

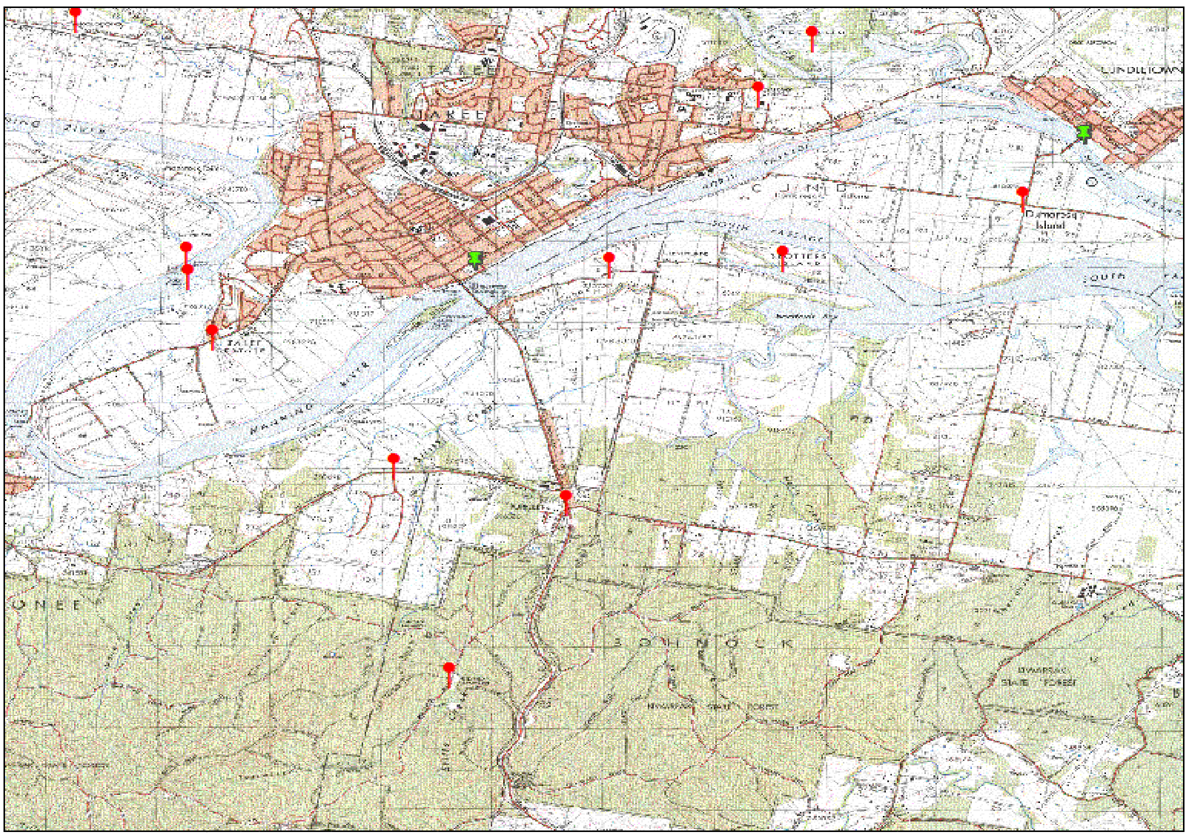
Attention: Penny Mccardle

Email: mcheritage@iprimus.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 445000 - 455000, Northings : 6462000 - 6472000 with a Buffer of 50 meters. Additional Info : Assessment, conducted by Penny Mccardle on 11 April 2018.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

26	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Taree

Client Service ID : 338363

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
30-5-0002	Purfleet Wunmurra Site	AGD	56	449700	6466100	Open site	Valid	Aboriginal Ceremony and Dreaming : -	Natural Mythological (Ritual)	
	Contact	**Recorders**	Harry Creamer,Barbara Clarke					**Permits**		
30-5-0015	TTRR1 / Blue hole;	AGD	56	449460	6464050	Open site	Valid	Water Hole : -	Water Hole/Well	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**		
30-5-0016	TTRR 3;	AGD	56	450000	6465550	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**		
30-5-0017	TTRR 4;	AGD	56	450180	6465500	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Elizabeth Rich,Mr.David Crew					**Permits**		
30-5-0018	TTRR 5;	AGD	56	451050	6466330	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**		
30-5-0019	TTRR 6;	AGD	56	451120	6466300	Open site	Valid	Artefact : -, Modified Tree (Carved or Scarred) : -	Open Camp Site,Scarred Tree	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**		
30-5-0020	TTRR 7;	AGD	56	451150	6466250	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**		
30-5-0021	TTRR 8;	AGD	56	451180	6466180	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**		
30-5-0022	TTRR 9;	AGD	56	451700	6466400	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Elizabeth Rich,Alice Gorman					**Permits**	612	
30-5-0023	TTRR 10;	AGD	56	451680	6466300	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Elizabeth Rich,Mr.David Crew					**Permits**		
30-5-0043	TTRR 14;	AGD	56	452260	6470000	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Ms.Jacqueline Collins					**Permits**	612	
30-6-0013	Farguhar Inlet;Farguhar Park;	AGD	56	453500	6465500	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Australian Museum					**Permits**		

Report generated by AHIMS Web Service on 11/04/2018 for Penny Mccardle for the following area at Datum :GDA, Zone : 56, Eastings : 445000 - 455000, Northings : 6462000 - 6472000 with a Buffer of 50 meters. Additional Info : Assessment. Number of Aboriginal sites and Aboriginal objects found is 26

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
30-5-0010	Purfleet Mission Cemetery	AGD	56	449700	6465400	Open site	Valid	Aboriginal Ceremony and Dreaming : -, Burial : -		1746,1943
	Contact	**Recorders**	Glen Morris,Elizabeth Rich,Alice Gorman,John Saunders,Gillian Saunders,Ms.Adrier					**Permits**		
30-5-0051	CBQ1	AGD	56	449160	6462020	Open site	Valid	Artefact : 1		4349
	Contact	**Recorders**	Ms.Jacqueline Collins					**Permits**		
30-5-0067	Buckets Way South Taree-4	GDA	56	448015	6466582	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact Searle	**Recorders**	Vienna Maslin,Mr.Murray Wood					**Permits**		
30-5-0068	Buckets Way South Taree-1	AGD	56	447744	6466468	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact Searle	**Recorders**	Vienna Maslin,Mr.Murray Wood					**Permits**		
30-5-0069	Buckets Way South Taree-2	AGD	56	448075	6466373	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Vienna Maslin,Mr.Murray Wood					**Permits**		
30-5-0066	Buckets Way South Taree-3	AGD	56	447043	6466345	Open site	Valid	Artefact : 0		
	Contact	**Recorders**	Vienna Maslin,Mr.Murray Wood					**Permits**		
30-5-0070	Buskets Way South Taree-1	AGD	56	447744	6466468	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact Searle	**Recorders**	Vienna Maslin,Mr.Murray Wood					**Permits**		
30-5-0072	Railway Cutting Site	GDA	56	450644	6469846	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Doctor.Alan Williams					**Permits**		
30-6-0165	WMR 2 OldBar	AGD	56	454457	6464825	Open site	Valid	Artefact : 1		99024
	Contact Mick Leon	**Recorders**	Purfleet Taree Local Aboriginal Land Council					**Permits**	1987	
30-6-0166	WMR 1 OldBar	AGD	56	454235	6464872	Open site	Valid	Artefact : 1		
	Contact Mick Leon	**Recorders**	Vienna Maslin					**Permits**	1988	
30-5-0077	MC Taree Masters PAD1	GDA	56	449270	6466372	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Myall Coast Archaeological Services					**Permits**		
30-5-0053	Kiwarrak State Forest	AGD	56	447620	6464619	Open site	Valid	Artefact : -		98226
	Contact	**Recorders**	Archaeological Risk Assessment Services (ARAS),Mr.Giles Hamm					**Permits**		
30-5-0064	PCW - 1	AGD	56	450248	6465510	Open site	Valid	Water Hole : 1		100072
	Contact T Russell	**Recorders**	Mr.Paul Irish					**Permits**		
30-5-0065	Wollards Creek IF 1	AGD	56	450402	6465297	Open site	Valid	Artefact : 1		

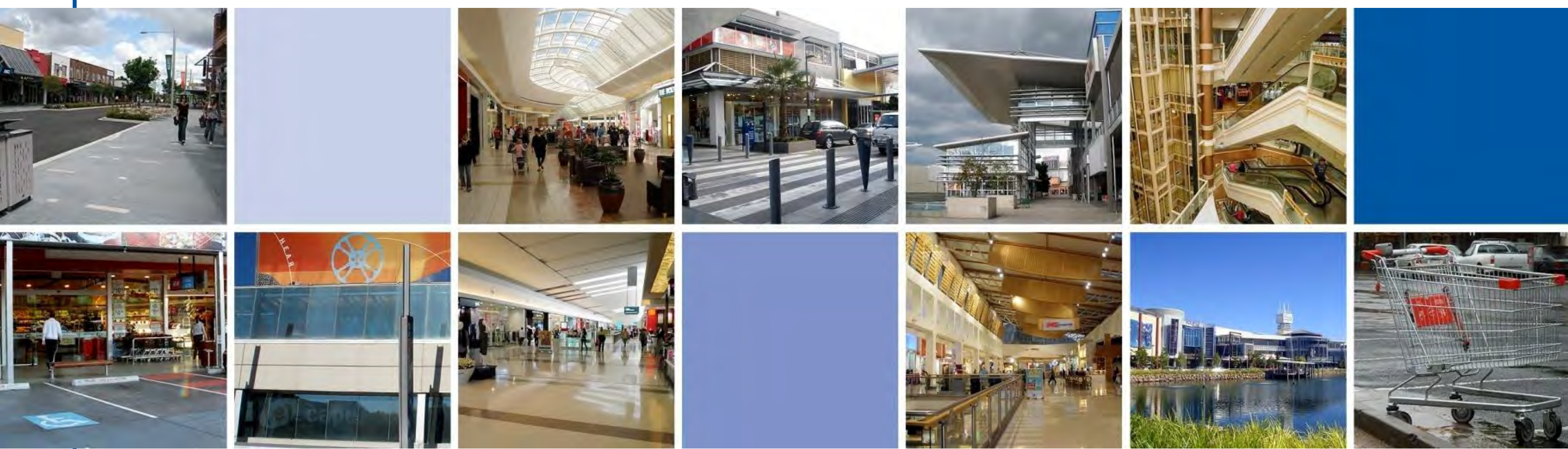
SiteID	SiteName		Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	S Scanlon	Recorders	Mr.Paul Irish					Permits		

Appendix F – Economic Assessment

Future Land Use at Glenthorne

Economic Assessment

October 2018



MacroPlanDimasi

MacroPlan

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Melbourne VIC 3000
(03) 9600 0500

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19 Martin Place
Sydney NSW 2000
(02) 9221 5211

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Brisbane QLD 4000
(07) 3221 8166

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Perth WA 6000
(08) 9225 7200

GOLD COAST
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The Wave, 89-91 Surf Parade
Broadbeach QLD 4218
(07) 3221 8166

Prepared for: Blue Sky Planning

MacroPlan staff responsible for this report:

Wayne Gersbach – General Manager (NSW)

Gordon Yoon – Manager, Economics

Thomas Killalea – Analyst

Table of Contents

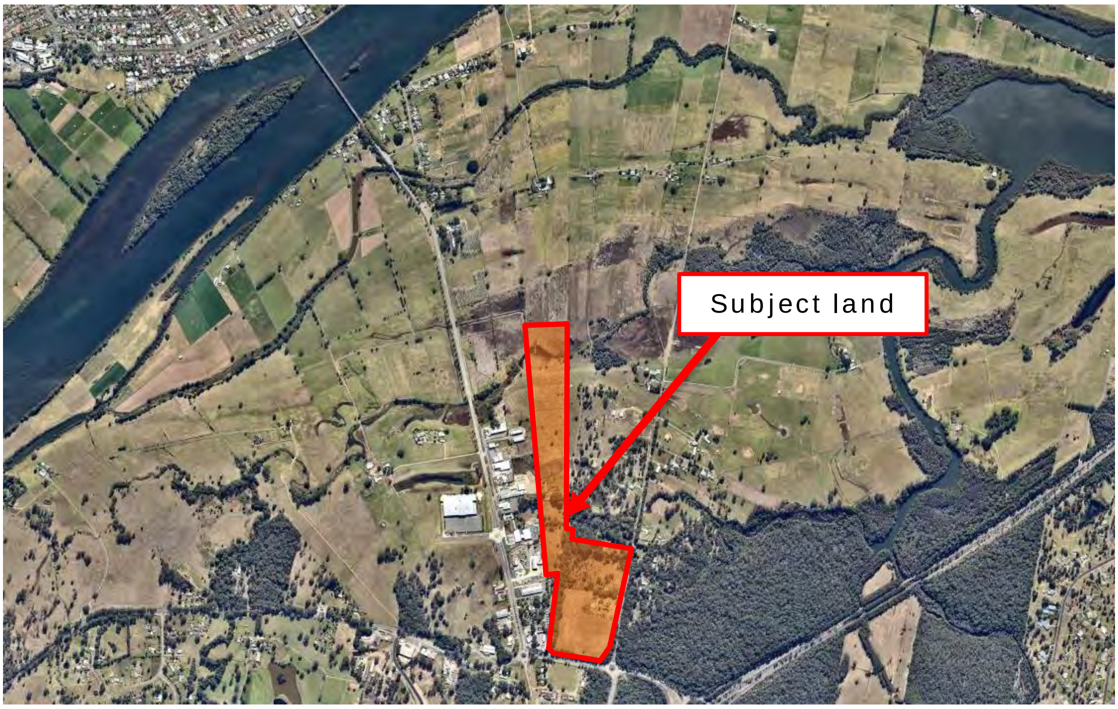
Executive Summary

Introduction

This economic assessment has been prepared by MacroPlan to inform a proposed amendment (i.e. Planning Proposal) to Greater Taree LEP 2010 which would increase the area of employment-related land in the Manning River Drive Employment Precinct, south of Taree.

The Planning Proposal seeks to rezone approximately 23.5 ha of land in Glenthorne north of Manning River Drive, between Glenthorne Road and Eriksson Lane. Part of the subject land is already identified for employment purposes in Mid-Coast Council's Draft Manning Valley Local Strategy (MVLS)[1].

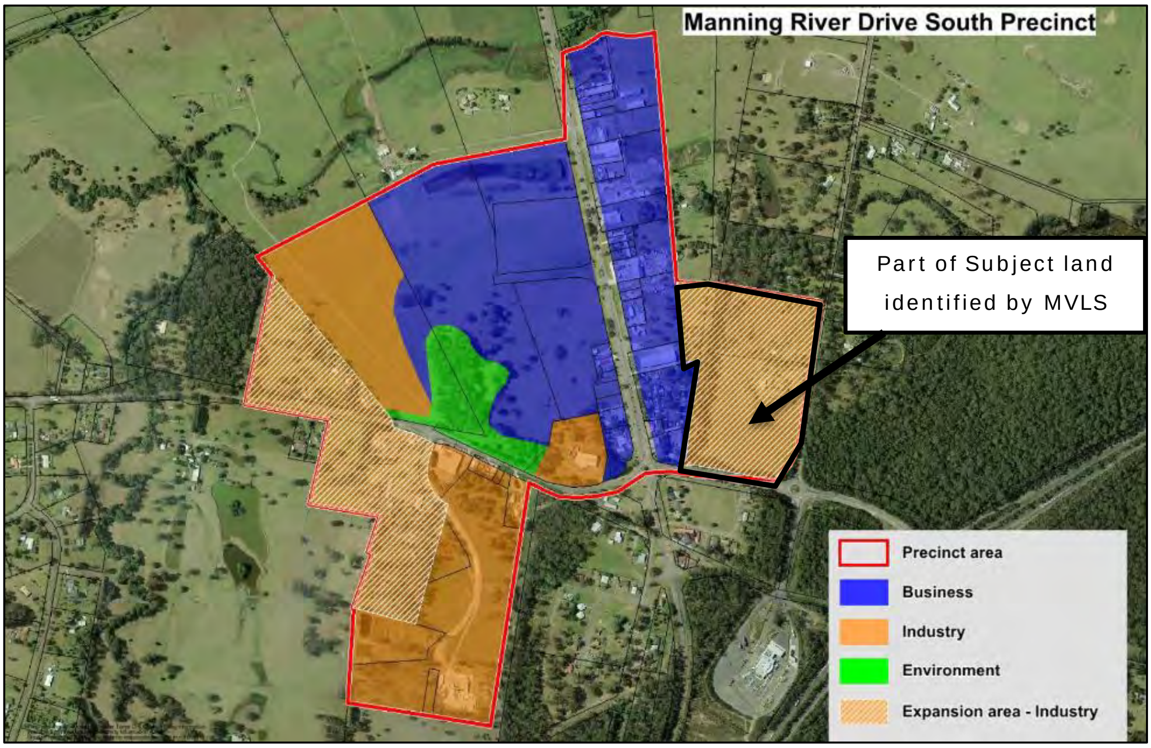
Subject Land – Specific Location



Source: Nearmap (2018)

[1] Mid-Coast Council, draft Manning Valley Local Strategy, May 2016, p.12

Manning Valley Draft Strategy - extract



Source: Mid-Coast Council (2016)

The Proposal

The Planning Proposal's vision is to enlarge and build on the existing capacities of the Manning River Drive Employment Precinct. A specific intent is to optimise the locational strengths relating to the site's accessibility and proximity to the Pacific Highway interchange.

The proposal would allow direct and committed "enabling" investment including a service station and directly associated transport-related servicing/manufacturing facilities and hospitality-related investments. Adequate additional land is also provided for ongoing industrial-entrepreneurial activity in future years.

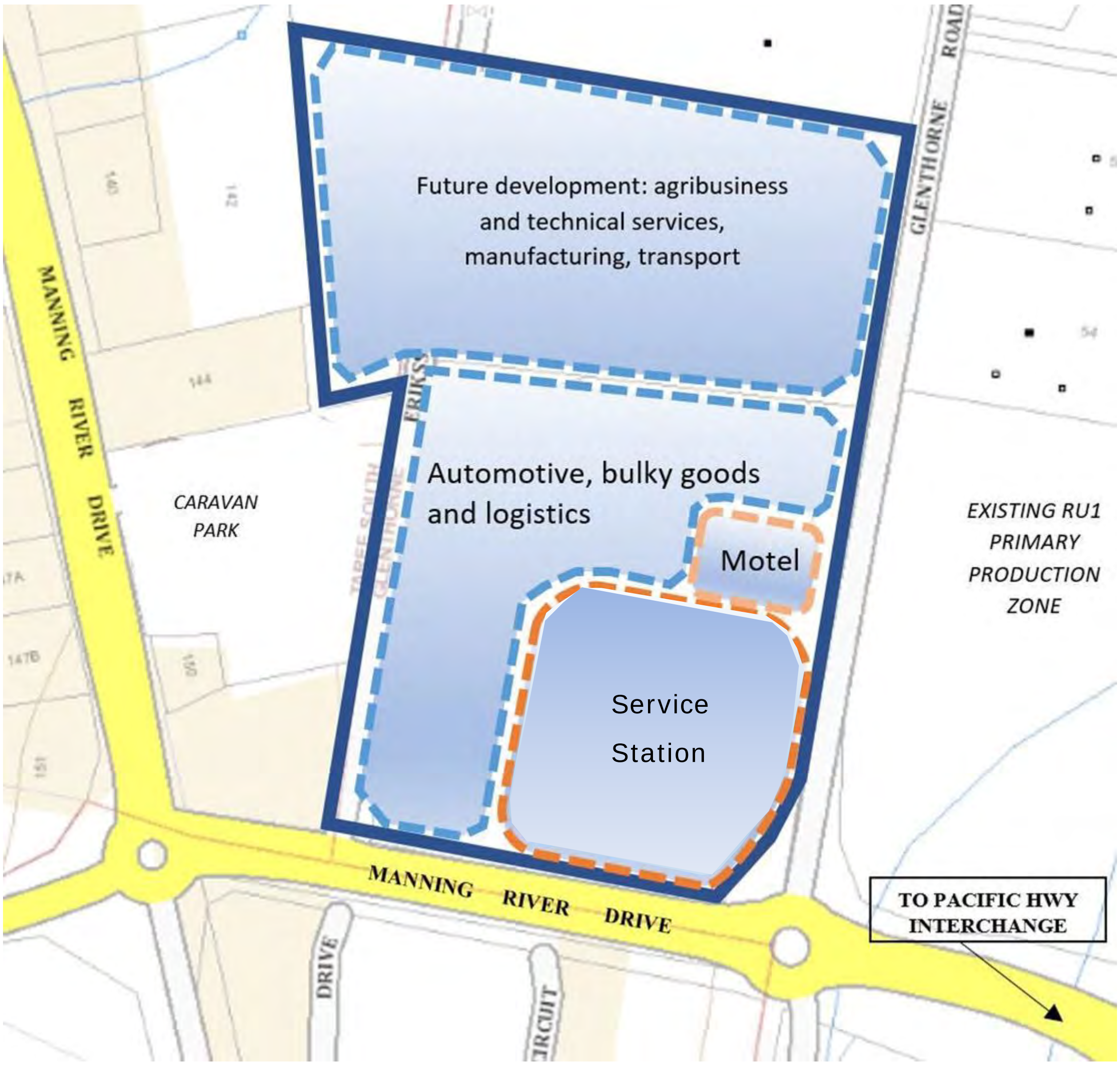
The below indicative layout plan shows the potential initial development intentions for the subject land (i.e. part of Subject land identified by MVLS). The development of the site is likely to be delivered in three stages. Stage 1[2] of

[2] The service station and the motel are to be delivered independently by two proponents.

development is likely to involve a service station and a motel. Stage 2 would commence in parallel with the first stage and would be likely to involve automotive and logistics operations. Stage 3 allows for other regional economic specialisations.

The rest of the subject land (predominantly part of 50 Eriksson Lane) is likely to be delivered as part of stage 3.

Indicative Layout for Initial Development Stages, Part of Subject Site



Source: Jasbe, Blue Sky Planning, MacroPlan (2018)

Context

Mid-Coast Council has undertaken an assessment on the local and regional economic development strategies to help inform the NSW Government initiated Regional Economic Development program (REDS) program. The *MidCoast Regional Economic Development Strategy 2018-2022* (2018) sets out a long-term economic vision and associated Strategy for the MidCoast Local Government Area. This strategy focuses on industry specialisation and opportunities that leverage the region's key economic endowments – relating to land and water, location and infrastructure, and lifestyle and amenity – to help guide investment within the area to 2022.

The economic assessment presented in this report in turn focuses on some of the challenges in the locality and analyses opportunities which may be available from the subject Planning Proposal in light of these newly finalised economic development strategies.

Key Findings

In summary, we highlight the following key drivers:

- The local demographic situation is quite characteristic of coastal settings in regional NSW. There is continuing population growth, virtually all of which is occurring in the retiree age cohort. While demand for services is increasing from retirees, the available local workforce is tending to decline – this is a difficult environment for business investment which is reflected in jobs growth data for the region.

- The subject land enjoys distinctive locational attributes which can naturally activate the creation of new private sector investment and employment opportunities. The strength is the site's Manning River Drive frontage adjacent to the Pacific Hwy interchange and at the major southern gateway to Taree, with two-way directional access available via the Glenthorne Road roundabout.

- The subject land's location on the highway corridor at Glenthorne brings natural locational strengths to activate the creation of these new employment opportunities, particularly in the provision of:
  - truck and passenger vehicle related retail;
  - transport related accommodation/hospitality (bringing flow-on effects to tourism);
  - transport related servicing and manufacturing; and
  - extensive agriculture and technical services, logistics and manufacture enterprises.

- These services are able to 'cluster' at the subject land, ensuring mutual co-location benefits that support the existing industry endeavours directly adjacent to the subject land and provide for wider economic benefits to be generated for Taree and the Mid-Coast Region more broadly. The proposal also seeks to incorporate provision for new economic and cultural development opportunities in partnership with the Purfleet/Taree Local Aboriginal Land Council.

- Further benefits may also arise to the businesses fronting Manning River Drive. This development will add to the critical mass of the location in, supporting business growth through agglomeration and will, at the same time, provide these businesses with a rear access which will provide some congestion relief in the morning and afternoon peaks.

- The construction aspect of stage 1 of initial development would involve approximately $11.5 million and can be estimated to create some 100 construction stage jobs which the proponents indicate would involve principally local trades and supplies. At operational stage the service station would create 60-80 jobs according to the proponents. The petrol price competition benefits of a new service station project in this location are estimated at $1.25 million per annum to local households, business and highway users.

- The evolving construction and operational stages of the wider precinct in the mid and longer term will benefit the Taree and wider economy. The benefit includes:
    - A major ongoing construction program across a number of different commercial and industrial elements, supporting spending and employment multipliers throughout the region.
    - The provision of local jobs in retailing, hospitality and commercial activities for local residents, providing employment and career opportunities for MidCoast residents.
    - The co-location of a wide range of industrial, warehouse and related land uses that support service specialisation and a deepening of Taree's service offer and labour force.

- The Planning Proposal will contribute to the establishment of a sustainable regional economy within MidCoast through new expenditure from residents and tourists.

- Additional benefits will accrue from the further initial stages of development at Glenthorne (i.e. Stages 2 & 3). The additional ongoing jobs from these industries will drive demand for commercial and retail floor space in the wider locality. MacroPlan has estimated longer term potential benefits amounting to approximately 300 additional jobs per year (i.e. in addition to those generated by the initial service station).

- Greater opportunities also exist in the development of the rezoned industrial land existing within Lot 2 DP 827097. The subject land, which is ideal for light industrial and freight/logistic industries, would deliver a superior employment outcome, accommodating 700-750 jobs.

- Finally, the assessment also confirms there is a sufficient demand for an additional service station at the southern gateway to the Pacific Highway, based on traffic volumes and RMS servicing expectations[3]. Moreover, such a use will complement the other proposed land uses, particularly 'automotive, bulky goods and logistics' and 'motel' uses.

- Other distinctive features of the project contribute to its potential to add local and regional value, including:
    - The project is driven by an intended end-user investor (i.e. Jasbe is a major service station provider in Australia) rather than being land developer/speculator-led;
    - The current land-owner is involved in transport enterprises along the state's east coast and has indicated a commitment to specific local investment;
    - Jasbe's commitment to investigate a partnership arrangement with Purfleet/Taree Local Aboriginal Land Council with potential to activate new economic and cultural development opportunities in the immediate site locality. This can help relieve the area's high unemployment and presents an opportunity to engage with local aboriginal communities to provide potential locational economic advantages proximate to the development site; and
    - Low-level reliance on government infrastructure investment at the project's start-up phase. The project leverages from the site's excellent accessibility and exposure, with little external funding/servicing required to enable the proposed development to progress.

- The rest of the subject land (predominantly part of 50 Eriksson Lane) will also be rezoned and retained for general industrial uses and development. This portion of land (approximately 13.2 ha) can create further benefits by

[3] Roads and Maritime Services (RMS), *Highway Service Centres Along The Pacific Highway - Policy Review*, May 2014 and RMS, *Highway Service Centres Along The Pacific Highway Policy Review - Summary Feedback Report*, June 2015

establishing a critical mass and can be expected to increase industrial, service retail and professional service jobs for South Taree.

Conclusion

Support for the Planning proposal is warranted on economic grounds and delivers on the MidCoast Council's objectives to promote a deepening of the local economy. Change to an employment zoning capitalises on the site's distinctive locational strengths (i.e. highway accessibility and exposure) and has the potential to trigger much needed local investment and job creation.

Section 1: Introduction

Blue Sky Planning and Environment is currently engaged by Jasbe Petroleum & Mulgrave Trust (the proponents) and seeks to consolidate the subject land's credentials for a zoning change, in response to demographic and market trends, for more employment land uses.

The current application to Council was initiated by Jasbe, a major service station developer and operator in Australia. The company owns approximately 50 facilities in Australia, located in New South Wales and Victoria, and has been operating service stations for over 25 years. Employment levels are in the order of 1,000 employees.

Mulgrave Trust, owners of the Taree Truck Centre and other Truck Sales Centres throughout NSW, initiated the inclusion of 50 Eriksson Lane into the Planning Proposal as they identified a potential economic benefit to include an area of industrial land to the east of the existing B6 zone along Manning River Drive.

MacroPlan has been engaged by Blue Sky Planning and Environment to inform the potential highest and best use of the subject land (50 Eriksson Lane, 51 & 55 Glenthorne Road). This report assesses the specific drivers for a range of employment activities at the site.

Regional and Locational Context

Taree is located within the Mid-Coast LGA. It is around 320km north of Sydney, 620km south of Brisbane and more proximate to Newcastle (approximately 170km to the south) and Port Macquarie (approximately 80km to the north).

Taree is connected to these and other east coast population centres via the Pacific Highway, the primary east coast arterial road, and the Sydney-Brisbane North

Coast rail, which provides both passenger and freight services. Taree can also be accessed through its domestic airport located northeast of the city.

Glenthorne is located approximately 3km south of the Taree Township. The Glenthorne locality is primarily rural, punctuated by Manning River Drive, the main road that connects Taree to the Pacific Highway to the south of the town.

Manning River Drive at Glenthorne accommodates a range of light industrial, warehouse, car sales and bulky goods establishments in what is known as the Manning River Drive Business Centre.

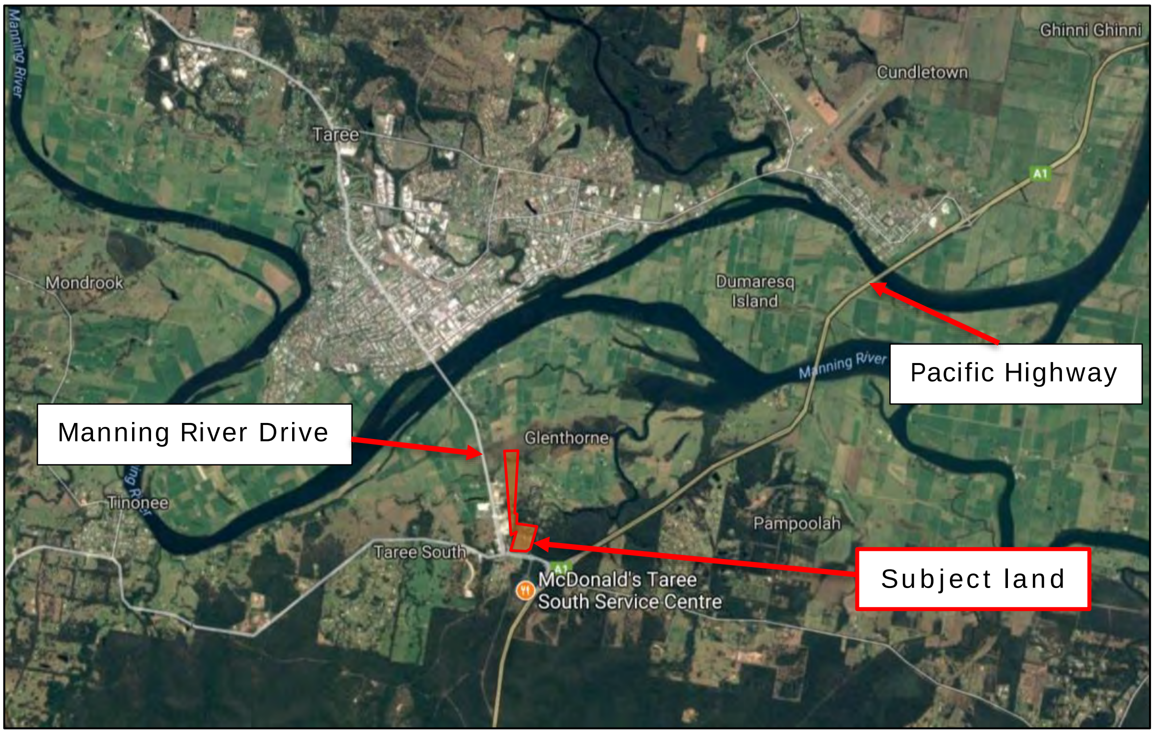
The land that is the subject of our investigations is generally situated north of Manning River Drive, at the southern end of Glenthorne Road, east of the existing Manning River Drive Business Precinct.

It is located north of the existing north-bound Taree South McDonald's / Caltex Star-Mart Service Centre, located adjacent to the Pacific Highway on-and-off ramps.

The subject land frames the southern gateway entrance to Taree from the Pacific Highway.

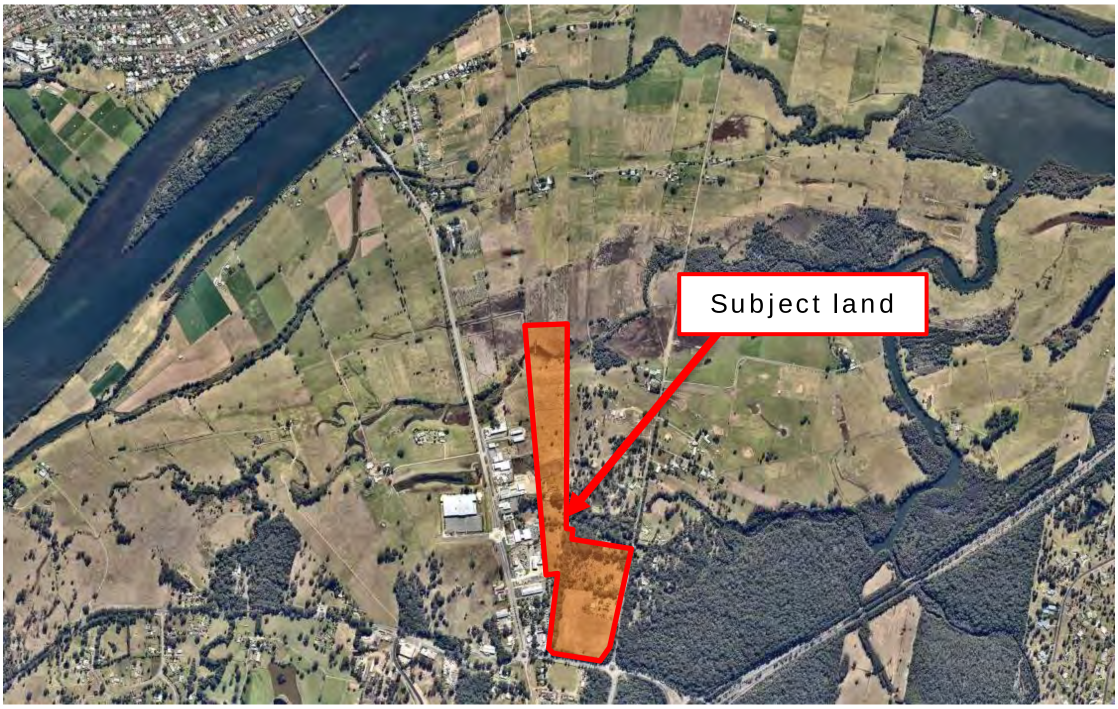
The site's location is depicted in the following locational diagrams (Figures 1 & 2).

Figure 1. Subject Land – Regional Location



Source: Google Maps (2018)

Figure 2. Subject Land – Specific Location



Source: Nearmap (2018)

Local Planning Context

The site comprises three individual lots, having a combined area of 23.5 ha, and currently zoned RU1 (Primary Production).

- Lot 2/DP827097 – 50 Eriksson Lane, Taree South (12.94 ha)
- Lot 2/DP573214 – 55 Glenthorne Road, Glenthorne (4.05 ha)
- Lot 50/DP863972 – 51 Glenthorne Road, Glenthorne (6.42 ha)

The zoning context of the subject land is depicted below.

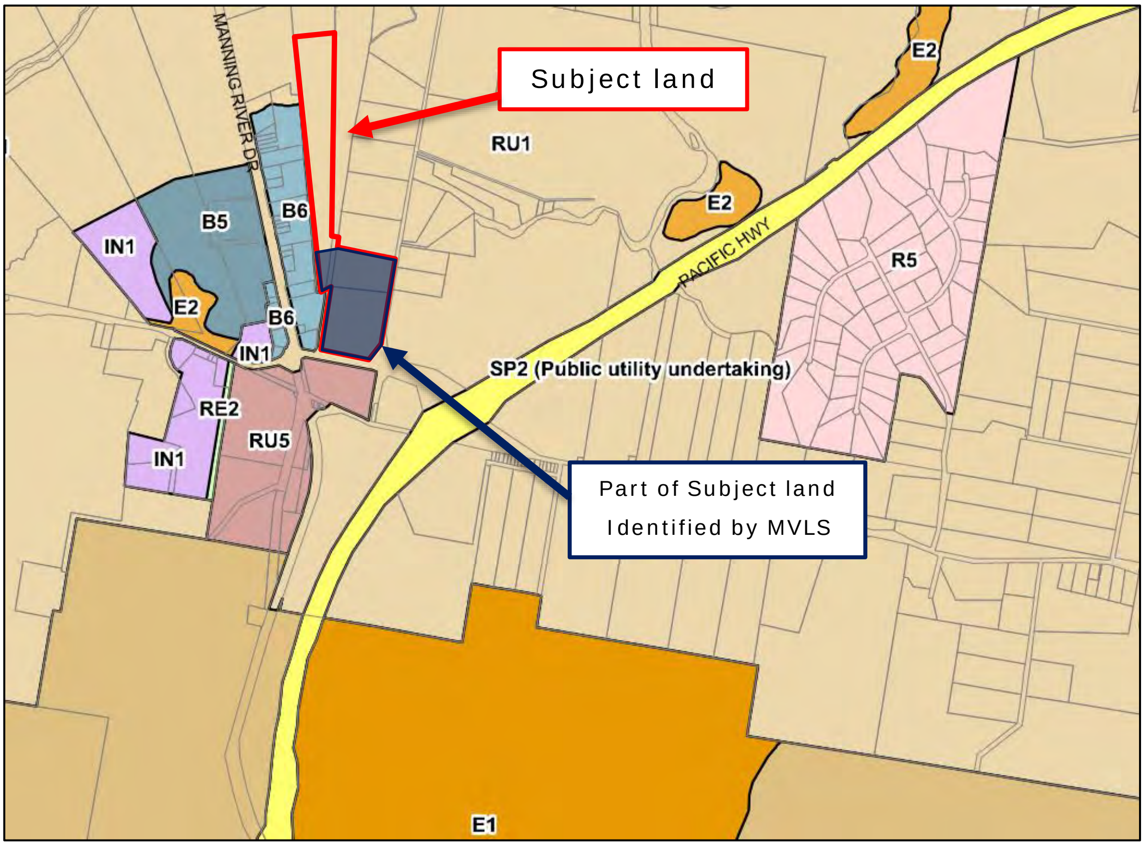
The part of the subject land (below, Figure 3) is recognised as potential areas for expansion in the Mid-Coast Council's Manning Valley Local Strategy (MLVS, May 2016) as having potential area for employment purposes.

The MVLS provides a 'blue-print' for growth across the Manning Valley and seeks to align Council's planning strategies to facilitate the coordinated delivery of key infrastructure, tourism, open space and community facilities.

A major goal of the MVLS is to 'grow the local economy', by offering accessible and affordable options for new businesses.

The strategy identifies key actions and prioritises necessary changes to Council's principal planning legislation and policies to facilitate new development.

Figure 3. Land Zoning



Source: Extract from Greater Taree Local Environmental Plan (2010)

High level priorities under the MVLS include:

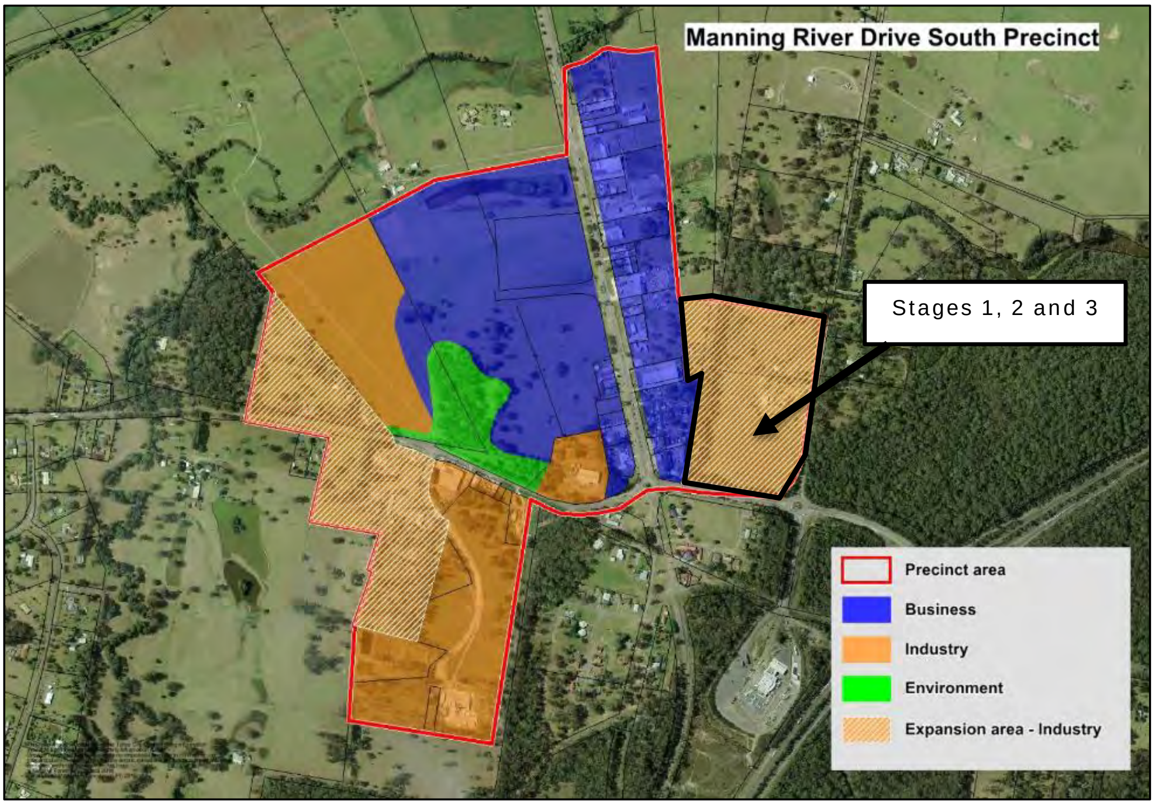
- Planning for the Northern Gateway Transport Precinct, located immediately north of the Cundletown by-pass, to the north of Taree and proximate to the northern Pacific Highway access ramps.

- Accommodating an expanded Taree Medical Precinct, immediately north of the Taree CBD.

- Expanding the Manning River Drive Employment Precinct, south of Taree and proximate to the southern Pacific Highway access points, to provide a commercial and industrial hub on accessible, flood-free land with good highway exposure and access to broader markets.

An extract from the MVLS, identifying the land that has been selected for expansion of the Manning River Drive Employment Precinct is provided below. The selected area is hatched. It comprises the subject land as well as land to the south-west of the existing business centre, with a total area of about 30 ha.

Figure 4. Extract from Manning Valley Draft Strategy[4]



Source: Mid-Coast Council (2016)

Project Concept

The proponent seeks to rezone the subject land from RU1 (Primary Production) to new uses that are a mixture of primary industry employment, retail and short-term accommodation uses.

During the initial development stages at the subject site (where identified by MVLS), the development will likely comprise a service station. Consistent with the

[4] Stages 1,2 and 3 (i.e.)Part of Subject Site identified by MVLS

site's advantageous setting, an objective of the proposed rezoning is to encourage complementary employment outcomes that are supportive of the broader economy of MidCoast.

The proponents have indicated that the above development will likely involve three stages, leveraging from the existing two-way access off Manning River Drive.

- Stage 1 service station and motel: The proponents have indicated that there is likely to be a new service station including facilities for locals and passing travellers; as well as a motel (comprising approximately 3.1ha). The service station and the motel are to be delivered independently by two proponents.

- Stage 2 transport and logistics services: This stage will be likely to comprise a range of automotive and logistics-related uses on a site area of some 4ha (e.g. towing company, depot[5], and warehouses). This stage would link directly to the new access and services infrastructure constructed as a component of Stage 1. It brings potential for an initial crosslink to the existing Manning Valley Drive Employment Precinct.

- Stage 3 future development: The last stage provides for longer term and more open-ended economic development opportunities aligned to the platform created by Stages 1 and 2, accommodating other regional economic specialisations (over a site area of some 16ha). Both Stages 2 and 3 bring potential for crosslinks to the existing Manning River Drive Employment Precinct.

Jasbe has also indicated that it has entered into a verbal agreement with representatives of the Purfleet/Taree Local Aboriginal Land Council. The arrangement would provide an area of some 60-80m^2 for use by the local community. These arrangements are yet to be finalised, but the concept includes

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[5] For use by the existing landowner who operates a multi-centre truck and tilt tray business along the state's east coast and has identified the need for a motorhome franchising business and service centre facility at the subject land.

the provision of this space as an art and cultural 'expo' and sales area to support PTLALC's ambitions to promote:

- Local employment/enterprise and work experience/training opportunities; and
- Cultural heritage development.

The site's locational strengths and its potential for significant levels of local patronage within the region (and some traffic flows along the Pacific Highway), creates the potential for success in this venture, connecting traveler services and food, tourism, arts and cultural development ambitions.

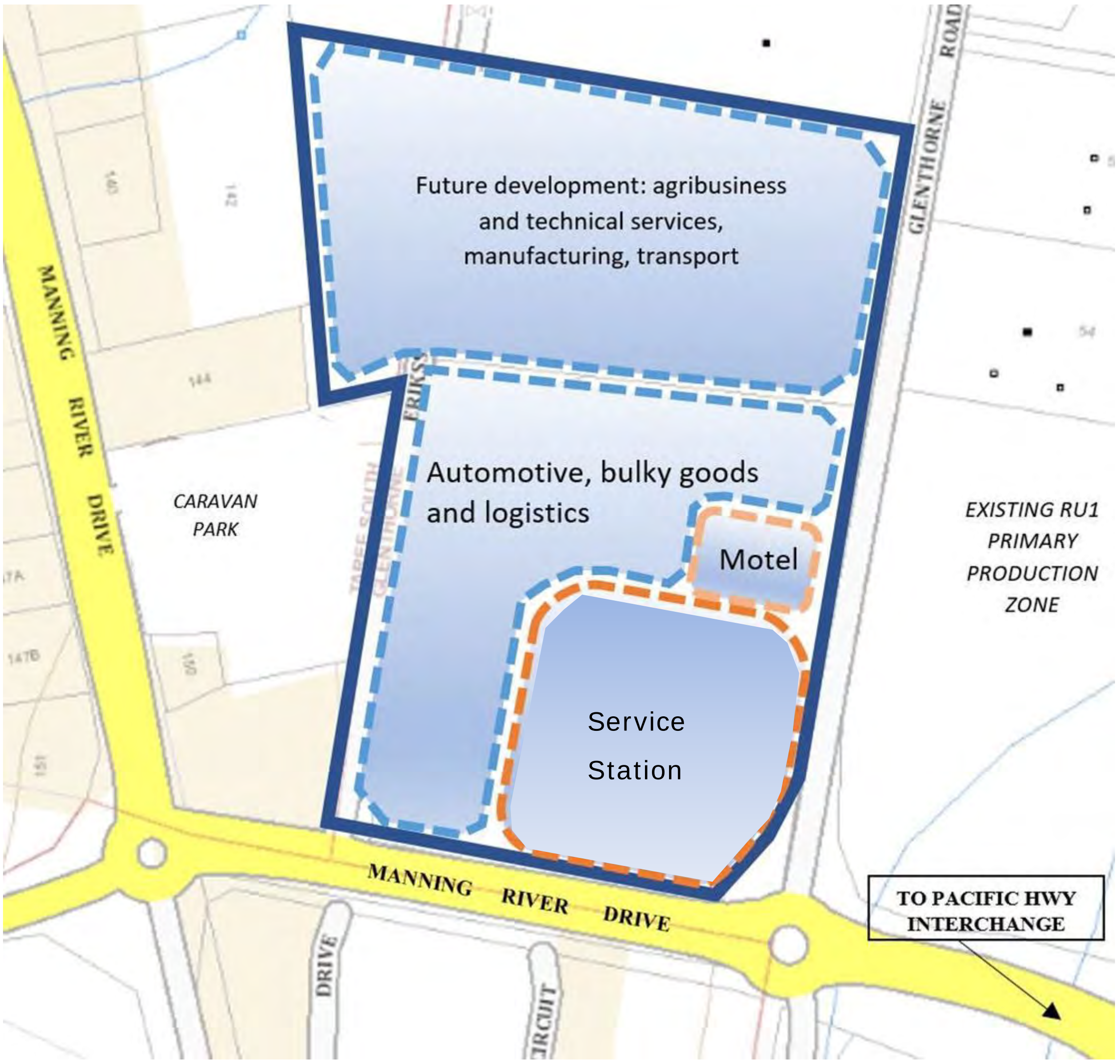
Further opportunities also lie in the potential development of the rest of the subject land (i.e. predominantly part of 50 Eriksson Lane) to enable a more intense development outcome in accordance with the Draft Manning Valley Local Strategy.

Particularly the sites 9/DP836884, 2/DP512153 and 102/DP1118846 (currently tenanted by Twilight Caravan Park and Gnomes Landscaping & Garden Supplies) are approximately 3.3 ha and located immediately to the east of the initial development stages (i.e. stages 1-3). After the initial development stages, the identified sites are subsequently more likely to lead to greater employment outcome at Glenthorne.

Overall, it is our professional opinion that the potential redevelopment of the rest of the subject land, which is ideal for light industrial and freight/logistic industries, would deliver a superior employment outcome, accommodating 700-750 additional jobs[6].

[6] Figure subject to change pending subsequent analysis on subject site business potential.

Figure 5: Indicative Layout for Initial Development Stages, Part of Subject Site



Source: Jasbe, Blue Sky Planning, MacroPlan (2018)

Study Area Catchment

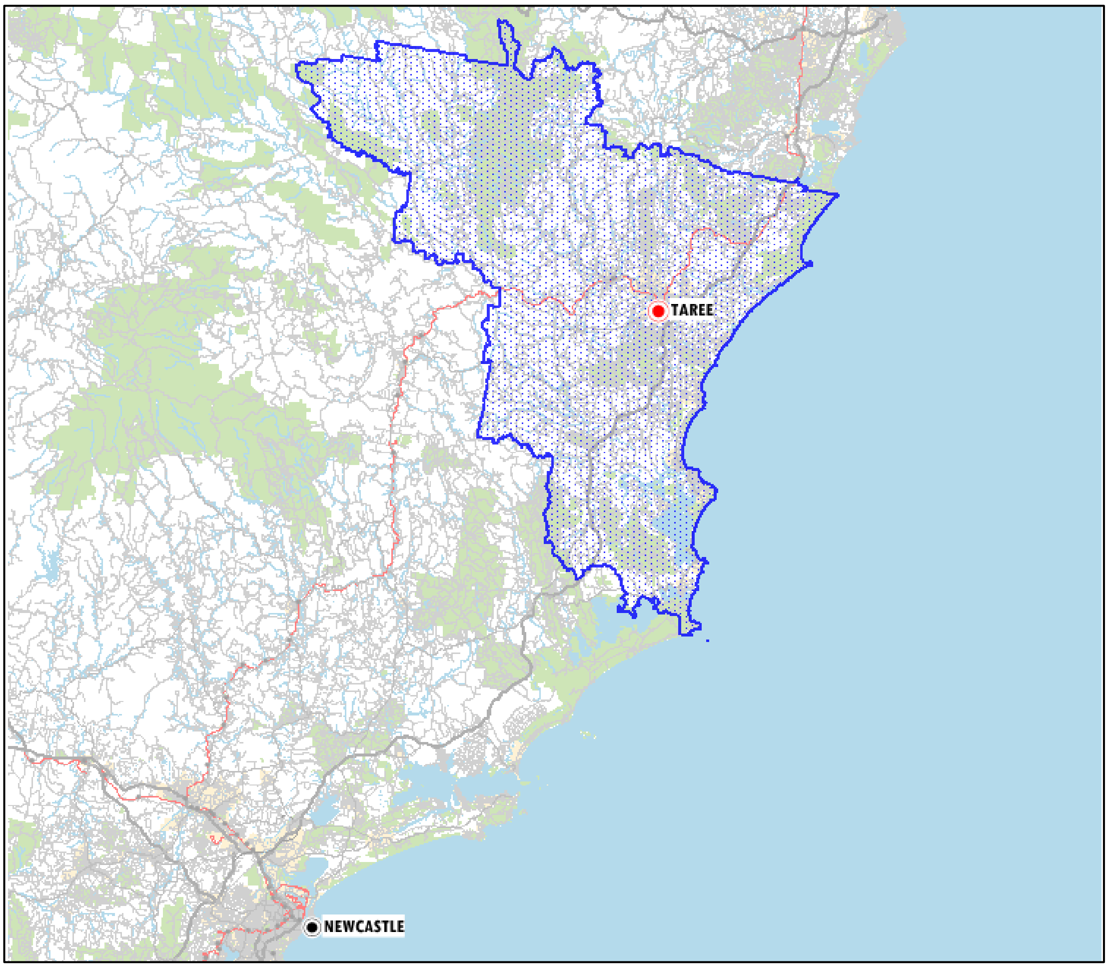
Due to the regional location of the subject land, a large catchment is considered for our investigations, allowing for local trends to be seen in a regional context.

For our investigations, we define the catchment of the subject land as the Taree SA2 (Primary) and its surrounding SA2 areas (secondary), including:

- Taree Township – 'Taree' SA2
- Coastal suburbs – 'Forster' SA2, 'Forster – Tuncurry region' SA2, 'Tuncurry' SA2, and 'Old Bar – Manning Point – Red Head' SA2

- Other surrounding areas – 'Taree region' SA2 and 'Wingham' SA2

Figure 6: Glenthorne Study Catchment



Source: MacroPlan Dimasi (August 2017)

MidCoast: Regional Economic Development Strategy (REDS)

The Regional Economic Development Strategy (REDS)[7] conducted for the MidCoast region by the NSW government in conjunction with the MidCoast Council, provides a vision for future economic development through strategies, initiatives and actions that will be implemented over the next four years to 2022.

There are three core strategies that are being targeted for the MidCoast. The first looks to strengthen the region as a 'location of choice'. In doing so improvements to core infrastructure, such as roads and businesses, will help drive growth and

[7] Regional Economic Development Study 2018-2022 (2018)

increase tourism into the area. The second looks to create a supportive businesses environment through reducing/removing regulatory barriers that should allow for the growth of new and existing businesses. The third will target marketing the MidCoast region to business owners, local residents and future retirees that will encourage a growth in the labour force and hence economic development within the area.

Initiatives will look to build upon the natural strengths of the area in order to achieve these strategies. For instance the regions natural assets include mineral resources for mining, agriculture for farming and water resources ideal for aquaculture. Furthermore, the regions proximity to Sydney and Newcastle via the Pacific Highway; that coupled with the affordable land makes it ideal for light industrial and freight/logistic industries. This potential will be accelerated following the completion of the Northern Gateway project which will make Taree a hub for freight and logistics that will significantly reduce freight costs in and out of the region.

Looking forward the strategy plans to consolidate the regions key industries. This will include boosting productivity in agriculture through greater use of technology and innovation (which will be supported through the addition of the NBN), growing the local aquaculture industry, leveraging advantages for freight and logistics and building on its strength as an attractive location for people to reside and visit.

Section 2: Socio-demographic Profile

This section of this report considers relevant economic and population data, drawing a link between recent trends and the region's future employment potential.

We find that the inclusion of the subject land as part of an expanded Manning River Drive Employment Precinct will deepen Taree's potential for jobs growth by creating a platform for a number of business opportunities that are in consonance with the region's demonstrated economic strengths, viz; automotive services, tourism and retail.

Historical Population Growth

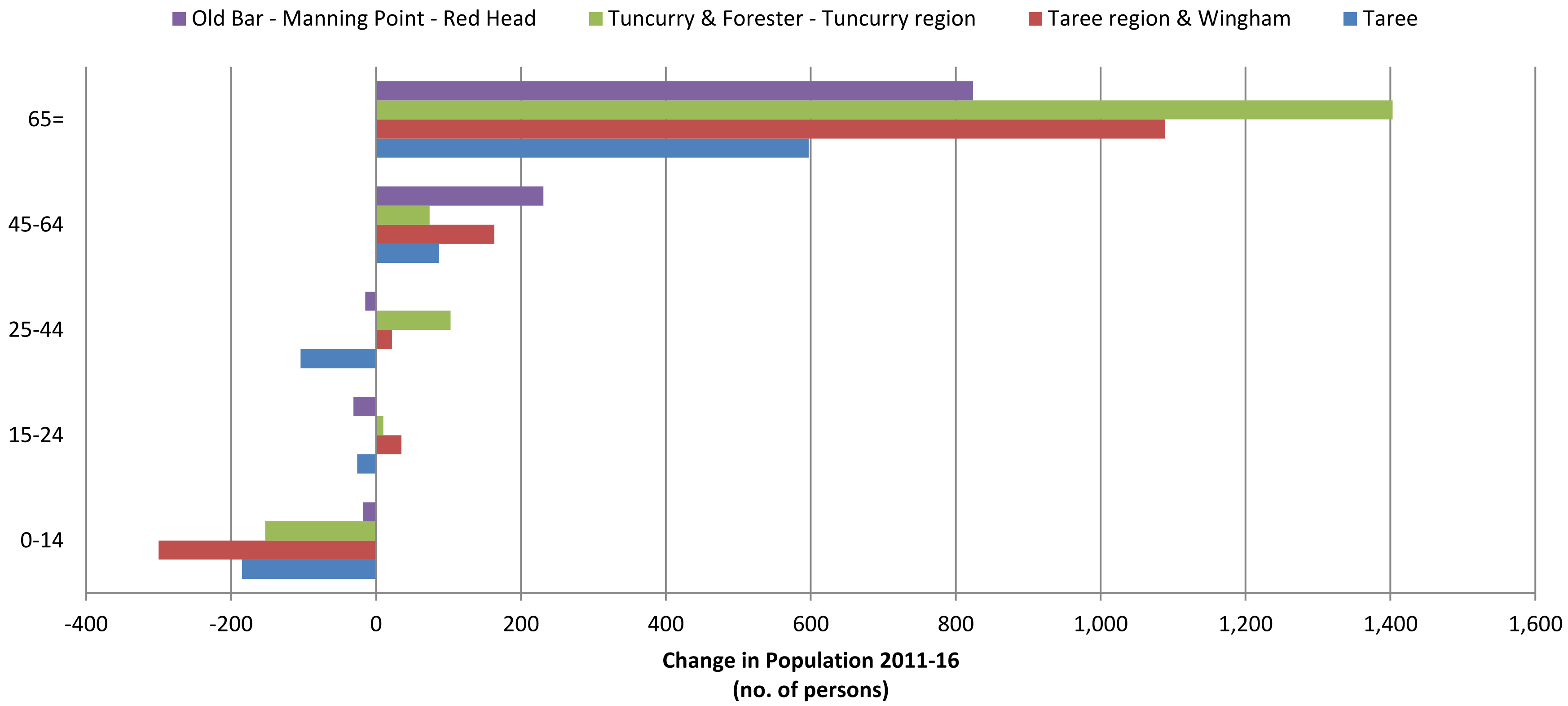
As at 2016, the population of the catchment area is 75,405 persons. Between 2011 and 2016, the population grew by 3,806 persons at an average of 1.04% per annum.

Over the 5-year period to 2016, the Taree SA2 region generated virtually no population growth (growing at 0.36% p.a.), but the population of the surrounding areas[8] grew at an average annual rate of 1.30%.

Notably, growth in the 'Old Bar – Manning Point – Red Head' SA2 area has been solid at 1.99%.

[8] 'Forster' SA2, 'Forster-Tuncurry region' SA2, Tuncurry' SA2, 'Old Bar - Manning Point - Red Head' SA2, 'Taree Region' SA2, and 'Wingham' SA2

Figure 7: Historical Population by age cohort (2011 & 2016), Selected SA2 regions[9]



Source: ABS Census (2011 & 2016)

[9] A more detailed analysis of historical population growth trends in those selected SA2 areas is presented in the Appendix A

As depicted above, population growth across the region has been led by 65+ age cohort (i.e. empty nesters and retirees). Over the five years to 2016, this age cohort expanded by 3.94%. There has also been some intermittent growth in younger age cohorts in the different SA2 areas.

Notwithstanding intermittent growth in the younger age groups, virtually all of the region's population growth is in the retiree age cohort.

This composition of growth, depicted below for the Taree and Forster-Tuncurry SA2's, is highly unfavourable for business growth. While demand for services is increasing from retirees, the available local workforce is tending to decline – this is a difficult environment for most businesses and is reflected in jobs growth data for the region.

The pressures within the local economy that result from this demographic trend will be most apparent for services that are subject to demand from local businesses and residents. Longer queues and less choice in service provisions are the more widespread outcomes. The greater risk is that some businesses face declining profitability, as revenue growth due to weak local demand loses out to stronger wages growth set by competition for workers in surrounding regions.

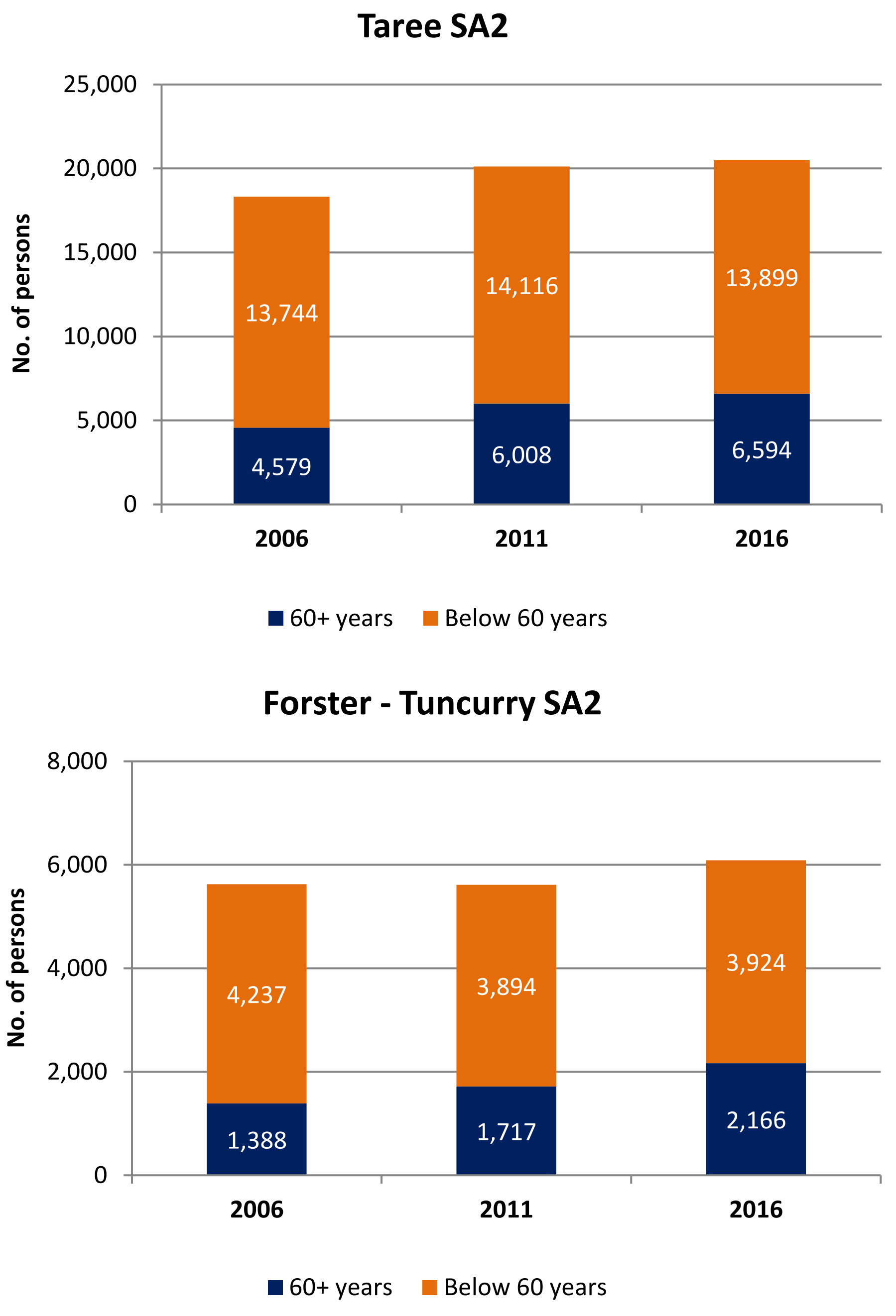
Our research shows that a lack of labour available to service businesses in any region will place great pressure on an increasing number of businesses to shut down, with their operators moving to other locations. This environment can create a vicious circle, where the workforce-aged population's departure places even more pressure on services for remaining residents.

This environment is likely to be already present, given current available ABS jobs data. The risk from here is that even more skilled-labour will tend to leave Taree, to pursue better job opportunities elsewhere.

Our view is that planning policy should seek to redress current demographic trends, with a view to achieving a healthier balance between household formation and labour workforce.

For Taree, if local demand is not growing, then passing trade on the Pacific Highway becomes much more important (as a basis of greater service provision for locals).

Figure 8: **'Taree' SA2 vs 'Forster-Tuncurry' SA2**



Source: ABS Census (2006, 2011, 2016)

NSW DP&E Population Projections

Summary population projections for the Mid-Coast LGA, produced by the NSW Department of Planning & Environment (DP&E) are reproduced in the table below.

These projections show that the LGA is expected to continue to lose its workforce age and younger age group cohorts.

At the same time, the region's retiree age population is projected to surge. In 2011, the ratio of workforce-aged persons to retiree-aged-persons was 2:1, but this ratio is projected to drop to just 1.1:1 by 2036.

A declining regional workforce will present increasing challenges for business, and a more difficult environment for retirees, as service choices and provisions are likely to decrease.

Table 1: NSW DP&E Population Projections by age cohort (2016 edition), Mid-Coast LGA

Age Cohort	*2011*	*2016*	*2021*	*2026*	*2031*	*2036*	Annual change p.a.
0-19	20,600	20,000	19,700	19,550	19,150	18,600	-70
20-34	10,200	10,650	10,300	9,550	8,950	8,600	-103
35-64	35,300	34,550	34,050	33,000	32,400	31,900	-133
65+	22,700	26,000	29,300	32,700	35,300	37,100	+555
Total	88,800	91,200	93,350	94,800	95,800	96,200	+250
Dependency ratio	34%	40%	46%	53%	58%	63%	

Source: DP&E NSW (2016)

Current DP&E projections reflect recent trends, rather than seeking to redress them. If planning policy aimed to secure a healthy rate of expansion in the number of skilled workers and young families, an imperative would be to create new employment opportunities that retained local working-age adults.

No Growth in Workforce-Aged Population

Our analysis shows that the Mid-Coast LGA has suffered from no growth in its workforce-aged population, particularly skilled and experienced workforce. The table below shows that from 2011 to 2016, there is continuing population growth, virtually all of which is occurring in:

- Retiree-aged persons, which contributed to the high growth in the 65 plus years cohort. This cohort grew by 4,919 persons in the same period.
- Young workers (less-experienced and low-skilled) aged 20-34 years. This cohort grew by 806 persons.
- However, the 35-64 age cohorts saw virtually no growth.

Table 2: Population Growth by Age (2011 & 2016), Mid-Coast LGA

Age Cohort	*2011*	*2016*	*Total change (2011-16)*	*Average change (p.a)*	CAGR*
0-19	19,866	18,720	-1,146	-229	-1.18%
20-34	9,352	10,158	806	161	1.67%
35-64	34,351	34,237	-114	-23	-0.07%
65+	22,278	27,197	4,919	987	4.07%
Total	85,847	90,312	4,465	893	1.02%

**Compound annual growth rate*

Source: ABS Census (2011 & 2016)

The demographic trend for Mid-Coast LGA is replicated for the Taree SA2 and its surrounds, which contains the suburb of Glenthorne.

Table 3: Population Growth by Age (2011 & 2016), Taree SA2

Age Cohort	*2011*	*2016*	*Total change (2011-16)*	*Average change (p.a)*	CAGR*
0-19	5229	4,916	-313	-63	-1.23%
20-34	2803	3,017	214	43	1.48%
35-64	7431	7,302	-129	-26	-0.35%
65+	4661	5,258	597	119	2.44%
Total	20,124	20,493	369	74	0.36%

**Compound annual growth rate*

Source: ABS Census (2011 & 2016)

Demographic Change: Impact on Business and Employment

The overall impact of fewer skilled workers in the region will gradually have direct consequences on the viability of existing businesses which trade at the local level. Retaining expenditure and expanding it through workforce growth is a vital connection for the local economy.

It is clear that the region has a rising age-dependency ratio[10,] as the number of retirees is increasing, but the workforce age and household formation groups are declining. These growth trends underline market risk for local residents and businesses.

In line with national trends, the population of the Mid-Coast LGA is expected to age further, with the number of people aged 65-years and over increasing from 22,689 residents in 2011 to 35,300 residents in 2031. This highlights the need for balancing the demographic pattern with younger residents who can work and contribute services and income to the local economy, which can in part be sourced through the planned development.

[10] The ratio of people aged 65 years and over to the working age population

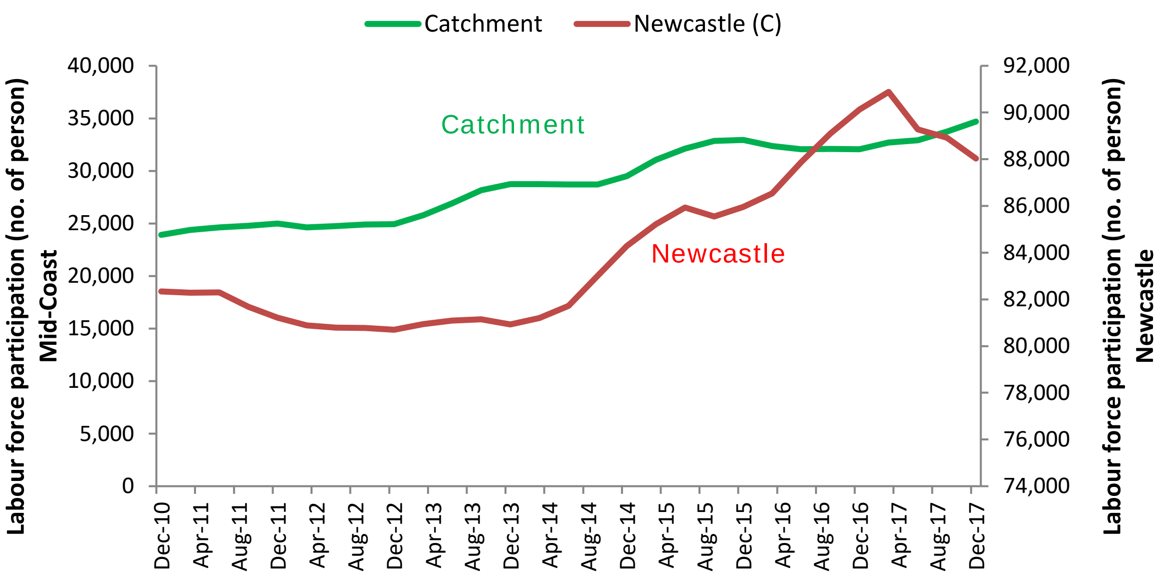
Regional Labour Market Variations

Many young and skilled workers are leaving Taree. A greater provision of business development opportunity is necessary to meet the needs of skilled workers.

The chart below shows that employment in the Glenthorne catchment area has been flat for the past five years, with only small fluctuations from year to year. By comparison, for the Newcastle LGA, there has been trend growth, with the total number of persons employed increasing from 86,000 to more than 88,000 over the two years to 2017.

It appears likely that Newcastle's economic expansion has drawn local workers from the catchment area (i.e. Taree and its surrounds), to the detriment of these regional locations.

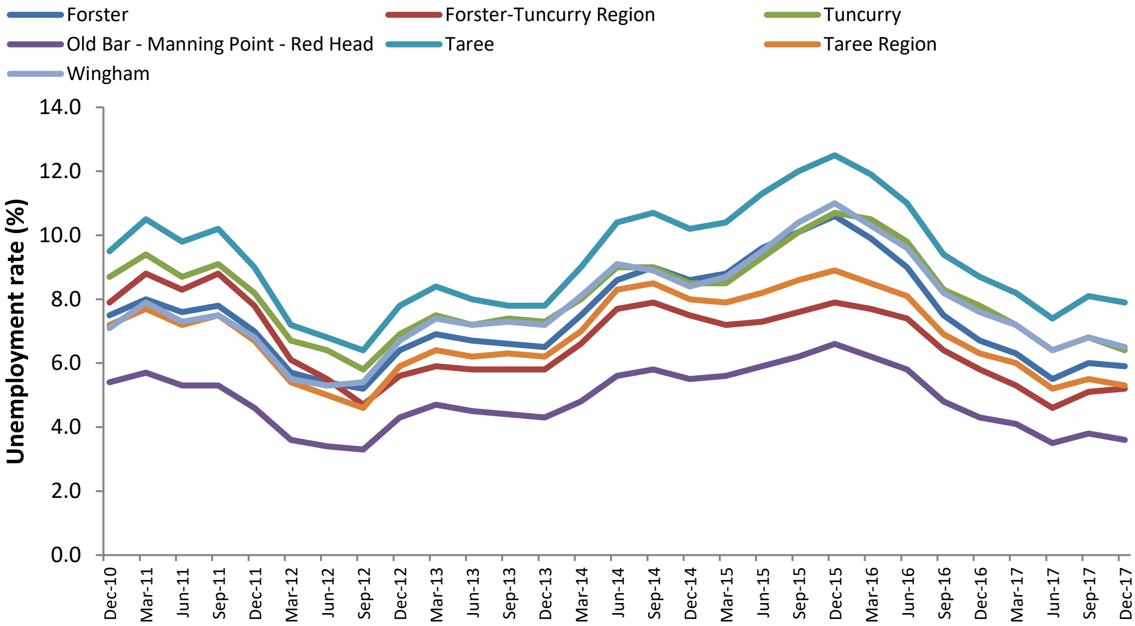
Figure 9: Labour Force Participation – Catchment and Newcastle LGAs



Source: Department of Jobs and Small Business, Small Area Labour Markets (2018)

The loss of younger workers to other regions is evident in a gradual decline in the unemployment rate. This trend is shown in the chart below. Flat employment, combined with a loss of workforce, is leading to lower unemployment statistics.

Figure 10: Unemployment - Selected SA2 areas near the subject land



Source: DoE, Small Area Labour Markets (2018)

However, this trend does not reflect a healthy local economy in this case. Instead, it represents a 'hollowing out' of the labour force. This is a negative pattern that needs to be addressed through new employment creation.

Across the nation, substantial changes in skill needs are challenging labour market policies and institutions and contributing to skill mismatches and shortages.

Local businesses experience a worker shortage as they cannot find workers with the skills that their businesses require.

At the same time, a number of skilled workers face difficulties in finding job opportunities matching their experience and their competencies, and many lower skilled workers face difficulty in accessing 'work-based learning' opportunities due to an absence of skilled workers.

While genuine skill mismatches do not explain all of these imbalances, skill demand and supply policies have a role to play in ensuring a better balance between skills of workers and the needs of employers in Taree.

As shown by our demographic analysis, some coastal towns are growing and need greater service provision. Notably, growth in the adjacent region, 'Old Bar – Manning Point – Red Head' SA2 area, has been solid at 1.99%.

Our view is that there will be (or already is) higher inward traffic movement from the coastal regions[11] to Taree and that maintaining and enhancing this flow is important to local businesses.

Glenthorne is strategically located as a basis of greater service provision for locals and visitors to the area and is therefore able to 'tap into' the economic opportunity that its accessibility and exposure presents.

To achieve this, a supportive environment for professionals and light industrial businesses needs to be provided immediately. Furthermore, REDS also suggests that this can be achieved through removing regulatory barriers that supress the growth of infant and existing businesses. This planning proposal provides opportunity for the immediate realisation of these goals.

[11] 'Forster' SA2, 'Forster-Tuncurry region' SA2, Tuncurry' SA2, 'Old Bar - Manning Point - Red Head' SA2

Section 3: Market Grounding & Research

MacroPlan also conducted a comprehensive market assessment to understand and determine the highest and best uses of the subject land.

Given the site is proposed to be located on zoned industrial and business land the types of developments that can take place are vast. No matter what development takes hold, as per the REDS, it should be accommodative to the existing provisions and provide a supportive business environment. Possible developments that would suit the site include but are not limited to; a short-term accommodation, automotive services and potentially a service station. These would all complement the existing services proximate to the site and actively promote the growth of the catchment.

Taree is identified as a 'Start/End' journey node along the highway, as it currently provides a regional service centre. However, this regional centre is identified by customers as being congested, affecting its provision of services and potentially deterring would-be highway users from stopping at and using its facilities. The existing centre also lacks green space and picnic amenities – its provision of 'rest stop' facilities is inadequate.

The provision of a service station with associated transport-related servicing/manufacturing (and hospitality-related) facilities at the subject land would deliver a set of mutually-reinforcing benefits. Specifically, a service station at this location could:

1. Accommodate future increased patronage from the local community (i.e. last fuel stop before the Pacific Highway & further industrial and commercial development on the subject site).

2. Improve vehicle safety through the provision of accommodation co-located with motor mechanic and dining services.

3. Accommodate growth in demand from coastal visitors.

4. By meeting the overlap in demand from passing traffic, and regional visitors to Taree, help to ensure that competitive fuel pricing is delivered at this juncture.

5. Act as a catalyst for further industrial and commercial development, particularly in the automotive services industry which already exists near the site.

6. Build upon the existing automotive repairs and services offering near the subject land and effectively scale it up into an automotive services hub.

7. Provide space for information and promotion of indigenous tourism and produce.

8. Increase the amenity around the main entrance into Taree, encouraging motorists to travel into town and providing economic benefits as a result.

9. Provide service station and fast food facilities for commuter traffic.

Increase in local traffic

The table below indicates daily patronage estimates for both the local arterial roads as well at the off-shoots from the larger Pacific Highway. This comprises two main categories of users - 'light' and 'heavy' vehicles.

Table 4: Daily Traffic Volume Counts, Selected Stations, Catchment, 2015-2017

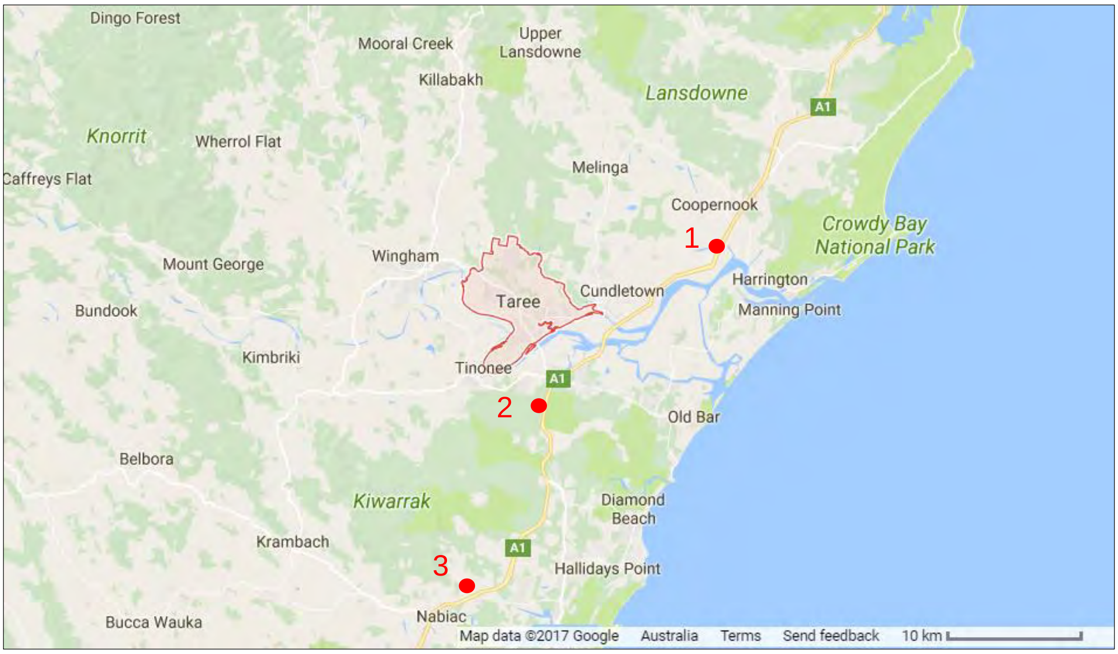
Station Location	Station ID	Traffic Direction (number of count)	Light Vehicles (2017)	% Changes (2015-2017)	Heavy Vehicles (2017)	% Changes (2015-2017)	All Vehicles (2017)	% Changes (2015-2017)
1.05km North of Barton St	PHSTC	North	6,883	*8.8%*	1,575	*6.5%*	8,458	*8.3%*
		South	7,127	*12.2%*	1,588	*6.3%*	8,715	*11.1%*
		North& South	**14,010**	***10.5%***	**3,163**	***6.4%***	**17,173**	***9.7%***
220m North of Jack Wards Rd	6120-PR	North	9,000	*5.9%*	1,695	*5.4%*	10,695	*5.8%*
		South	9,121	*9.3%*	1,837	*7.1%*	10,958	*9.0%*
		North& South	**18,121**	***7.6%***	**3,532**	***6.3%***	**21,653**	***7.4%***
390m East of Pipeclay	6119-PR	North	7,318	*8.6%*	1,633	*8.1%*	8,951	*8.5%*
		South	7,543	*14.6%*	1,627	*7.0%*	9,170	*13.2%*
		North& South	**14,861**	***11.5%***	3,260	***7.6%***	**18,121**	***10.8%***

Source: RMS (2015-2017)

The location of the selected stations with respect to Taree is depicted below.

This analysis of daily traffic counts shows that the local passing traffic has been growing quickly at each of the three locations examined.

Figure 11: Selected Stations, Catchment



Source: Google Maps (2017), RMS (2017)

- *Station 1 (ID: **'PHSTC'**): 1.05km north of Barton street, Jones Island*

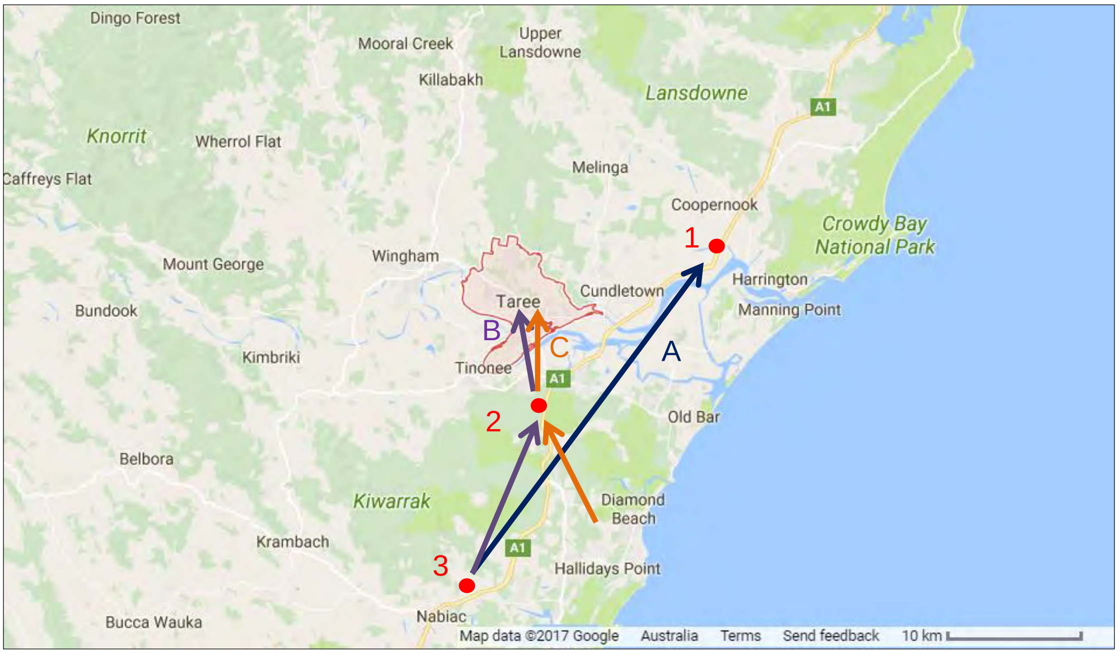
- ***Station 2 (ID: '6120-PR')**: 220m north of Jack Wards road, Kiwarrak*

- ***Station 3 (ID: '6119-PR')**: 390m east of Pipeclay Creek road, Nabiac*

Analysis of northbound traffic data, from Station 3 to Station 1 reveals that, the traffic inflow into Taree totalled 2,237 vehicles as at 2017 (refer to the figure 8 below):

A. Northbound net traffic flow from station 3 to station 1 (via station 2): 8,458 vehicles.
B. Northbound net traffic flow from station 3 to station 2, then into Taree: 493 vehicles.
C. Northbound net traffic flow from the nearby coastal regions to station 2, then into Taree: 1,744 vehicles.

Figure 12: Illustration of Northbound Traffic, from Station 3 to Station 1

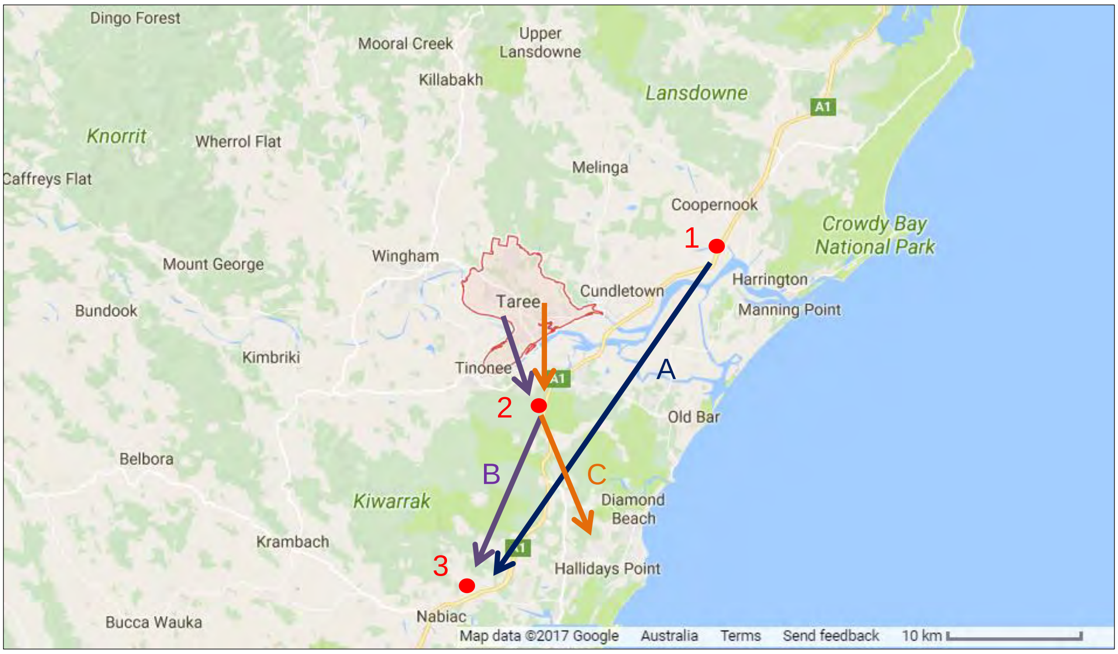


Source: Google Maps (2017), RMS (2017)

Conversely, there were 1,788 vehicles outward traffic movements from Taree (refer to the figure 9 below):

A. Southbound net traffic flow from station 1 to station 3 (via station 2): 8,715 vehicles.
B. Southbound net traffic flow from Taree to station 2, then station 3: 455 vehicles.
C. Southbound net traffic flow from Taree to station 2, then into the nearby coastal regions: 1,333 vehicles.

Figure 13: Illustration of Southbound Traffic, from Station 1 to Station 3



Source: Google Maps (2017), RMS (2017)

Key points to note from this analysis include:

- Larger light vehicle movements by number – likely to be coming from coastal traffic into Taree.
- There are also similar trends for heavy vehicles - maybe about 200 to 300 vehicles detour into Taree. This would fit with Taree being a regional service provider of building materials, construction businesses, etc.
- The increase in traffic loads from 2015 to 2017 would help explain customer feedback in the RMS report that services at the existing highway service centre at Taree are often congested. The increase in 'background'

traffic levels also supports the case for additional road user services and service stations at Taree, noting that the provision of services at the Glenthorne southern gateway will complement other services planned north of Taree at Cundletown[12].

Glenthorne is positioned strategically on the transport and employment corridor between Taree and the neighbouring coastal towns. It fronts the key arterial roads (i.e. Manning River Drive and Pacific Highway), which allows it to benefit from the completed Pacific Highway upgrades whilst servicing local traffic needs.

Provision of short-term accommodation and other services

Short-term accommodation can play a significant role in creating employment, promoting tourism, providing hospitality and entertainment and supporting local community groups.

The hospitality industry can make significant contributions to the economic development of local communities on one condition: its ability to fill new positions with young workers who need on-the-job training. The industry is particularly dependent on its ability to hire youth and young workers, who make up the largest share of employees in the sector.

According to our demographic analysis, there has been some growth in the 25-29 age cohort, although intermittent across the region and usurped by a decline in older age groups.

As older employees retire, training young people to equip them with technical skills and life skills is more important than ever. The short-term accommodation sector is well suited to this transitioning of skills to younger populations.

Glenthorne is well-suited to this form of employment offer. The provision of short-term accommodation at Glenthorne will complement the range of existing

[12] This is based on the increased provisions of traffic that will filter through both the town and the subject site following the development of the area. Hence the rezoning will be complementary and able to co-service the expected increase in traffic and business levels.

transport and automotive-related services in the locality (see separate listings below) and is consistent with the promotion of highway safety through the provision of overnight accommodation for road users.

The provision of existing short-term accommodation and other services proximate to the site are outlined in the below tables.

Table 5: Existing Short-term Accommodation, Glenthorne

Name	Address
Taree Country Motel	145 Manning River Dr, Taree
All Seasons Country Lodge Taree	110 Manning River Dr, Taree

Source: MacroPlan (2018)

Table 6: Service Stations, Taree

Name	Address
Caltex Woolworths Taree	70 – 76 Manning Street
United Petroleum	56 Victoria Street
United Petroleum	85 Muldoon Street
Coles Express Taree	59/63 Victoria Street
Caltex Star Mart	Glenthorne Road & Manning River Drive
BP Taree South	7087 The Bucketts Way
BP	102 Commerce Street
United Petroleum	Corner of Main Street & Else Street

Source: MacroPlan (2018)

Table 7: Existing Transport & Related Services, Manning River Drive

Name	Address
Taree Recycled Building Materials	118 Manning River Drive
Jacana Bus Sales	118 Manning River Drive
Sharpes Tractor Centre Pty Ltd	144 Manning River Drive
Stable Sheds & Garages (Fair Dinkum Sheds Distributor)	147 Manning River Drive
The Shed Company Taree	118 Manning River Drive
Edstein Creative Stone	128-130 Manning River Drive
Chesterfield Australia	144 Manning River Drive
Gnomes Landscaping & Garden Supplies Pty Ltd	152 Manning River Drive

Source: MacroPlan (2018)

Table 8: Existing Automotive Businesses, Taree

Name	Address
Jacana Bus Sales	118 Manning River Drive
Twilight Caravan Park	146 Manning River Dr
Thrifty Car & Truck Rental Taree Airport	Taree Airport, 1 Lansdowne Road
Hertz Car Rental Taree Airport	Landsdowne Road
Autobarn Taree	18 Victoria Street
Autopro Taree	3 Victoria Street
Taree Truck Centre	142 Manning River Drive
Chesterfield Australia	144 Manning River Drive
Manning Valley Automotive	22-26 Victoria Street
Taree Mitsubishi	136 Manning River Drive
Taree Motorama	54 Victoria Street
Men-in Trailers	118 Manning River Drive

Source: MacroPlan (2018)

Automotive Service Hub at Glenthorne

There are a series of existing local automotive services provided at Glenthorne. In our view, it is logical to build upon these existing services to create an automotive services hub. This will act as a catalyst for further industrial and commercial development in Glenthorne and Taree, with the following likely outcomes:

- A greater degree of competition will be generated through a larger grouping of automotive repair and service providers at Glenthorne.

- The hub can deliver a large-scale, integrated vehicle repairs and servicing network to meet the needs of both freight and recreational vehicles.

- It will also improve the efficiency in matching current automotive industry workers to prospective jobs and salary growth through a deepening of the local economy’s employment offer.

- Furthermore, attracting and retaining skilled automotive workers in Glenthorne and Taree could give more work-based learning opportunities for local youth and less-skilled workers. On-the-job training can be a powerful instrument for local employers to up-skill and re-train their workforce in the face of increasing needs (as shown in the daily traffic counts analysis) and to address skill shortages and reduce skill mismatch for new recruits lacking essential competencies.

- At the community level, the incidence of job training is linked to higher productivity, a more skilled workforce, and more frequent work and holiday visitors from nearby suburbs or regions.

Demand from coastal neighbourhoods

Nearby coastal villages have enjoyed greater population growth compared to the Taree township. Between 2011 and 2016, the Taree SA2 saw virtually no population growth (i.e. 0.36% p.a.), but the population of the surrounding coastal towns[13] grew at an average annual rate of 1.30%. Notably, growth in the 'Old Bar – Manning Point – Red Head' SA2 area has been solid at 1.99%.

It would appear that there is a clear preference for new households to be formed at these coastal locations, which allows Taree to focus as an employment centre servicing its satellite villages.

This phenomenon can translate into planning policy, where new employment opportunity is favoured at Taree.

Glenthorne is well positioned to accommodate new employment opportunities and is especially suited to new employment activity given its proximity to the coastal neighbourhoods of Old Bar, Hallidays Point and Forster-Tuncurry. These areas are all easily accessible to the site via Manning River Drive. Glenthorne is therefore strategically positioned to respond to new employment demand from Taree itself and its hinterland coastal locations which drive residential demand in the region.

[13] 'Forster' SA2, 'Forster-Tuncurry region' SA2, Tuncurry' SA2, 'Old Bar - Manning Point - Red Head' SA2, 'Taree Region' SA2, and 'Wingham' SA2

Food-catering demand and potential

There is a relatively limited food catering supply (i.e. café or restaurant) located in close proximity to the subject land. There is also a spatial gap for food retail tenants along the Manning River Drive and the Pacific Highway, with only one café (i.e. Coolabah Tree Café) provided at the existing South McDonald's / Caltex Star-Mart Service Centre and others located within the Taree township.

The potential food catering retail uses to be incorporated within a new service station at the subject land will service the local resident traffic and passing highway traffic as well.

The food catering offer at the potential retail development at the subject land could comprise two tenancies for food retail totalling a provision of around 300m^2. Table 17 provides estimated sales for the proposed food tenants.

Table 9: Potential retail opportunities, Initial Development Stages

Food retail tenancy	GLA	Estimated sales potential	
	(m^2)	($'000)	($ per m^2)
Tenancy 1 – café	100	500	5,000
Tenancy 2 – dining	200	1,100	5,500
Total	300	1,600	-

Source: MacroPlan (2018)

The average sales productivity levels of 'food catering' type retailers is typically around $5,000-6,000 per m^2. The proposed food catering offer at the subject land is estimated to achieve total sales of around $1.6 million (in constant 2017 dollars and including GST).

Taking into account the lack of food catering tenants in Glenthorne, the potential food retail uses at the subject land will benefit the local community through job creation and amenity offering in the local area. Furthermore, such uses will not undermine the existing service centre (i.e. Caltex Star-Mart Service Centre), which is heavily focused on fast-food retail (McDonalds, KFC and Subway).

The provision of food service outlets on the subject land will help avoid potential customers from crossing over the busy intersections to meet their food requirements.

Potential economic benefits

According to our market grounding research on the best potential uses for the subject site we believe that a service station would be the best fit for the site and the locality. It would complement the existing uses located proximate to the development allowing for greater economic development within the catchment. Further analysis surrounding these benefits can be found in Appendix B.

The provision of a service station at Glenthorne could have a direct impact on petrol pricing in the local area. We estimate that such a facility at Glenthorne will benefit about $1.25 million per annum to local households, business and highway users.

Table 10: Potential economic benefits, Initial Development Stages

	(per annum)
Economic Benefit – Lower petrol prices	
Recreational visitor	$0.10 M
Local resident	$0.26 M
Transport worker	$0.50 M
Non-transport worker	$0.39 M

Source: MacroPlan (2018)

Section 4: Other Opportunities

Bringing forward the activation of Glenthorne for industry expansion would introduce a corresponding increased level of competition for industrial land uses in the locality. This early activation would proactively provide industrial land occupiers, investors and tenants with greater choice in terms of site selection, and potentially create more investment attraction for the broader Taree catchment.

The REDS also notes the benefits that the MidCoast has when it comes to the value of its land, particularly its industrial land. It outlines that relative to other coastal regions to the north (Port Macquarie and Coffs Harbour) and south (Central Coast and Lake Macquarie) it has a significant advantage in its proximity to Sydney and Newcastle. Land in the MidCoast LGA is relatively more affordable and less congested, which is conducive to accommodating the growth of industry in the area.

The role for Taree as a regional service centre should be reinforced by providing local-scale retail, commercial & industrial development and automotive services. As it already currently supplies a large public hospital and other health facilities in addition to its direct rail access and local airport it will be an important regional asset moving forward. This aligns with one of the initiatives outlined in the 'Regional Action Plan' which looks at the redevelopment of Taree CBD as a potential means to revitalise the retail experience and encourage local expenditure.

In our view, Glenthorne is well-positioned to play an important role as a transport-related service hub, with surrounding coastal towns maintaining a residential focus. All three regions (i.e. Taree town, its gateway service corridors and its satellite villages) are projected to play a complementary role.

Glenthorne can support local employment by providing a motel, a service station, vehicle repairs and food retail facilities, which will support growing other businesses and industries.

Other land uses may also provide a positive economic benefit to the catchment. In this regard, we note that:

- The Pacific Highway freight task is expected to grow rapidly over the next twenty to thirty years which will increase road traffic and the significance of freight and logistics in the area.
- It is expected that, in conjunction with the Northern Gateway Transport Hub, the relevance and importance of Taree as a central and accessible freight and logistics node will be obvious to markets.
- Both intra and inter-state firms are able to be accommodated due to close access to the Pacific Highway.
- The Glenthorne site is flood-free, which ensures uninterrupted operation.
- Glenthorne has the flexibility to provide a range of different industrial and business zoned sized lots to accommodate a wide range of firms and industries.

The following candidate industries are suited to the attributes that Glenthorne offers.

Transport, Postal and Warehousing (TPW)

The TPW industry represents a game changer for the industrial land uses. The changing trends within this sector therefore are leading to ever increasing demand as existing supply continues to be taken up. This demand, from both within the Taree catchment and from beyond is being driven by the local population's needs as well global forces including:

- Reduced tariffs;
- Free trade agreements;
- Increased competition;
- Improved infrastructure;
- E-commerce (internet retail) and changing consumer behaviours and tastes; and
- Regional population growth.

TPW in the form of warehouse and distribution facilities are likely industries that could be accommodated on the subject land. Given the locational attributes and future projected freight task along the Pacific Highway, this industry is considered as a 'natural fit'.

Construction

Population growth and changing demographic patterns will ensure that there will be an ongoing need for businesses within the construction sector in the catchment.

Given the location within the catchment, especially its accessibility to larger metropolitan markets in Sydney and Port Macquarie via the Pacific Highway, there exists the opportunity to support the growth of firms in the construction and building materials sector. Examples of firms that provide building materials include those that:

- Supply and install roofing, fascia, gutter, patios, downpipes, solar systems, steel and timber house frames and commercial safety systems;
- Design, manufacture and installation of residential, commercial fixtures and fittings;
- Other building materials supplies – landscape, sand soil, cement, timber, steel etc.

Construction firms are considered likely candidates to take up key sites in the immediate near term. This is considered an important opportunity to pursue given that the ongoing demand for residential and commercial buildings, particularly in nearby coastal locations.

Manufacturing

With automotive servicing firms in place, there may be an opportunity for manufacturing of mechanical components and parts. Firms could also be involved in metal fabrication and respond to demand for steel fabrication, sheet-metal, laser cutting and precision machining and engineering. Firms that supply, fabricate and install metalwork and light to medium structural steel may also be attracted to the subject location due to its proximity to the Pacific Highway.

Environmental Technologies

Pressures from population growth on the environment presents a series of business opportunities relating to agriculture, water and wastewater systems, construction and other industries. Examples of firms which may operate within this niche in the catchment include those that:

- Provide environmental consulting and monitoring in areas such as air quality, acoustics and groundwater;
- Design, produce and supply of water hygiene technologies;
- Produce wastewater treatment and domestic grey water systems; and
- Deliver energy and water efficiency using wireless technology.

Food Processing and Distribution

As per the REDS, there is an opportunity for the early activation of the subject lands to accommodate the needs of the surrounding food and agribusiness sector. Taree presents a diverse range of production capabilities, from fresh seafood, meat, fruit and vegetables to value-added products. This may be in the form of storage, warehousing and distribution facilities that provide efficient access to the busy north-south Pacific Highway freight corridor.

Employment Dividend

The initial development stages (i.e. stages 1-3) have the potential to generate locally-significant employment opportunities. These opportunities include:

- Direct employment generation: the initial amount of ongoing jobs directly created by the proposed construction/ development phase and other visitor expenditure flows; and
- Indirect employment generation: additional ongoing jobs indirectly created by the proposed development in other industries not directly linked to the initial development.

A summary of the total employment impact is provided below. Total direct employment generated from the construction of stage 1 would be 50-70 jobs per annum during the construction phase. There will also be 10 ongoing jobs related to the maintenance expenditure.

Moreover, there will also be 300 ongoing jobs from resident and visitor expenditure in other industries including extensive industrial uses, retail, recreation and tourism. The construction jobs during stages 2 and 3 are estimated at around 300 jobs.

Table 11: Employment Impact

	(Full Time Equivalent jobs)
Initial Stage (Service station)[14]	
Construction Employment (p.a.)	100
Ongoing jobs - Operation (p.a.)	50-70
Ongoing jobs - Maintenance (p.a.)	10
Stage 2 & 3[15]	
Construction Employment (p.a.)	280-300
Long term generated employment - Operation (p.a.)	265-275
Long term generated employment - Maintenance (p.a.)	25

Source: MacroPlan (2018)

[14] Jasbe (2017)
[15] MacroPlan (2018)

Section 5: Conclusion

Our examination of demographic and employment trends relevant to Taree and its surrounding regions suggests that:

- Growing local jobs is key to curtailing population decline and maintaining service levels for Taree's ageing demographic.
- Retaining expenditure and expanding it through workforce growth is a vital connection for the local economy.
- For Taree, if local demand is not growing, then passing trade on the Pacific Highway becomes much more important (as a basis of greater service provision for locals).
- There is a vital need to balance Taree's ageing demographic with younger residents who can work and contribute services and income to the local economy.

Glenthorne is strategically located as a basis of greater service provision for locals and visitors to the area and is therefore able to 'tap into' the economic opportunity that the site's accessibility and exposure presents.

A service-oriented employment offer at Glenthorne will facilitate a direct and committed "enabling" investment by way of a service station and directly associated transport-related servicing/manufacturing facilities and hospitality-related investments. This offer can be further complemented through the provision of additional land that is sufficiently sized to provide for ongoing industrial-entrepreneurial activity.

These services can 'cluster' at Glenthorne, ensuring mutual co-location benefits that support the wider region over a staged development provision. The proposal also seeks to incorporate provision for new economic and cultural development opportunities in partnership with the Purfleet/Taree Local Aboriginal Land Council.

The proposed initial stages of development at Glenthorne will inject some $11.5 million into the local economy, and is estimated to create some 100 construction jobs. The proponents have indicated a preference to source local trades and supplies. At its operational stage the service station would create 60-80 FTE jobs.

Our estimates also indicate that the additional competition generated by the proposal would present a net price saving of $1.25 million per annum to local households, business and highway users.

Further, we estimate that $0.48 million of additional food catering expenditure will be generated by the project. The 'impact' of this expenditure capture is minor and can be absorbed by other existing businesses. It therefore represents a benefit to the local economy, bringing the total estimated benefit from stage one of the project to $1.73 million annually.

The increase in 'background' traffic levels into and out of, and that which bypasses Taree supports the case for additional road user services at Taree. In this light the provision of additional services at the Glenthorne southern gateway will complement the nearby existing highway service centre and other automotive services planned for the north of Taree at Cundletown.

The Glenthorne rezoning will consolidate the significance of Manning River Drive Employment Precinct as an important southern entry to Taree. The proposal complements the Northern Gateway precinct, ensuring that Taree captures every opportunity to trade from highway traffic and local resident movements in order to maximise the available local economic benefits.

The provision of an integrated service station at the subject land would deliver a set of mutually-reinforcing benefits. Specifically, a service station at this location could meet the anticipated increase in demand from Pacific Highway users and act as a catalyst for further industrial and commercial development, strengthening and deepening the employment relevance of the adjacent Manning River Drive Employment Precinct.

Other benefits will be derived as further stages of development occur.

We find that the proposed rezoning is consistent with the aims of the Manning Valley Local Strategy which seeks to 'grow the local economy' by offering accessible and affordable options for new businesses. This objective is key to current Council and state government initiatives to strengthen the regional economy and to build local resilience in the face of challenging demographic and economic trends.

Overall, there are strong economic grounds to support the proposed rezoning of land at Glenthorne. An employment zone capitalises on the site's distinctive locational strengths (i.e. highway accessibility and exposure) and has the potential to trigger much needed local investment and job creation.

Our view is that planning policy should seek to redress Taree's current demographic trends, with a view to achieving a healthier balance between household formation and labour workforce. Building capacity for employment growth and retaining a youthful workforce is key to achieving this outcome. The proposal for Glenthorne is consistent with this primary economic aim.

Appendix A: Historical Population Growth Trends

Table 12: Historical Population by age cohort (2011 & 2016), Selected SA2 regions

Taree SA2					Taree region & Wingham				
Age Cohort	2011	2016	Total Change (2011 - 2016)	CAGR (%)	Age Cohort	2011	2016	Total Change (2011 - 2016)	CAGR (%)
0-4	1,208	1,173	-35	-0.6%	0-4	872	708	-164	-4.1%
5–9	1,280	1,237	-43	-0.7%	5–9	956	1,005	49	1.0%
10–14	1,381	1,274	-107	-1.6%	10–14	1,187	1,002	-185	-3.3%
15–19	1,360	1,232	-128	-2.0%	15–19	1,044	1,016	-28	-0.5%
20–24	986	1,088	102	2.0%	20–24	603	666	63	2.0%
25–29	946	969	23	0.5%	25–29	510	636	126	4.5%
30–34	871	960	89	2.0%	30–34	604	624	20	0.7%
35–39	1,073	916	-157	-3.1%	35–39	776	678	-98	-2.7%
40–44	1,159	1,100	-59	-1.0%	40–44	933	907	-26	-0.6%
45–49	1,244	1,215	-29	-0.5%	45–49	1,258	1,114	-144	-2.4%
50–54	1,346	1,275	-71	-1.1%	50–54	1,406	1,422	16	0.2%
55–59	1,262	1,460	198	3.0%	55–59	1,498	1,599	101	1.3%
60–64	1,347	1,336	-11	-0.2%	60–64	1,522	1,712	190	2.4%
65–69	1,197	1,463	266	4.1%	65–69	1,315	1,674	359	4.9%
70–74	1,090	1,209	119	2.1%	70–74	930	1,331	401	7.4%
75–79	887	1,029	142	3.0%	75–79	631	795	164	4.7%
80–84	712	708	-4	-0.1%	80–84	452	508	56	2.4%
85 and over	775	849	74	1.8%	85 and over	312	421	109	6.2%
Total	**20,124**	**20,493**	**369**	**0.36%**	**Total**	**16,809**	**17,818**	**1009**	**1.17%**

Tuncurry & Forster & Forster - Tuncurry Region					Old Bar - Manning Point - Red Head				
Age Cohort	2011	2016	Total Change (2011 - 2016)	CAGR (%)	Age Cohort	2011	2016	Total Change (2011 - 2016)	CAGR (%)
0-4	1,162	1,090	-72	-1.3%	0-4	569	522	-47	-1.7%
5–9	1,297	1,283	-14	-0.2%	5–9	532	661	129	4.4%
10–14	1,367	1,300	-67	-1.0%	10–14	681	581	-100	-3.1%
15–19	1,303	1,294	-9	-0.1%	15–19	614	557	-57	-1.9%
20–24	834	853	19	0.5%	20–24	304	330	26	1.7%
25–29	739	875	136	3.4%	25–29	317	361	44	2.6%
30–34	892	938	46	1.0%	30–34	357	407	50	2.7%
35–39	1,152	1,041	-111	-2.0%	35–39	528	444	-84	-3.4%
40–44	1,253	1,285	32	0.5%	40–44	618	593	-25	-0.8%
45–49	1,526	1,416	-110	-1.5%	45–49	590	638	48	1.6%
50–54	1,708	1,643	-65	-0.8%	50–54	736	666	-70	-2.0%
55–59	1,807	1,993	186	2.0%	55–59	784	819	35	0.9%
60–64	2,186	2,249	63	0.6%	60–64	773	991	218	5.1%
65–69	2,167	2,634	467	4.0%	65–69	747	1,059	312	7.2%
70–74	1,858	2,327	469	4.6%	70–74	561	811	250	7.6%
75–79	1,497	1,745	248	3.1%	75–79	393	507	114	5.2%
80–84	1,261	1,254	-7	-0.1%	80–84	284	314	30	2.0%
85 and over	1,101	1,327	226	3.8%	85 and over	168	286	118	11.2%
Total	**25,110**	**26,547**	**1,437**	**1.12%**	**Total**	**9,556**	**10,547**	**991**	**1.99%**

Source: ABS Census (2011 & 2016)

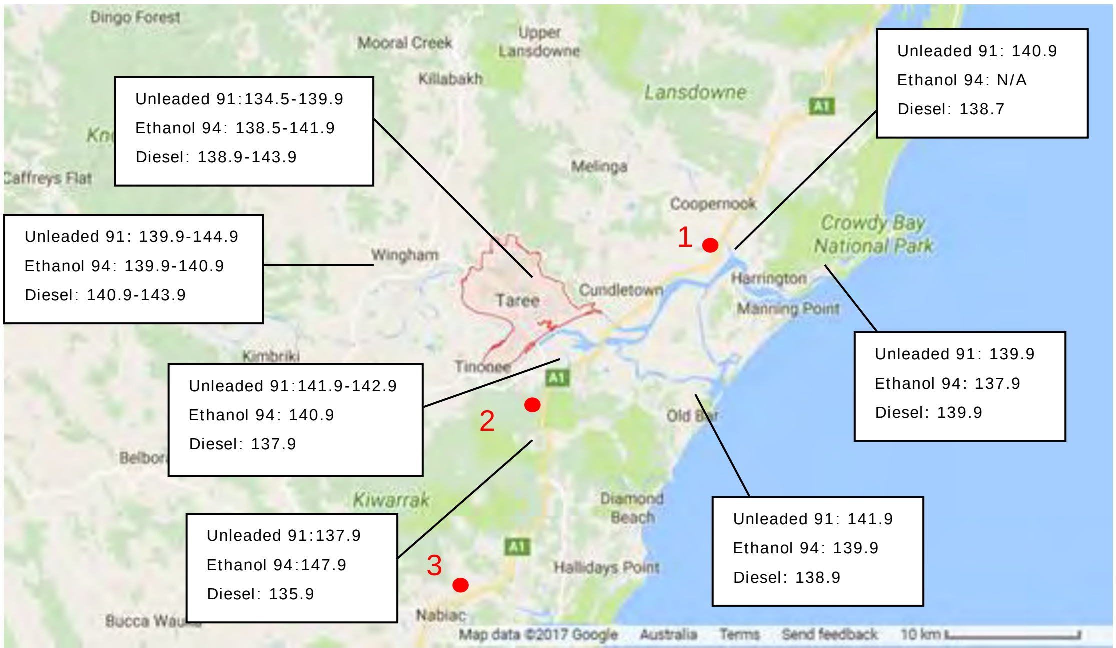
Appendix B: Market Grounding: Petrol Prices

This section notes the potential impacts that the additional service station will have on both the local and regional community. Both the traffic levels heading in-and-outward bound from the subject site as well as competing fuel prices in the locality were studied for this analysis.

The proponents have outlined that the development of this service station is feasible based on domestic traffic levels alone. However, as this section notes the additional benefit generated from the passing regional traffic will most likely improve the competition of the centre and hence drop the price (marginally) of fuel within the area. This will benefit not only the subject site but also the broader community.

The provision of highway, automotive and related services at Glenthorne could have a direct impact on petrol pricing in the local area.

Figure 14: Current petrol prices (₵ per litre) at Glenthorne and Taree (March 2018)



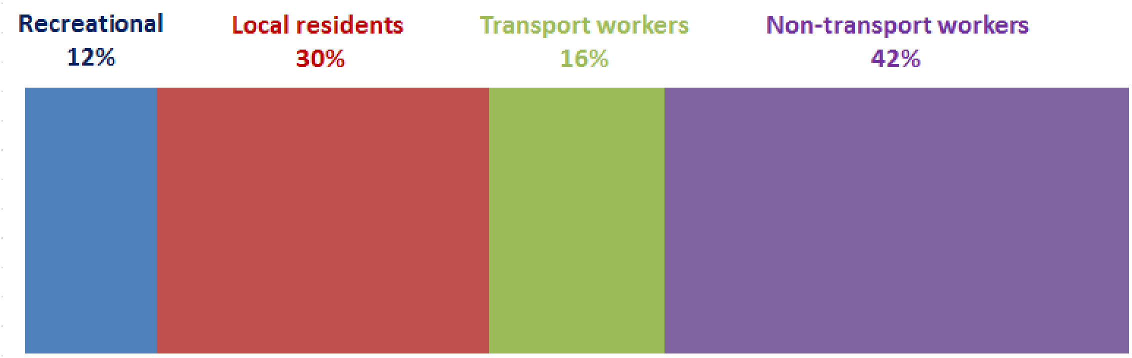
Source: FuelCheck (2018)

Our assessment of impact is based on an assumed visitor profile and resident profile that may be visiting or working at the site, at the Taree Township, and its surrounding towns. Based on this approach we can calculate the expenditure and employment impact of visitors, workers and residents in the catchment area.

A detailed breakdown of our daily traffic analysis follows.

Figure 17 illustrates the assumed composition (in percentages) of daily traffic at the catchment area.

Figure 15: Composition of Daily Traffic, Catchment Area



Source: MacroPlan (2018)

Table 9 lists the assumed daily 'recreational visitor' traffic counts at each location of the selected stations.

Table 13: Recreational visitor – Indicative Daily Traffic counts

(number of vehicles)

Northbound daily traffic	*Light*
Northbound traffic flow from station 3 to station 1	1,020
Northbound traffic flow from station 3 to station 2, then into Taree	59
Northbound traffic flow from the nearby coastal towns to station 2, then into Taree	204
Southbound daily traffic	
Southbound traffic flow from station 1 to station 3	1,044
Southbound traffic flow from Taree to station 2, then station 3	54
Southbound traffic flow from Taree to station 2, then into the nearby coastal towns	156

Source: MacroPlan (2018)

Table 10 lists the assumed daily 'local resident traffic' traffic counts at each location of the selected stations.

Table 14: Local resident – Indicative Daily Traffic counts

(number of vehicles)

Northbound daily traffic	*Light*
Northbound traffic flow from station 3 to station 1	2,550
Northbound traffic flow from station 3 to station 2, then into Taree	147
Northbound traffic flow from the nearby coastal towns to station 2, then into Taree	510
Southbound daily traffic	
Southbound traffic flow from station 1 to station 3	2,610
Southbound traffic flow from Taree to station 2, then station 3	135
Southbound traffic flow from Taree to station 2, then into the nearby coastal towns	390

Source: MacroPlan (2018)

Table 11 lists the assumed daily 'transport worker' traffic counts at each location of the selected stations.

Table 15: Transport worker – Indicative Daily Traffic counts

(number of vehicles)

Northbound daily traffic	*Light*	*Heavy*
Northbound traffic flow from station 3 to station 1	1,156	204
Northbound traffic flow from station 3 to station 2, then into Taree	67	12
Northbound traffic flow from the nearby coastal towns to station 2, then into Taree	231	41
Southbound daily traffic		
Southbound traffic flow from station 1 to station 3	1,183	209
Southbound traffic flow from Taree to station 2, then station 3	61	11
Southbound traffic flow from Taree to station 2, then into the nearby coastal towns	177	31

Source: MacroPlan (2018)

Table 12 lists the assumed daily 'non-transport worker' traffic counts at each location of the selected stations.

Table 16: Non-transport worker – Indicative Daily Traffic counts

(number of vehicles)

	Light
Northbound daily traffic	
Northbound traffic flow from station 3 to station 1	3,570
Northbound traffic flow from station 3 to station 2, then into Taree	206
Northbound traffic flow from the nearby coastal towns to station 2, then into Taree	714
Southbound daily traffic	
Southbound traffic flow from station 1 to station 3	3,654
Southbound traffic flow from Taree to station 2, then station 3	189
Southbound traffic flow from Taree to station 2, then into the nearby coastal towns	546

Source: MacroPlan (2018)

By meeting the overlap in demand from passing traffic, and regional visitors to Taree, the provision of new transport-related services at Glenthorne will ensure that competitive fuel pricing is delivered at this juncture. It will encourage more frequent movement of light and heavy vehicles into Taree for services and will create a more competitive environment that limits the pricing power of existing operations.

Yet, as previously stated the indicative daily traffic counts from the local residents (above 5,000) are significant enough to support the development. The additional demand generated from those turning off the highway strengthens the underlying economic basis for the project.

All assumptions necessary for our economic benefits assessment are listed below.

Table 17: Assumptions – Economic Benefit Analysis (lower petrol prices)

Fuel Tank Capacity – light vehicle	55 litres
Fuel Tank Capacity – heavy vehicle	600 litres
Potential discount on local petrol price (max)	1 cents
Potential discount on local diesel price (max)	0.5 cents
% of light vehicle using petrol	40%
% of light vehicle using diesel	60%
% of heavy vehicle using petrol	20%
% of heavy vehicle using diesel	80%
Transport workers - % of heavy vehicle	15%
Transport workers - % of light vehicle	85%
*All other users/drivers using light vehicle	100%

Source: MacroPlan (2018)

Appendix G – Traffic Impact Assessment

TAREE, GLENTHORNE INDUSTRIAL REZONING – TRAFFIC IMPACT ASSESSMENT

Prepared for:

Jasbe Glenthorne Pty Ltd
and Mulgrave Trust

SLR Ref: 620.12373-R01
Version No: v1.0
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Jasbe Glenthorne Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
620.12373-R01-v1.0	04 December 2018	Andrew Green	Brett McClurg	Brett McClurg

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APPENDICES

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Jasbe Glenthorne & Mulgrave Trust (c/- Blue Sky Planning & Environment) to prepare a traffic assessment and report to accompany a planning proposal for a site on Manning River Drive, at Taree South.

This document has been prepared to inform the Midcoast Council (Council) and Roads and Maritime Service (RMS) assessment of the application by identifying and addressing the traffic and transport matters relevant to the Project. This report addresses site access and transport infrastructure upgrades required to mitigate impacts of the planning proposal.

The Stage 1 Planning Proposal provides enough detail to proceed to a gateway determination while a subsequent Stage 2 Planning Proposal will include further detail to allow exhibition of the proposal to rezone the land. A subsequent and separate application is likely to be made, at a later date, for a service station on the south east corner of the rezoning land.

This report does not include detailed review of any on site layout or parking elements of the planning proposal, as this will form part of the subsequent applications to Council. The focus of this report has therefore been to evaluate the risks of the planning proposal in its entirety to impact on traffic and transport operations and safety and to present suitable mitigation strategies.

2 Planning Proposal

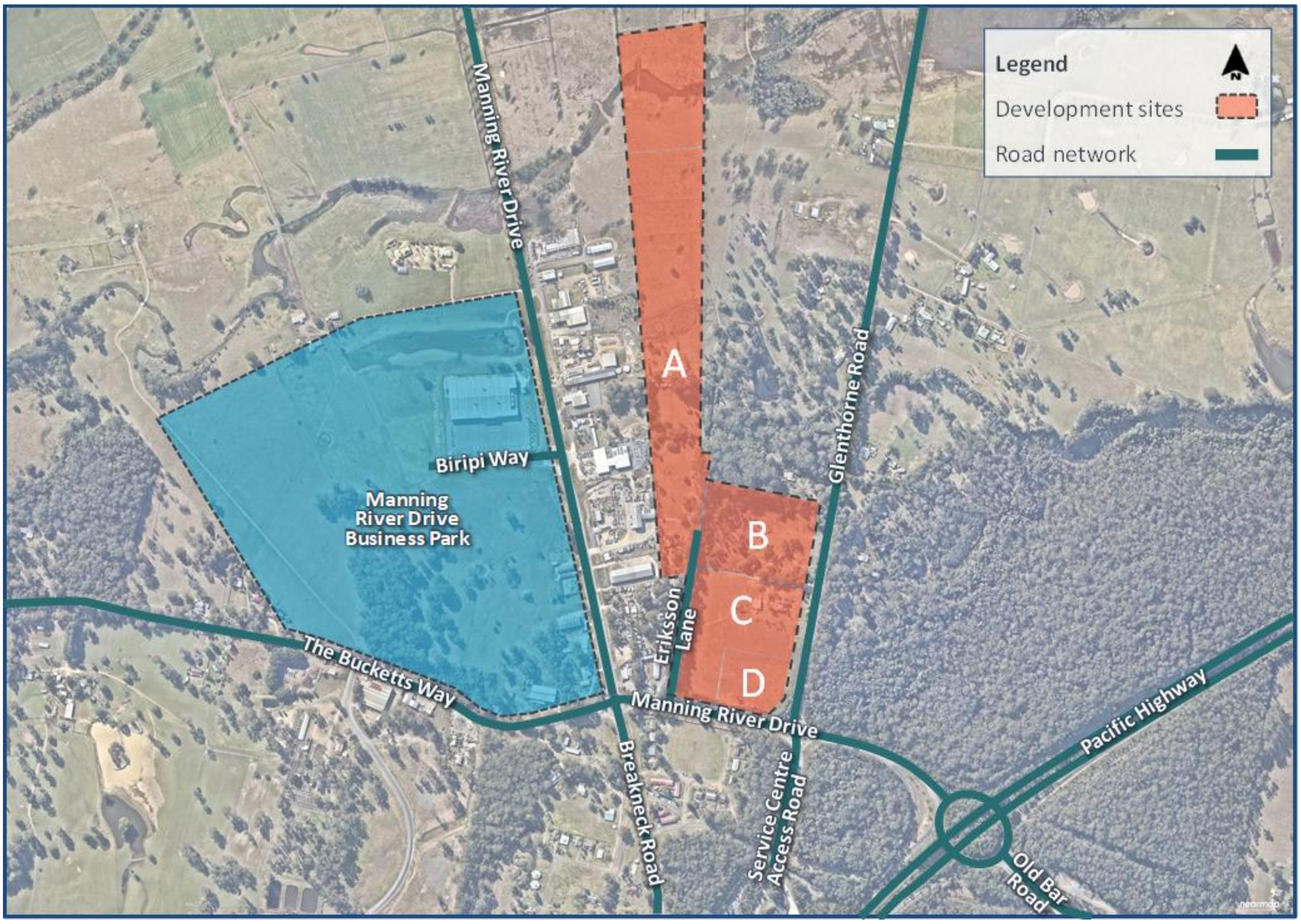
2.1 Subject Site

The subject land is located approximately 3 kilometres south of the Taree CBD. The subject land sits across 51 Glenthorne Road, 55 Glenthorne Road and 50 Eriksson Lane. The sites have a real property description of Lot 50 DP 863972, Lot 2 DP 573214 and Lot 2 DP827097.

The site is located within the Midcoast Council local government jurisdiction and is situated within the primary production zone. The Manning River Drive Business Park and Enterprise Corridor is located just west of the site.

The extents of the study area are shown on Figure 1, along with key road network.

Figure 1 Study Area Extent



Source: Nearmap; Note: Site boundaries indicative only

2.2 Proposed Rezoning

The proposed rezoning represents a total land area of approximately 23.7 hectares as shown in the rezoning plan included at Appendix A.

Details of the land uses on the site have not been confirmed, however the overall rezoned land will be developed over time and the land use types will be subject to the market demands at the time of development of each component of the land. Therefore, the proposed development uses will not be known for many years.

Notwithstanding the latter, for the purpose of consideration of the traffic impacts of the planning proposal, the potential development of the rezoning land is assumed as follows (with reference to Figure 1):

- **Site A:** Approximately 48,400sqm land area, after exclusion of land for roads and waterway/environmental corridors. Assume 50% site cover. Therefore, 48,400 x 50% = **24,200sqm Gross Floor Area (GFA) Industrial**.
- **Site B:** Approximately 31,200sqm land area, after exclusion of land for roads and environmental corridors (including approx. 10,000sqm E2 zone). Assume 50% Industrial and 50% Bulky Goods. Assume 50% site cover. Therefore, it is assumed that this is to be developed as follows:
  - 31,200sqm land area x 50% x 50% = **7,800sqm GFA Industrial**.
  - 31,200sqm land area x 50% x 50% = **7,800sqm GFA Bulky Goods**.
- **Site C:** Approximately 39,200sqm land area after exclusion of land for roads and environmental corridors. It is assumed that this is to be developed for the following:
  - 13,600sqm land area for Industrial. Assume 50% site cover. Therefore, 13,600 x 50% = **6,800sqm GFA Industrial.**
  - 25,600sqm land area for Bulky Goods. Assume 50% site cover. Therefore, 13,600 x 50% = **12,800sqm GFA Bulky Goods**.
- **Site D: Service Station** – Approximately 24,000sqm land area. Based on indicative planning, the development is assumed to include car bowsers, truck bowsers and a **Shop Area of 855sqm GFA.**

Table 1 provides a summary of the assessed land uses.

Table 1 Summary of Assessed Land Uses

Site	Land Use	Yield
A	Industrial	24,200sqm GFA
B	Industrial	7,800sqm GFA
	Bulky Goods	7,800sqm GFA
C	Industrial	6,800sqm GFA
	Bulky Goods	12,800sqm GFA
D	Service Station	855sqm GFA (shop area)

2.3 Development Timing

The timing of potential development on the rezoned land is unknown, however the likely first stage will be a service station on Site D. For the purpose of consideration of the traffic impacts of the planning proposal, the development timing is assumed as outlined in Table 2.

Table 2 Development Timing Assumptions

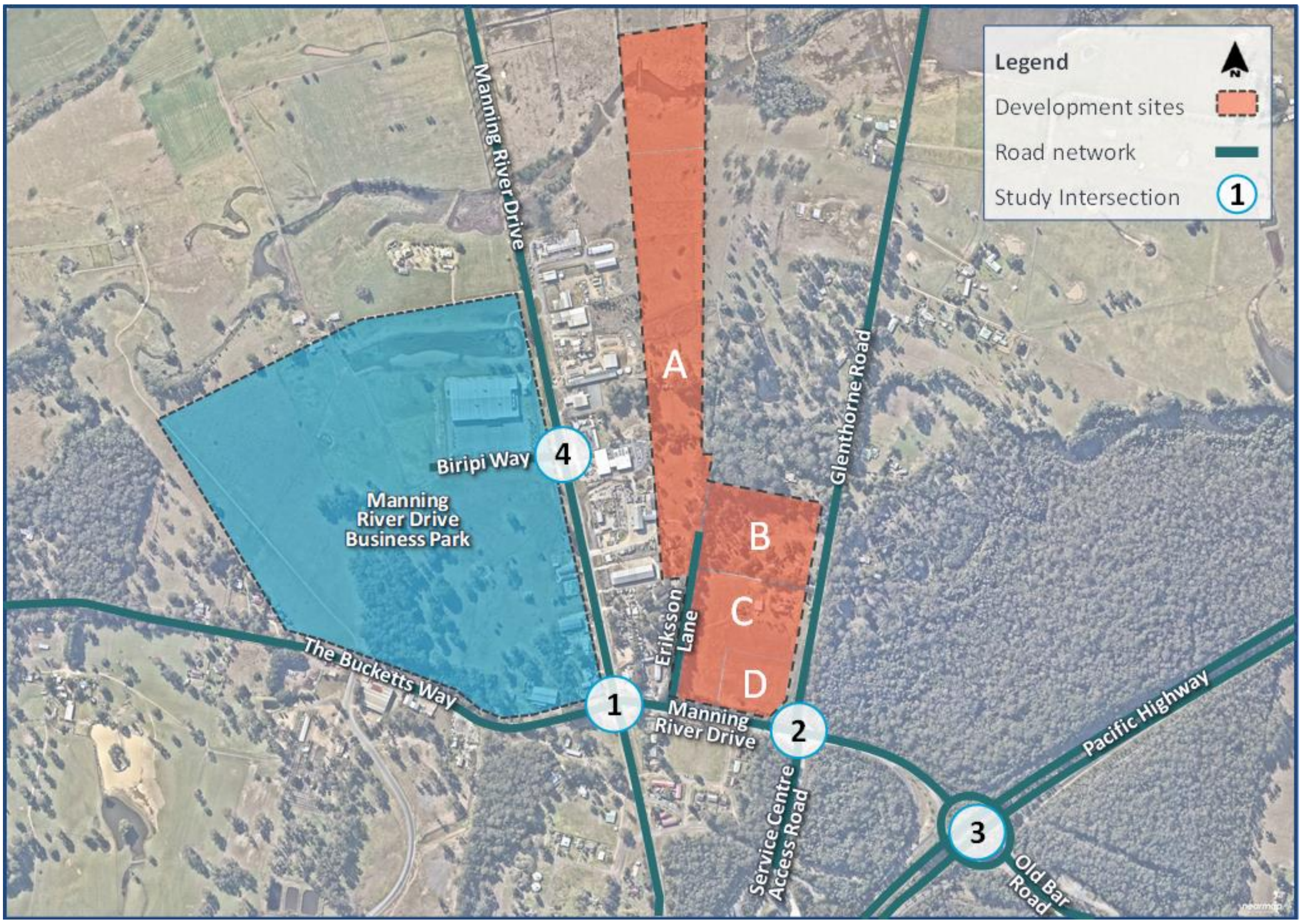
Site	Year			
	2020	**2025**	**2030**	**2040**
A	0%	0%	50%	100%
B	0%	0%	50%	100%
C	0%	50%	100%	100%
D	100%	100%	100%	100%

3 Scope of Traffic Assessment

3.1 Study Intersections

The assessment will consider the intersections presented on Figure 2 and summarised in Table 3.

Figure 2 Assessed Intersections



Source: Nearmap; Note: Site boundaries indicative only

Table 3 Study Intersections for Assessment

Number	Intersection	Form
1	The Bucketts Way/Manning River Drive	Roundabout
2	Manning River Drive/Glenthorne Road/Service Centre Access Road	Roundabout
3	Pacific Highway/Manning River Drive/Old Bar Road	Roundabout at Highway Interchange
4	Biripi Way/Manning River Drive	Roundabout

3.2 Background Traffic

Traffic surveys were undertaken during the AM and PM peak periods on Thursday 26th July 2018 at each of the four study intersections. The adopted survey periods are outlined in Table 4. In addition to the peak surveys, a 24-hour automatic traffic count was considered of use to assist in determining the potential drop-in traffic volumes associated with the proposal.

The traffic count records are summarised at Appendix B.

Table 4 Survey Assessment Periods

Location	Period	Survey Times
Study Intersections	Weekday AM Peak	7:00 – 10:00am
	Weekday PM Peak	3:00 – 6:00pm
Pacific Motorway	Weekday	24-hour

3.3 Traffic Growth

The background traffic growth rates used for future years' assessment were adopted following consideration of the "*Taree CBD Transport Study, Stage 2 – Action Plan*" prepared by Bitzios Consulting. The plan used the growth rates outlined in Table 5.

Table 5 Annual Growth Rates (Taree CBD Transport Study)

Region	2012 to 2017	2012 to 2022	2012 to 2032
Great Taree	0.88%	1.38%	1.63%
Old Bar/Wallabi Point	1.61%	1.89%	1.89%
Taree	0.22%	0.48%	0.66%

To enable a conservative assessment of potential future traffic conditions, a 2% linear growth rate per annum has been adopted for this assessment. Growth has been applied to:

- All movements at intersections 1 and 3; and
- Only the through movements on Manning River Drive at intersections 2 and 4.

3.4 Background Development

Background development is assumed to occur irrespective of the subject planning proposal.

To the west of Manning River Drive, a large area of land has the potential for future industrial and/or bulky goods development. This potential development area is part of the DCP. This development traffic has been added as background traffic that will be operational in future years. Given that the Masters Site is no longer operational it has been included as part of the bulky goods leasable area, rather than as a separate use.

For the purpose of this traffic assessment, the background development in the subject area is represented by the proposed Manning River Drive Business Park. The background traffic generation included in the assessment as part of the Manning River Drive Business Park is derived using the following land development assumptions:

- Masters Site: assumed 70% of the approximate 10,000sqm GFA building area = **7,000sqm GFA of Bulky Goods**.
- Balance of Bulky Goods in catchment: assumed **16,000sqm GFA of Bulky Goods.**
- Balance of Industrial in catchment: assumed **24,000sqm GFA of Industrial.**

The latter two use areas (16,000sqm + 24,000sqm) are consistent with the assumption in the "*Taree CBD Transport Study, Stage 2 – Action Plan*" report of 80,000sqm land area x 50% site cover, with 40% bulky goods (80,000 x 50% x 40% = 16,000sqm) and 60% industrial (80,000 x 50% x 60% = 24,000sqm).

The timing of development within the Manning River Drive Business Park is unknown, however for the purpose of consideration of the background traffic impacts, the development timing is outlined in Table 6.

Table 6 Background Development Timing Assumptions

Site	Year			
	2020	**2025**	**2030**	**2040**
Masters	100%	100%	100%	100%
Balance of Bulky Goods/Industrial	0%	25%	50%	100%

4 Development Traffic

4.1 Planning Proposal

The traffic generation assumptions for the potential development of the planning proposal land are outlined in Table 7.

Table 7 Planning Proposal – Trip Rates

Use	Peak Trip Rates		Source
	AM Peak	PM Peak	
Service Station	66 trips per 100sqm GFA of shop		RTA Guide to Traffic Generating Developments
Bulky Goods	2.7 per 100sqm GFA	2.7 per 100sqm GFA	RTA Guide to Traffic Generating Developments – 2013 Updated Traffic Surveys
Industrial	0.7 per 100sqm GFA	0.78 per 100sqm GFA	RTA Guide to Traffic Generating Developments – 2013 Updated Traffic Surveys

Note that the traffic counts of the adjacent highway service centre indicate that the RTA traffic generation rate for the Service Station is appropriate.

The development traffic distribution assumptions for the planning proposal are outlined in Table 8.

Table 8 Planning Proposal – Distribution

Direction	Proportion		
	Service Station	**Bulky Goods**	**Industrial**
North (Taree, Manning River Drive)	70%	40%	40%
West (The Bucketts Way)	9%	9%	9%
South (Purfleet)	1%	1%	1%
East (Old Bar Road)	10%	20%	20%
North East (Pacific Highway)	5%	15%	15%
South East (Pacific Highway)	5%	15%	15%

The service station development traffic on the rezoning land is assumed to be drop in traffic from the passing traffic on Manning River Drive (i.e. it is not added as new trips). This drop-in traffic will be assigned to the external network as outlined in Table 9.

Table 9 Planning Proposal – Service Station – Assignment

Movement		Route	Proportion
Entry Traffic	From West	Left turn into Glenthorne Road	50%
		Direct left turn in from Manning River Drive	50%
	From East	Right turn into Glenthorne Road	100%
		Direct left turn in from Manning River Drive	0%
Exit Traffic	To West	Right turn from Glenthorne Road	100%
		Direct left turn out to Manning River Drive	0%
	To East	Left turn from Glenthorne Road	50%
		Direct left turn out to Manning River Drive	50%

The bulky goods and industrial development traffic on the planning proposal land is assumed to be assigned to the external road network via Glenthorne Road in the 2020, 2025 and 2030 assessment years. In 2040, a new connection to Manning River Drive at Biripi Way is expected to be available and some traffic will use this route. The adopted assignment in 2040 is outlined in Table 10.

Table 10 Planning Proposal – Bulky Goods and Industrial – 2040 Assignment

Direction	Route	Proportion
North (Taree, Manning River Drive)	Glenthorne Road	50%
	New Connection to Manning River Drive at Biripi Way	50%
West (The Bucketts Way)	Glenthorne Road	50%
	New Connection to Manning River Drive at Biripi Way	50%
South (Purfleet)	Glenthorne Road	50%
	New Connection to Manning River Drive at Biripi Way	50%
East (Old Bar Road)	Glenthorne Road	100%
North East (Pacific Highway)	Glenthorne Road	100%
South East (Pacific Highway)	Glenthorne Road	100%

4.2 Background Development

The traffic generation assumptions for the background development within the Manning River Drive Business Park are outlined in Table 11.

Table 11 Background Development – Trip Rates

Use	Peak Trip Rates		Source
	AM Peak	**PM Peak**	
Bulky Goods	2.7 per 100sqm GFA	2.7 per 100sqm GFA	RTA Guide to Traffic Generating Developments – 2013 Updated Traffic Surveys
Industrial	0.7 per 100sqm GFA	0.78 per 100sqm GFA	RTA Guide to Traffic Generating Developments – 2013 Updated Traffic Surveys

The traffic distribution assumptions for the background development are outlined in Table 12.

Table 12 Background Development – Distribution

Direction	Proportion
North (Taree, Manning River Drive)	40%
West (The Bucketts Way)	9%
South (Purfleet)	1%
East (Old Bar Road)	20%
North East (Pacific Highway)	15%
South East (Pacific Highway)	15%

In 2020 and 2025, all of the background development traffic from the Manning River Drive Business Park is assumed to be assigned to the external road network via the existing Biripi Way connection to Manning River Drive. In 2030, a new connection to The Bucketts Way is assumed to be available and some traffic will use this route. The adopted assignment in 2030 and 2040 is outlined in Table 13.

Table 13 Background Development – 2030 and 2040 Assignment

Direction	Route	Proportion
All Directions	Existing Biripi Way connection to Manning River Drive	65%
	New connection to The Bucketts Way	35%

5 Traffic Analysis

5.1 Performance Criteria

The traffic analysis has been undertaken using the volumes developed in a spreadsheet model using the assumptions outlined in Sections 2, 3 and 4 herein. The volumes are summarised at Appendix C.

Intersection analysis has been undertaken using SIDRA Intersection 7.0 (SIDRA). SIDRA is an industry recognised analysis tool used to estimate the capacity and performance of intersections based on input parameters, including geometry and traffic volumes.

SIDRA provides an estimate of an intersection's Degree of Saturation (DOS), queues and delays. The desirable maximum DOS thresholds considered to be appropriate for the assessment are presented in Table 14 below.

Table 14 GARID Intersection Performance Thresholds

Intersection Type	DOS Thresholds
Signalised intersections	Less than or equal to 0.90
Roundabouts	Less than or equal to 0.85
Priority controlled intersections	Less than or equal to 0.80

DOS values exceeding those presented in Table 14 indicate that an intersection is nearing its practical capacity and upgrade works may be required. Above these threshold values, users of the intersection are likely to experience rapidly increasing delays and queuing.

5.2 Assessment Scenarios

The SIDRA assessment has been undertaken for the following scenarios:

- 2018 background survey;
- 2020 background traffic only;
- 2020 background and rezoning traffic;
- 2025 background traffic only;
- 2025 background and rezoning traffic;
- 2030 background traffic only;
- 2030 background and rezoning traffic;
- 2040 background traffic only;
- 2040 background and rezoning traffic.

For each intersection, the assessment results are summarised in the following sections, with SIDRA results summarised at Appendix D.

5.3 Glenthorne Road/Manning River Drive/Caltex Service Centre

The Glenthorne Road/Manning River Drive/Caltex Service Centre intersection was assessed in its current form as a dual lane roundabout. The SIDRA intersection form is shown alongside an aerial image in Figure 3. The SIDRA analysis results are presented in Table 15.

Figure 3 Glenthorne Road/Manning River Drive/Caltex Service Centre – Assessed Intersection Form

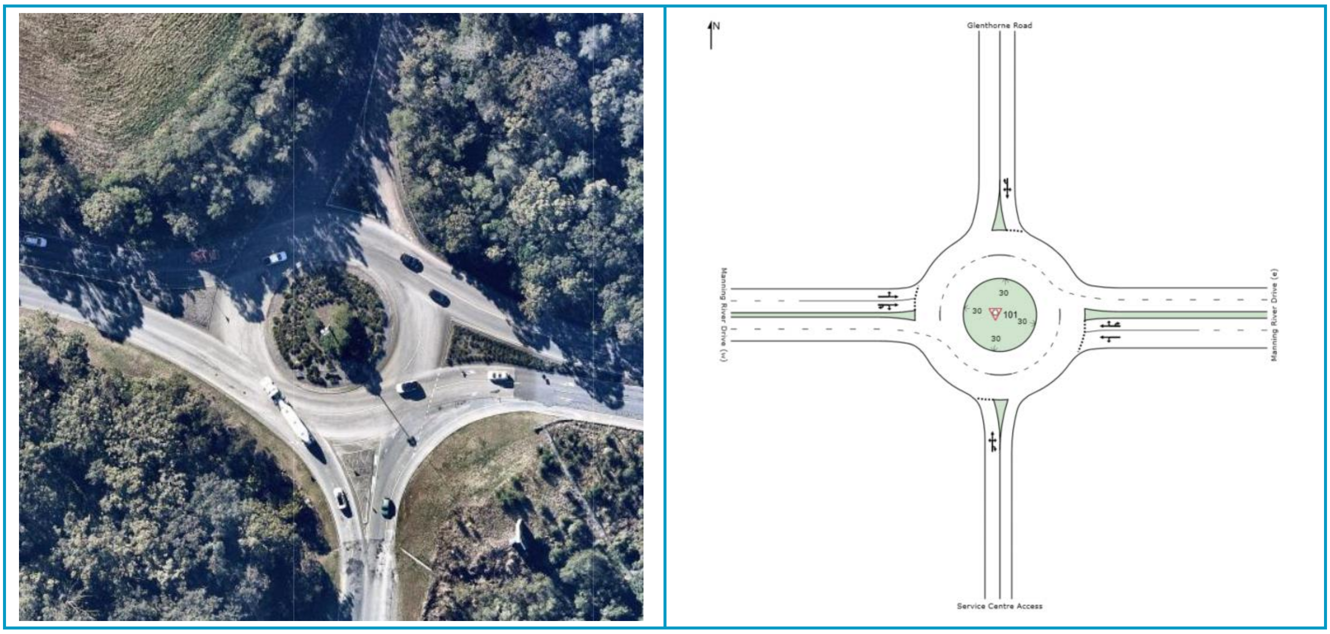


Table 15 Glenthorne Road/Manning River Drive/Caltex Service Centre – SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2018 Survey	0.47	4.9 sec	18.1m	0.46	5.4 sec	22.5m
2020 Background Traffic	0.52	4.9 sec	21.2m	0.51	5.4 sec	26.3m
2020 With Rezoning Traffic	0.56	5.4 sec	23.4m	0.53	6.1 sec	27.7m
2025 Background Traffic	0.58	4.9 sec	26.4m	0.57	5.4 sec	32.4m
2025 With Rezoning Traffic	0.67	5.9 sec	34.1m	0.62	7.2 sec	38.6m
2030 Background Traffic	0.64	4.9 sec	32.9m	0.64	5.5 sec	39.9m
2030 With Rezoning Traffic	0.82	8.0 sec	72.9m	1.51	94.5 sec	1,168.2m
2040 Background Traffic	0.76	5.2 sec	54.4m	0.77	6.2 sec	70.7m
2040 With Rezoning Traffic	1.20	25.8 sec	258.8m	2.25	199.9 sec	1,960.3m

The SIDRA analysis results indicate that the intersection would operate acceptably beyond 2040 with background growth and background development only. With the addition of the planning proposal traffic, the results indicate that the intersection will operate above the desired threshold for a roundabout (DOS of 0.85) in 2030 and beyond.

To offset the impacts of the future (2030 and beyond) rezoning development and bring the operation to an acceptable level, the intersection requires upgrading to signals, with three through lanes in each direction on Manning River Drive. Phasing in the SIDRA analysis has been set to optimise for minimum delay. The assessed potential intersection form is presented in Figure 4, with SIDRA analysis results provided in Tables 16.

Figure 4 Glenthorne Road/Manning River Drive/Caltex Service Centre – 2030/2040 Upgraded Intersection Form

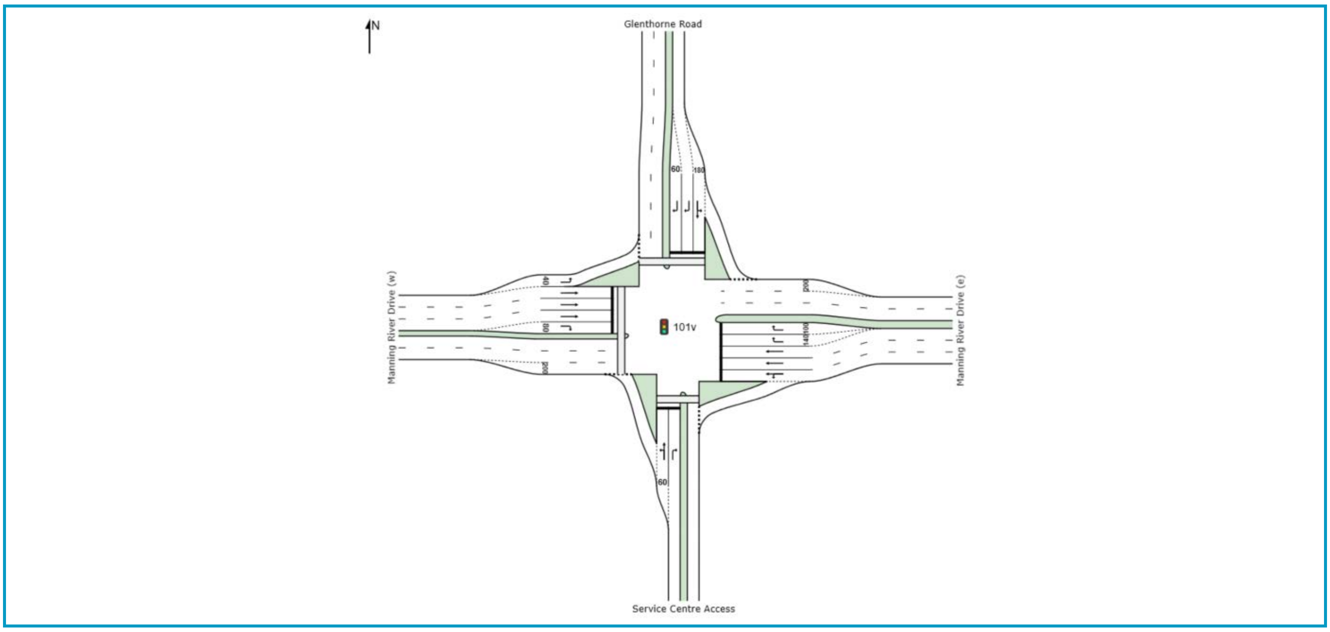


Table 16 Glenthorne Road/Manning River Drive/Caltex Service Centre – 2030/2040 Upgraded SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2030 With Rezoning Traffic	0.78	36.5 sec	244.0m	0.84	34.2 sec	160.2m
2040 With Rezoning Traffic	0.90	47.2 sec	420.7m	0.86	38.6 sec	260.9m

The SIDRA analysis results indicate that the potential signalised intersections form will be able to accommodate the background and planning proposal traffic in all future years up to and including 2040.

It is important to recognise that the analysis at this intersection makes no allowance for the potential for the existing Caltex Service Centre (on the southern leg of the intersection) to be accessed via a direct connection from the Pacific Highway. It is understood that such a connection has previously been approved. This connection would result in a significant reduction in traffic volumes at this intersection, potentially reducing the intersection upgrading required at this location.

5.4 Old Bar Road/Manning River Drive/Pacific Highway Ramps

The Old Bar Road/Manning River Drive/Pacific Highway Ramps intersection was assessed in its current form as an interchange roundabout. The SIDRA intersection form is shown alongside an aerial image in Figure 5. The SIDRA analysis results are presented in Table 17.

Figure 5 Old Bar Road/Manning River Drive/Pacific Highway Ramps – Assessed Intersection Form

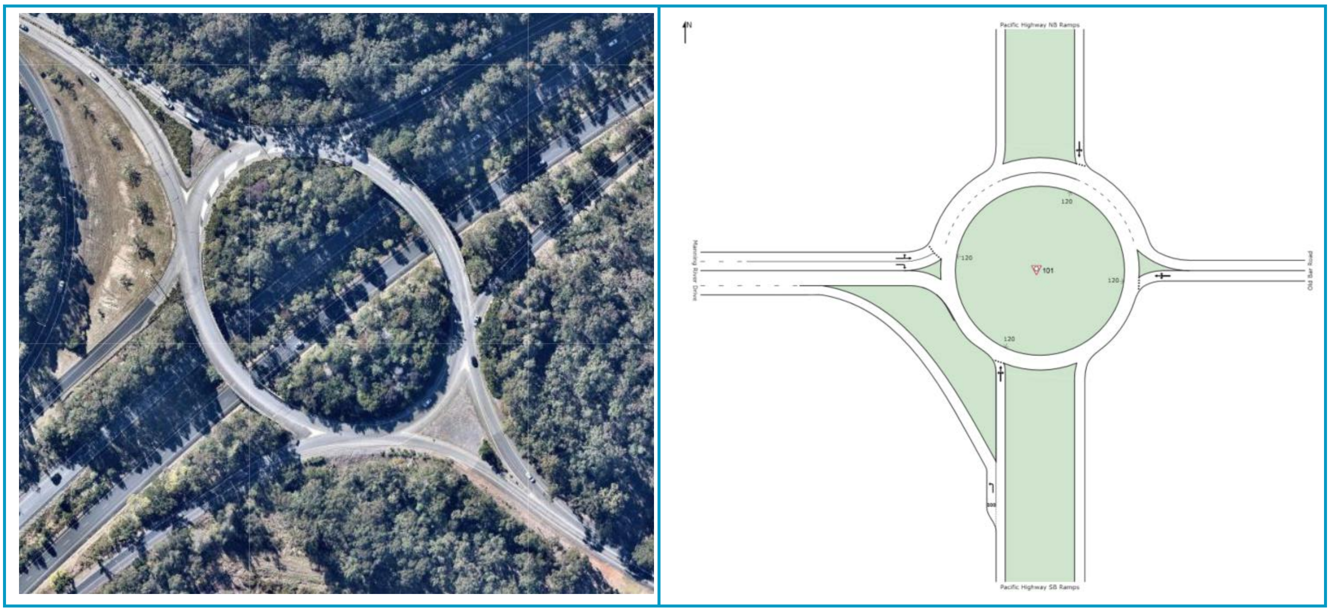


Table 17 Old Bar Road/Manning River Drive/Pacific Highway Ramps – SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2018 Survey	0.58	5.4 sec	37.0m	0.39	5.4 sec	20.4m
2020 Background Traffic	0.65	5.9 sec	49.6m	0.42	5.5 sec	23.2m
2020 With Rezoning Traffic	0.65	5.9 sec	49.6m	0.42	5.5 sec	23.2m
2025 Background Traffic	0.76	7.1 sec	80.3m	0.48	5.8 sec	28.3m
2025 With Rezoning Traffic	0.80	7.8 sec	97.8m	0.49	5.8 sec	30.0m
2030 Background Traffic	0.88	9.9 sec	150.9m	0.54	6.2 sec	34.4m
2030 With Rezoning Traffic	1.04	27.8 sec	481.6m	0.59	7.0 sec	51.7m
2040 Background Traffic	1.17	64.6 sec	1,059.7m	0.77	9.3 sec	98.0m
2040 With Rezoning Traffic	1.47	153.6 sec	2,245.0m	1.05	23.9 sec	369.6m

The SIDRA analysis results indicate that the intersection will operate above the desired threshold for a roundabout (DOS of 0.85) in 2030 (and beyond) with and without the planning proposal traffic. The impact of the planning proposal traffic is to cause intersection capacity to fail approximately three (3) years sooner (by 2026) than failure would occur with background traffic only (by 2029).

To offset the impacts of the future development the roundabout requires a short additional lane an on the eastern approach as well as an additional circulating lane between the eastern and southern legs. The upgraded intersection form is presented in Figure 6 with SIDRA analysis results provided in Table 18.

Figure 6 Old Bar Road/Manning River Drive/Pacific Highway Ramps – Upgraded Intersection Form

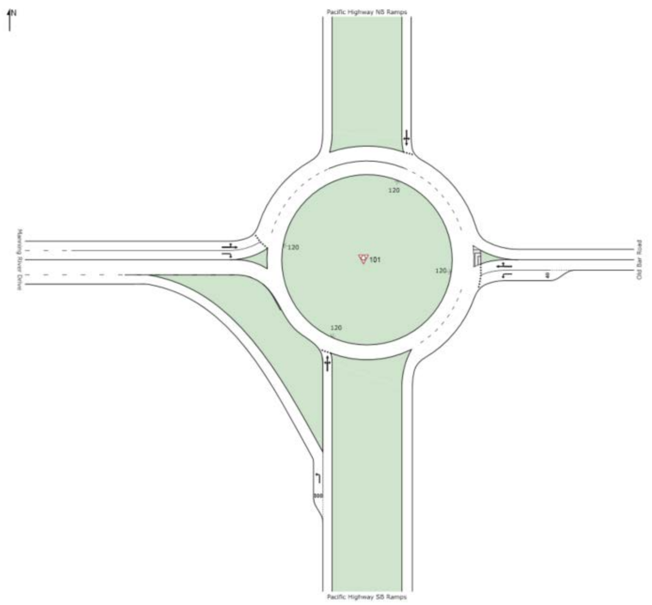


Table 18 Old Bar Road/Manning River Drive/Pacific Highway Ramps – Upgraded SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2030 With Rezoning Traffic	0.70	7.3 sec	75.6m	0.59	6.1 sec	41.1m
2040 With Rezoning Traffic	1.00	23.0 sec	457.6m	0.73	9.3 sec	91.2m

The SIDRA analysis results indicate that the upgraded roundabout form (see Figure 6) will be able to accommodate the planning proposal traffic in 2030. In 2040 the intersection will operate above the desired threshold (DOS of 0.85), however its performance will be significantly better than the existing roundabout formation with 2040 background traffic only.

Since the 2040 horizon is so distant (22 years away) and the traffic volumes are based on conservative assumptions, it would be unreasonable to implement intersection upgrading works for the 2040 horizon. Notwithstanding the latter, as a guide for future planning by others, an assessment of the 2040 intersection needs has been undertaken. To improve the operation in 2040 the roundabout could be upgraded (by others) to provide two full circulating lanes as shown in Figure 7. The SIDRA analysis results for this form are provided in Table 19.

Figure 7 Old Bar Road/Manning River Drive/Pacific Highway Ramps – 2040 Ultimate Intersection Form

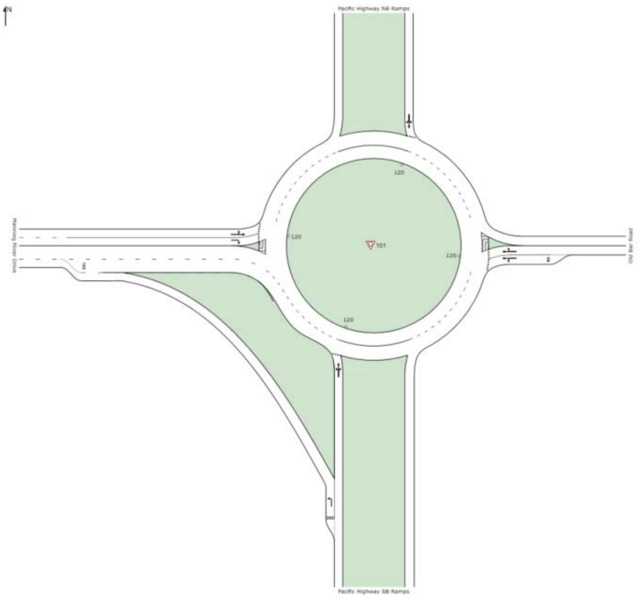


Table 19 Old Bar Road/Manning River Drive/Pacific Highway Ramps – 2040 Ultimate SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2040 With Rezoning Traffic	0.70	8.2 sec	86.9m	0.73	7.6 sec	67.4m

The SIDRA analysis results indicate that the 2040 ultimate intersection form (full dual lane roundabout) will significantly reduce the intersection degree of saturation to below the desired threshold (DOS of 0.85).

5.5 The Bucketts Way/Manning River Drive

The Bucketts Way/Manning River Drive intersection was assessed in its current form as a dual lane roundabout. The SIDRA intersection form is shown alongside an aerial image in Figure 8. The SIDRA analysis results are presented in Table 20.

Figure 8 The Bucketts Way/Manning River Drive – Assessed Intersection Form

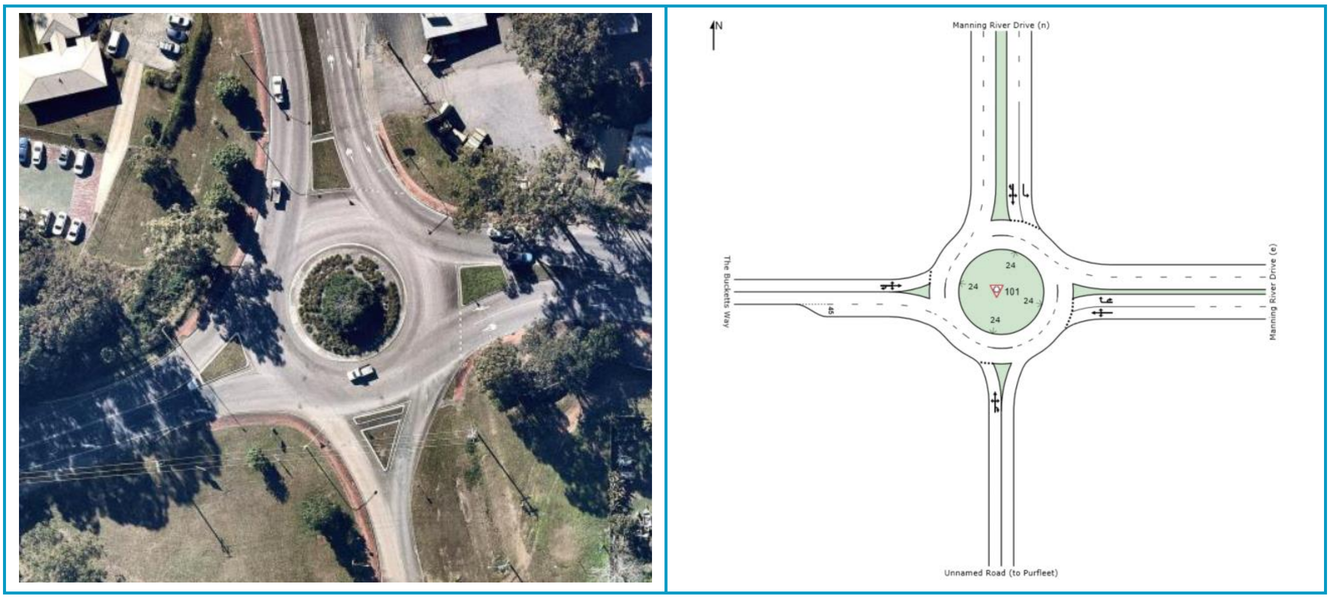


Table 20 The Bucketts Way/Manning River Drive – SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2018 Survey	0.52	8.4 sec	24.5m	0.48	6.6 sec	22.5m
2020 Background Traffic	0.59	8.8 sec	29.3m	0.53	6.6 sec	27.2m
2020 With Rezoning Traffic	0.59	8.8 sec	29.3m	0.53	6.6 sec	27.2m
2025 Background Traffic	0.76	9.7 sec	40.8m	0.61	6.8 sec	35.3m
2025 With Rezoning Traffic	0.80	10.0 sec	46.5m	0.62	6.9 sec	36.6m
2030 Background Traffic	1.08	24.3 sec	240.8m	0.72	7.4 sec	48.4m
2030 With Rezoning Traffic	1.27	47.3 sec	555.4m	0.75	8.1 sec	57.4m
2040 Background Traffic	2.13	169.3 sec	1,407.4m	0.92	12.2 sec	143.8m
2040 With Rezoning Traffic	2.41	221.2 sec	1,724.2m	0.96	17.3 sec	206.8m

The SIDRA analysis results indicate that the intersection will operate above the desired threshold for a roundabout (DOS of 0.85) in 2030 and beyond with and without the inclusion of the planning proposal traffic. Failure occurs by approximately 2026 with the planning proposal traffic. Without the planning proposal traffic, failure of the intersection would occur approximately one (1) year later (by 2027).

To offset the impacts of the future development the roundabout requires a continuous left slip lane from the northern approach as well as a short additional lane on the western approach. The upgraded intersection form is presented in Figure 9 with SIDRA analysis results provided in Table 21.

Figure 9 The Bucketts Way/Manning River Drive – Upgraded Intersection Form

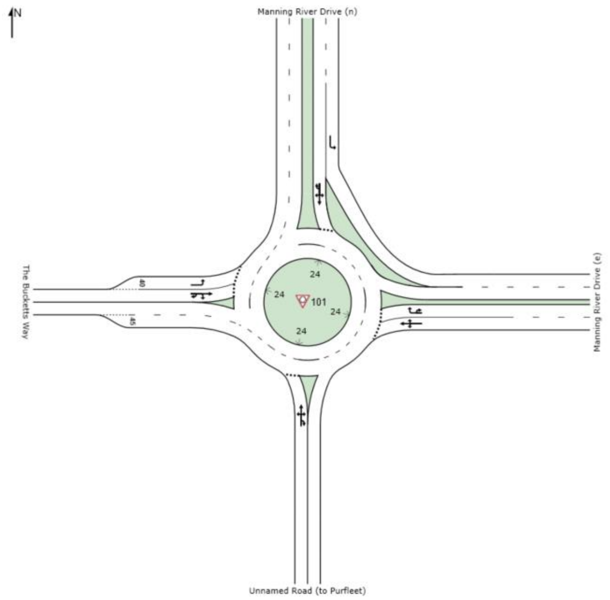


Table 21 The Bucketts Way/Manning River Drive – Upgraded SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2030 With Rezoning Traffic	0.81	10.1 sec	74.8m	0.58	6.9 sec	31.2m
2040 With Rezoning Traffic	1.03	44.7 sec	404.9m	0.73	21.9 sec	124.9m

The SIDRA analysis results indicate that the upgraded roundabout (see Figure 9) will operate acceptably at 2030 with the planning proposal traffic, however by 2040 its operation will exceed the desired threshold. However its performance at 2040 will be substantially better than the existing formation in 2040 with background traffic only.

Since the 2040 horizon is so distant (22 years away) and the traffic volumes are based on conservative assumptions, it would be unreasonable to implement intersection upgrading works for the 2040 horizon. Notwithstanding the latter, as a guide for future planning by others, an assessment of the 2040 intersection needs has been undertaken. To improve the operation in 2030 and 2040 the roundabout could be upgraded (by others) to signals as shown in Figure 10. To provide adequate capacity, the signalised form requires three right turn lanes from east to north and two left slip lanes (signalised) on the northern approach, however this is not a realistic outcome. For the SIDRA analysis, phasing has been set to optimise for minimum delay. The SIDRA analysis results for this form are provided in Table 22.

Figure 10 The Bucketts Way/Manning River Drive – Ultimate Intersection Form

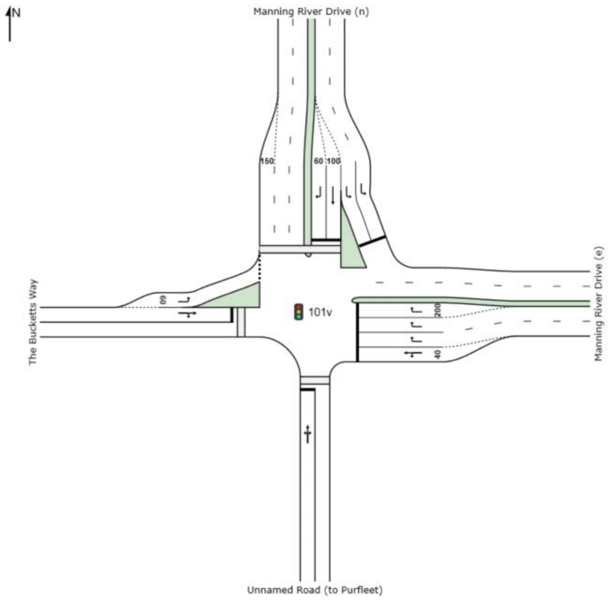


Table 22 The Bucketts Way/Manning River Drive – Ultimate SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2030 With Rezoning Traffic	0.73	21.9 sec	124.9m	0.76	27.9 sec	183.4m
2040 With Rezoning Traffic	0.82	29.4 sec	240.1m	0.82	32.4 sec	282.5m

The SIDRA analysis results indicate that the 2030/2040 ultimate intersection form will reduce the intersection degree of saturation to below the desired threshold.

5.6 Biripi Way/Manning River Drive

The Biripi Way/Manning River Drive intersection was assessed in its current form as a dual lane roundabout. The SIDRA intersection form is shown alongside an aerial image in Figure 11. The SIDRA analysis results are presented in Table 23.

Figure 11 Biripi Way/Manning River Drive – Assessed Intersection Form

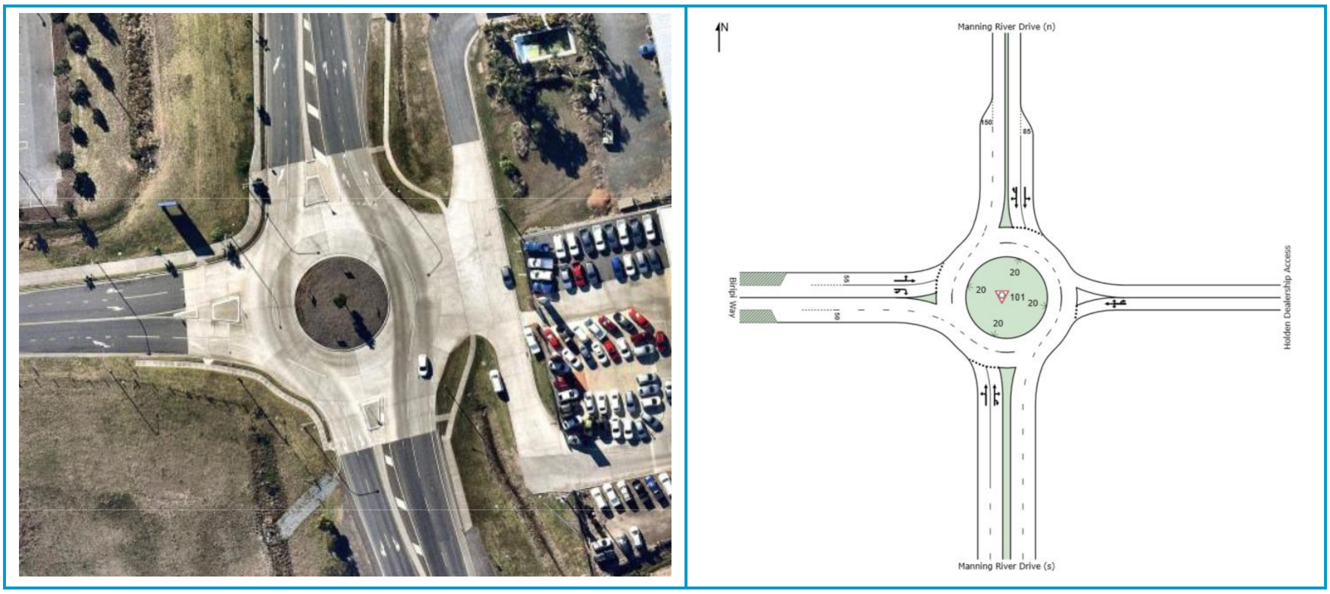


Table 23 Biripi Way/Manning River Drive – SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2018 Survey	0.50	4.5 sec	22.5m	0.44	4.4 sec	17.3m
2020 Background Traffic	0.60	5.0 sec	31.0m	0.53	5.1 sec	25.7m
2020 With Rezoning Traffic	0.60	5.0 sec	31.0m	0.53	5.1 sec	25.7m
2025 Background Traffic	0.72	5.6 sec	45.2m	0.63	5.7 sec	34.2m
2025 With Rezoning Traffic	0.73	5.6 sec	46.3m	0.64	5.7 sec	35.1m
2030 Background Traffic	0.78	5.6 sec	54.0m	0.68	5.7 sec	40.6m
2030 With Rezoning Traffic	0.80	5.6 sec	58.3m	0.70	5.7 sec	44.3m
2040 Background Traffic	0.99	14.3 sec	269.1m	0.87	8.8 sec	102.3m
2040 With Rezoning Traffic	1.05	30.2 sec	532.4m	0.92	12.7 sec	134.4m

The SIDRA analysis results indicate that the intersection will operate above the desired threshold for a roundabout (DOS of 0.85) in 2040 and beyond with or without the planning proposal traffic. With the planning proposal traffic failure occurs by approximately 2032. Without the planning proposal traffic, failure of the intersection would occur approximately one (1) year later (by 2033).

To offset the impacts of the future rezoning development the roundabout requires an additional short lane for left turning traffic from both the northern and southern approaches (including a third circulating lane from north to east and south to west). The upgraded intersection form is presented in Figure 12 with SIDRA analysis results provided in Table 24.

Figure 12 Biripi Way/Manning River Drive – Upgraded Intersection Form

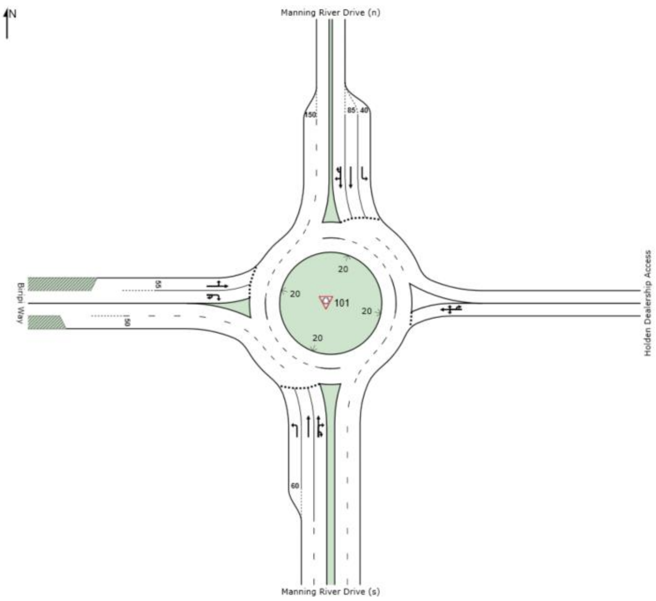


Table 24 Biripi Way/Manning River Drive – Upgraded SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2040 With Rezoning Traffic	0.83	7.0 sec	79.3m	0.79	8.5 sec	69.4m

The SIDRA analysis results indicate that in 2040 with planning proposal traffic, the intersection will operate within the desired threshold, and its performance will be better than the existing formation in 2040 with background traffic only.

The 2040 horizon is 22 years away and the traffic analysis volumes are based on conservative assumptions. Therefore, it would be unreasonable to implement intersection upgrading works solely to accommodate the 2040 horizon. Notwithstanding the latter, as an alternative to the roundabout form and as a guide for future planning by others, an assessment of a signalised intersection form to accommodate the 2040 traffic has been undertaken (see the potential layout shown in Figure 13). The signalised form requires three through lanes on Manning River Drive northbound and two southbound. Phasing in the SIDRA analysis has been set to optimise for minimum delay. The SIDRA analysis results for this alternative signalised form are provided in Table 25.

Figure 13 Biripi Way/Manning River Drive – Ultimate Intersection Form

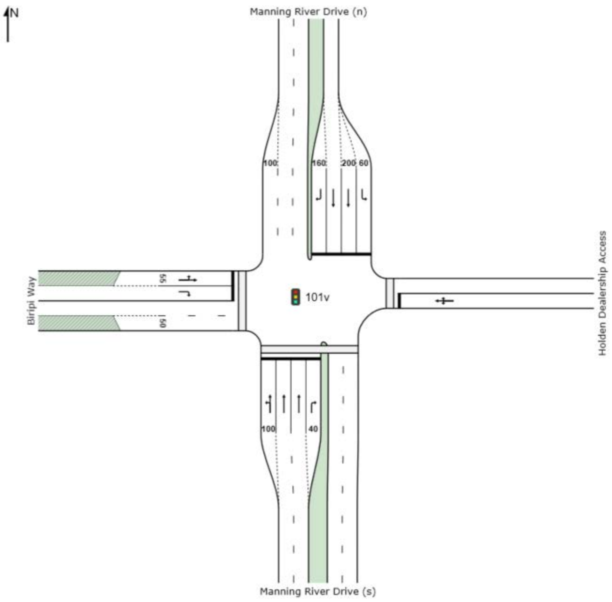


Table 25 Biripi Way/Manning River Drive – Ultimate SIDRA Outputs

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th %ile Queue	DOS	Average Delay	95th %ile Queue
2040 With Rezoning Traffic	0.85	26.2 sec	386.2m	0.87	29.4 sec	360.1m

The SIDRA analysis results indicate that the potential signalised intersection form (see Figure 13) can accommodate the 2040 traffic forecasts within the desired threshold.

6 Road and Access Geometry

In the review of the traffic impacts of the planning proposal, consideration has been given to a number of road geometry related matters, in respect of proposed access arrangements for the subject land. These matters are discussed in the following sections.

6.1 Service Station Access

Whilst the access arrangements for the service station development will be assessed as part of a separate application, the preferred means of access for the potential service station would occur in two locations:

- Direct access will be achieved from Manning River Drive via a left-in/left-out only driveway. The direct left-in access will provide enough queuing spaces to ensure that vehicles do not queue back onto Manning River Drive. The direct left in/left out driveways on Manning River Drive would provide the most efficient means of entry and exit for the majority of service station patrons. Such access (being left in and left out) is appropriate for the service station use on an arterial roadway. A visual assessment of the sight distances along the Manning River indicates that adequate visibility to/from the relevant driveways can be achieved to satisfy Austroads guidelines (however this will be subject to the finalised design for the service station site).
- Secondary access driveways will be provided on Glenthorne Road. The first (southern-most) driveway would be for light vehicles (LV) accessing the car bowsers and shop, while the second (northern-most) driveway will be for heavy vehicles (HV) entering the truck bowsers. The separation of the two driveways reduces the risk of any LV/HV accidents and removes HV's from the parking areas associated with the shop where there will be more pedestrian traffic.

6.2 Traffic Weave from Pacific Highway Ramps

Traffic exiting the Pacific Highway northbound and wanting to turn right into Glenthorne Road (to access the rezoning land) currently has an 80m length over which lane merging/weaving is permitted (ie. to cross a dashed/broken lane line). The physical road form is such that this could be extended to a length of 130m (with revised line marking).

The Austroads guidelines suggest that weaving (or merge) across one traffic lane requires the following:

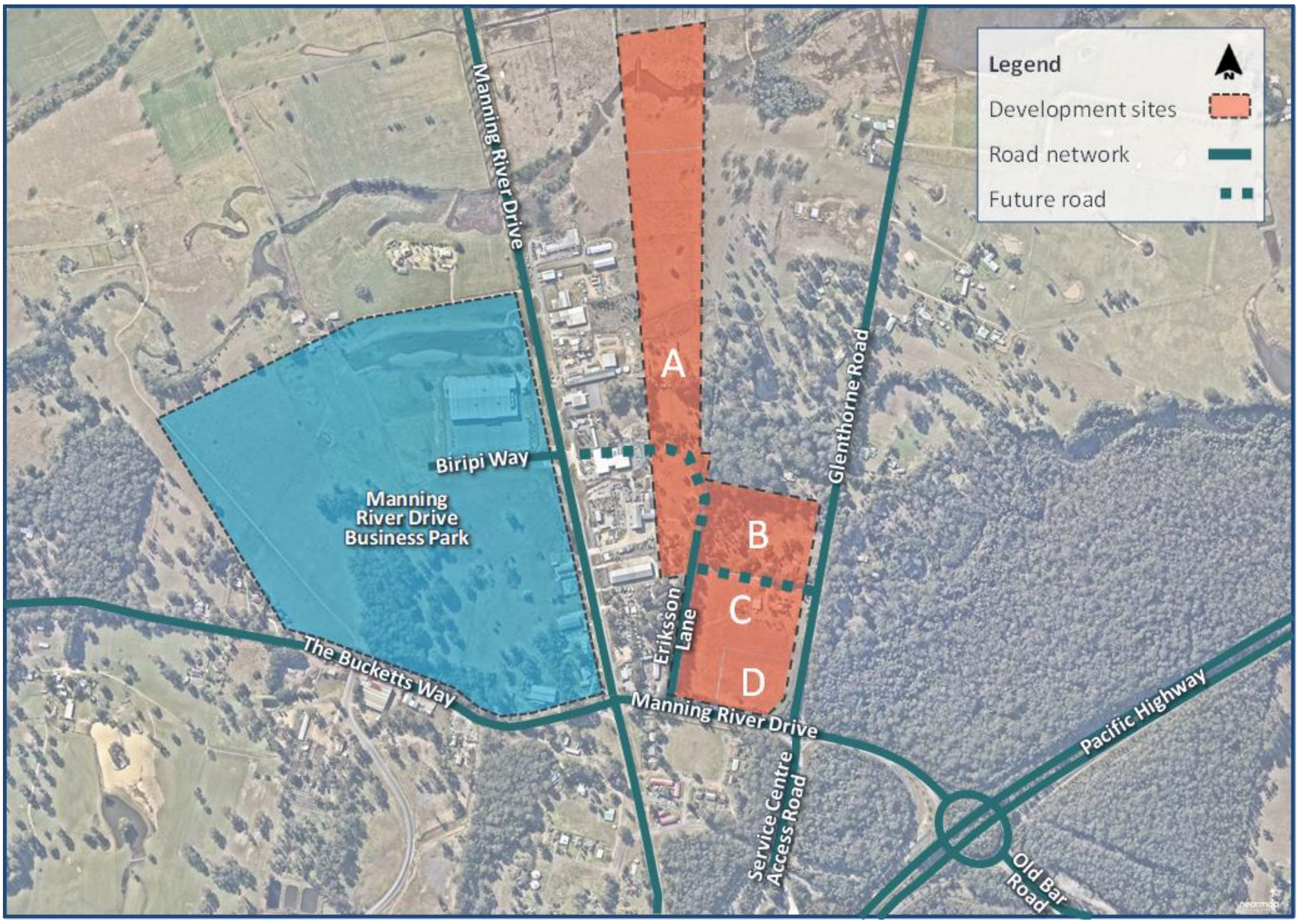
- a posted speed of 70km/h (design speed of 80km/h) requires a distance of 130m.
- a posted speed of 60km/h (design speed of 70km/h) across one traffic lane requires a distance of 113m.

Therefore, appropriate weaving distance can be achieved by minor revisions to the line marking and/or a reduction of the posted speed limit on Manning River Drive to 60km/h in this location. Given the adjacent land uses, intersection configurations and traffic volumes in this location, a reduced speed limit of 60km/h would be appropriate.

6.3 Future Connection West to/from Manning River Drive

Whilst it is beyond the land ownership controls of the planning proposal, it is anticipated that a future road connection could be provided between the rezoning land and Manning River Drive at the Biripi Way roundabout. The potential new road would connect between Eriksson Lane and Manning River Drive through Site A. This also provides a link through to Glenthorne Road via Sites B and C (as shown on Figure 14). The assessment has assumed the connection will be in place in 2040.

Figure 14 Future Road Connections



This potential future connection would provide improved accessibility of the rezoning land to the other industrial/bulky goods precinct within the overall DCP area. The road connection could be incorporated within Council's future plans for a service road that connects the existing industrial properties along the eastern side of Manning River Drive to the Manning River Drive/Biripi Way roundabout (eastern leg). It is recognised that further planning and concept design for such a road connection would be needed in the future.

6.4 Pedestrian and Cyclist Connections

The new roadways within the proposed development of the rezoning land can include an appropriate network of pathways within the road verge (or within open space corridors). These pathways would facilitate pedestrians and cyclists. It would be desirable for such pathways to connect with other (existing and planned) pathways along Manning River Drive. In particular, connection as part of the potential future road connecting to the Manning River Drive/Biripi Way roundabout (eastern leg) will provide a valuable pedestrian and cyclist link.

In addition, it is understood that Midcoast Council is proposing to develop an off-road cycleway from Taree to Old Bar through parts of Khappinghat National Park's existing road and trail system and other public land. While the route has not yet been confirmed, a dedicated off-road facility in the vicinity of the site will enable cycle trips to be made from further afield.

7 Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Jasbe Glenthorne & Mulgrave Trust (c/- Blue Sky Planning & Environment) to prepare a traffic assessment and report to accompany a planning proposal for land on Manning River Drive, at Taree South.

This document has been prepared to inform the Midcoast Council and RMS assessment of the application by identifying and addressing the traffic and transport matters relevant to the planning proposal, including the presentation of suitable mitigation strategies to offset any impact.

The Stage 1 Planning Proposal provides enough detail to proceed to a gateway determination while a subsequent Stage 2 Planning Proposal will include further details to support the application during exhibition. A subsequent and separate application is expected to be made for a potential service station on the south east corner of the rezoned land. This report does not include detailed review of any on site layout or parking elements of the planning proposal, as this will from part of the subsequent applications to Council.

The assessment outlined herein considered a planning proposal comprising a mix of industrial and bulky goods land uses as well as a service station. Such forecasts are considered to be very conservative, given that land development (including land use type and yield) will be driven by market demands over the next 20 or so years. In addition, the traffic forecasts include 2% per annum growth in existing traffic, added to the rezoning land traffic and the traffic estimated for the Manning River Drive Business Park (DCP area). The forecasts represent the 2020, 2025, 2030 and 2040 future horizon years (including 2% annual background growth and the adjacent Manning River Drive Business Park).

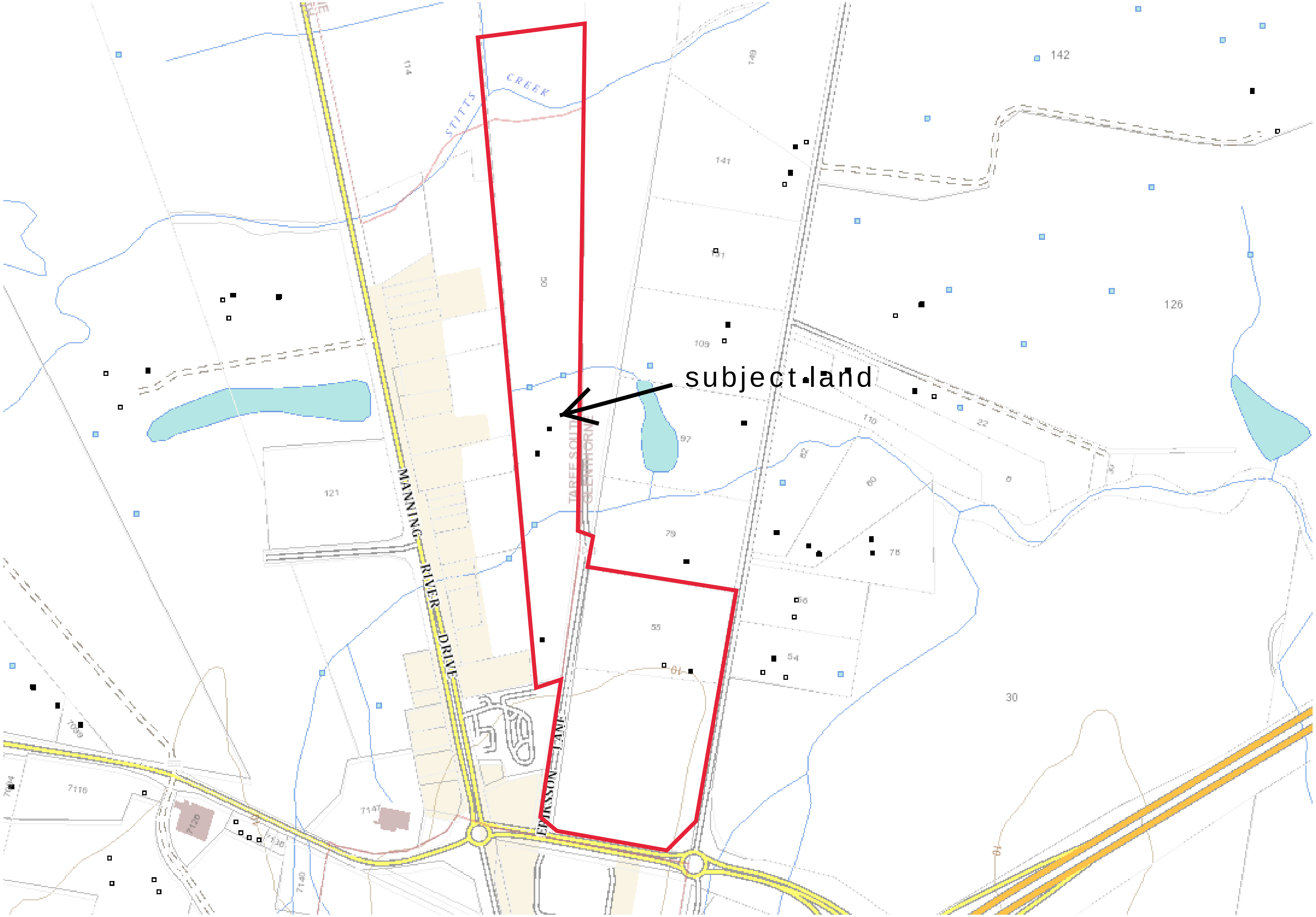
The SIDRA intersection assessment has concluded the following:

- Glenthorne Road/Manning River Drive/Caltex Service Station:
  - The existing roundabout form could accommodate the rezoning traffic up until about 2026.
  - Beyond 2026, a major signalised intersection form would be needed to accommodate the 2040 horizon traffic.
- Old Bar Road/Manning River Drive/Pacific Highway Ramps:
  - The existing roundabout form could accommodate the rezoning traffic up until about 2026.
  - With background development and growth only (ie. ignoring the rezoning traffic), the existing roundabout form would be adequate until about 2029.
  - Beyond 2026, a minor upgrade (line marking only) of the existing roundabout would be needed to accommodate the impact of the rezoning traffic to about 2040.
- The Bucketts Way/Manning River Drive:
  - The existing roundabout form could accommodate the rezoning traffic up until about 2025.
  - With background development and growth only (ie. ignoring the rezoning traffic), the existing roundabout form would be adequate until about 2026.
  - Beyond 2025, an upgrade of the existing roundabout (slip lane from north and additional approach lane from the west) would be needed to accommodate the impact of the rezoning traffic.

- Biripi Way/Manning River Drive:
    - The existing roundabout form could accommodate the rezoning traffic up until about 2032.
    - With background development and growth only (ie. ignoring the rezoning traffic), the existing roundabout form would be adequate until about 2033.
    - Beyond 2032, an upgrade of the existing roundabout (added approach lanes from the north and from the south) would be needed to accommodate the impact of the rezoning traffic until 2040.

APPENDIX A

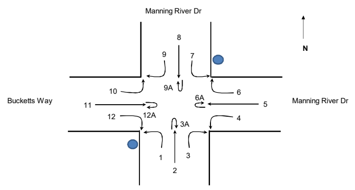
Rezoning Plan


subject land
MANNING RIVER DRIVE
ERIKSSON LANE
STITTS CREEK
TAREE SOUTH
142
126
30
121
141
109
97
79
55
78
22
54

APPENDIX B

Traffic Counts

Client	: SLR Consulting
Job	: SLR Taree Traffic Counts Counts Survey
Day/Date	: Thursday, 26 July 2018
Survey Location	: The Bucketts Way & Manning River Dr
Weather	: Fine



AM

Time Period	Movement 1 Light	Heavy	Total	Movement 2 Light	Heavy	Total	Movement 3 Light	Heavy	Total	Movement 3A Light	Heavy	Total	Movement 4 Light	Heavy	Total	Movement 5 Light	Heavy	Total	Movement 6 Light	Heavy	Total	Movement 6A Light	Heavy	Total
6:00 - 6:15	0	0	**0**	1	0	**1**	0	0	**0**	0	0	**0**	1	0	**1**	6	0	**6**	44	4	**48**	0	0	**0**
6:15 - 6:30	0	0	**0**	1	0	**1**	0	0	**0**	0	0	**0**	0	0	**0**	6	0	**6**	78	6	**84**	1	0	**1**
6:30 - 6:45	0	0	**0**	1	0	**1**	0	0	**0**	0	0	**0**	0	0	**0**	5	2	**7**	132	6	**138**	0	0	**0**
6:45 - 7:00	1	0	**1**	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	8	2	**10**	138	8	**146**	0	0	**0**
7:00 - 7:15	0	0	**0**	2	0	**2**	1	0	**1**	0	0	**0**	0	0	**0**	8	2	**10**	98	9	**107**	0	0	**0**
7:15 - 7:30	0	0	**0**	0	0	**0**	1	0	**1**	0	0	**0**	0	0	**0**	14	5	**19**	137	7	**144**	0	0	**0**
7:30 - 7:45	1	0	**1**	1	0	**1**	0	1	**1**	0	0	**0**	0	0	**0**	7	4	**11**	212	6	**218**	0	0	**0**
7:45 - 8:00	0	0	**0**	0	0	**0**	0	0	**0**	1	0	**1**	3	0	**3**	11	4	**15**	297	7	**304**	0	0	**0**
8:00 - 8:15	0	0	**0**	3	1	**4**	2	0	**2**	0	0	**0**	0	0	**0**	16	0	**16**	290	8	**298**	1	0	**1**
8:15 - 8:30	0	0	**0**	1	0	**1**	2	0	**2**	0	0	**0**	5	0	**5**	28	4	**32**	288	15	**303**	0	0	**0**
8:30 - 8:45	0	0	**0**	2	1	**3**	2	0	**2**	0	0	**0**	5	0	**5**	17	4	**21**	237	5	**242**	0	0	**0**
8:45 - 9:00	0	0	**0**	5	0	**5**	2	0	**2**	0	0	**0**	2	0	**2**	21	2	**23**	198	6	**204**	0	0	**0**
Total	**2**	**0**	**2**	**17**	**2**	**19**	**10**	**1**	**11**	**1**	**0**	**1**	**16**	**0**	**16**	**147**	**29**	**176**	**2149**	**87**	**2236**	**2**	**0**	**2**
AM Peak	**0**	**0**	**0**	**6**	**2**	**8**	**6**	**0**	**6**	**1**	**0**	**1**	**13**	**0**	**13**	**72**	**12**	**84**	**1112**	**35**	**1147**	**1**	**0**	**1**

Time Period	Movement 7 Light	Heavy	Total	Movement 8 Light	Heavy	Total	Movement 9 Light	Heavy	Total	Movement 9A Light	Heavy	Total	Movement 10 Light	Heavy	Total	Movement 11 Light	Heavy	Total	Movement 12 Light	Heavy	Total	Movement 12A Light	Heavy	Total	Total of all Movements
6:00 - 6:15	50	6	**56**	0	0	**0**	3	1	**4**	1	0	**1**	3	1	**4**	14	4	**18**	0	0	**0**	0	0	**0**	**139**
6:15 - 6:30	53	12	**65**	2	0	**2**	1	4	**5**	1	0	**1**	18	2	**20**	13	3	**16**	0	0	**0**	0	0	**0**	**201**
6:30 - 6:45	58	11	**69**	0	0	**0**	7	0	**7**	0	1	**1**	18	1	**19**	12	2	**14**	1	0	**1**	0	0	**0**	**257**
6:45 - 7:00	55	8	**63**	0	0	**0**	5	1	**6**	0	0	**0**	17	0	**17**	6	2	**8**	0	0	**0**	0	0	**0**	**251**
7:00 - 7:15	57	14	**71**	2	0	**2**	3	4	**7**	0	0	**0**	7	0	**7**	14	1	**15**	0	0	**0**	0	0	**0**	**222**
7:15 - 7:30	85	16	**101**	1	0	**1**	5	5	**10**	1	0	**1**	23	2	**25**	16	3	**19**	1	0	**1**	0	0	**0**	**322**
7:30 - 7:45	102	20	**122**	2	2	**4**	12	1	**13**	3	0	**3**	31	4	**35**	20	2	**22**	0	0	**0**	0	0	**0**	**431**
7:45 - 8:00	91	8	**99**	6	0	**6**	13	3	**16**	2	1	**3**	40	3	**43**	25	3	**28**	1	0	**1**	0	0	**0**	**519**
8:00 - 8:15	97	10	**107**	6	0	**6**	17	2	**19**	1	1	**2**	30	1	**31**	37	2	**39**	0	0	**0**	0	0	**0**	**525**
8:15 - 8:30	74	15	**89**	8	0	**8**	8	1	**9**	3	0	**3**	50	3	**53**	23	2	**25**	2	0	**2**	0	0	**0**	**532**
8:30 - 8:45	106	11	**117**	9	1	**10**	15	3	**18**	6	0	**6**	46	4	**50**	23	0	**23**	1	0	**1**	0	0	**0**	**498**
8:45 - 9:00	98	7	**105**	6	1	**7**	21	2	**23**	6	0	**6**	32	1	**33**	14	2	**16**	0	0	**0**	0	0	**0**	**426**
Total	**926**	**138**	**1064**	**42**	**4**	**46**	**110**	**27**	**137**	**24**	**3**	**27**	**315**	**22**	**337**	**217**	**26**	**243**	**6**	**0**	**6**	**0**	**0**	**0**	**4323**
AM Peak	**368**	**44**	**412**	**29**	**1**	**30**	**53**	**9**	**62**	**12**	**2**	**14**	**166**	**11**	**177**	**108**	**7**	**115**	**4**	**0**	**4**	**0**	**0**	**0**	**2074**

Peak Hour Volume Determination	
6:00 - 7:00	848
6:15 - 7:15	931
6:30 - 7:30	1052
6:45 - 7:45	1226
7:00 - 8:00	1494
7:15 - 8:15	1797
7:30 - 8:30	2007
7:45 - 8:45	2074
8:00 - 9:00	1981
AM Peak	2074

PM

Time Period	Movement 1 Light	Heavy	Total	Movement 2 Light	Heavy	Total	Movement 3 Light	Heavy	Total	Movement 3A Light	Heavy	Total	Movement 4 Light	Heavy	Total	Movement 5 Light	Heavy	Total	Movement 6 Light	Heavy	Total	Movement 6A Light	Heavy	Total
14:00 - 14:15	1	0	**1**	3	0	**3**	4	0	**4**	0	0	**0**	3	0	**3**	11	1	**12**	115	9	**124**	1	0	**1**
14:15 - 14:30	0	0	**0**	5	0	**5**	1	0	**1**	0	0	**0**	1	0	**1**	10	4	**14**	122	13	**135**	0	0	**0**
14:30 - 14:45	0	0	**0**	7	0	**7**	2	0	**2**	0	0	**0**	3	0	**3**	16	1	**17**	144	8	**152**	0	0	**0**
14:45 - 15:00	0	0	**0**	7	0	**7**	2	0	**2**	0	0	**0**	2	0	**2**	15	2	**17**	138	17	**155**	0	0	**0**
15:00 - 15:15	0	0	**0**	7	1	**8**	2	0	**2**	0	0	**0**	1	0	**1**	14	7	**21**	133	7	**140**	2	0	**2**
15:15 - 15:30	1	0	**1**	12	1	**13**	0	0	**0**	0	0	**0**	1	0	**1**	28	2	**30**	157	7	**164**	1	0	**1**
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16:30 - 16:45	1	0	**1**	7	0	**7**	2	0	**2**	1	0	**1**	0	0	**0**	21	1	**22**	134	9	**143**	0	0	**0**
16:45 - 17:00	0	0	**0**	4	0	**4**	4	0	**4**	0	0	**0**	1	0	**1**	18	0	**18**	120	7	**127**	0	0	**0**
17:00 - 17:15	1	0	**1**	9	0	**9**	4	0	**4**	0	0	**0**	2	0	**2**	22	1	**23**	117	8	**125**	1	0	**1**
17:15 - 17:30	1	0	**1**	7	0	**7**	0	0	**0**	0	0	**0**	0	0	**0**	21	0	**21**	110	5	**115**	0	0	**0**
17:30 - 17:45	2	0	**2**	8	0	**8**	3	0	**3**	0	0	**0**	2	0	**2**	20	1	**21**	120	4	**124**	0	0	**0**
17:45 - 18:00	0	0	**0**	2	0	**2**	3	0	**3**	0	0	**0**	1	0	**1**	15	0	**15**	78	5	**83**	0	0	**0**
Total	**9**	**0**	**9**	**101**	**2**	**103**	**34**	**0**	**34**	**2**	**0**	**2**	**30**	**0**	**30**	**300**	**29**	**329**	**2079**	**129**	**2208**	**7**	**0**	**7**
PM Peak	**2**	**0**	**2**	**23**	**0**	**23**	**7**	**0**	**7**	**1**	**0**	**1**	**13**	**0**	**13**	**89**	**9**	**98**	**591**	**30**	**621**	**2**	**0**	**2**

Time Period	Movement 7 Light	Heavy	Total	Movement 8 Light	Heavy	Total	Movement 9 Light	Heavy	Total	Movement 9A Light	Heavy	Total	Movement 10 Light	Heavy	Total	Movement 11 Light	Heavy	Total	Movement 12 Light	Heavy	Total	Movement 12A Light	Heavy	Total	Total of all Movements
14:00 - 14:15	157	7	**164**	7	0	**7**	28	1	**29**	5	0	**5**	14	0	**14**	9	1	**10**	3	0	**3**	0	0	**0**	**380**
14:15 - 14:30	160	9	**169**	4	0	**4**	27	0	**27**	3	1	**4**	18	2	**20**	13	8	**21**	0	0	**0**	0	0	**0**	**401**
14:30 - 14:45	165	5	**170**	5	0	**5**	28	3	**31**	3	1	**4**	24	4	**28**	14	0	**14**	0	0	**0**	0	0	**0**	**433**
14:45 - 15:00	178	8	**186**	7	0	**7**	37	1	**38**	2	0	**2**	24	1	**25**	15	3	**18**	1	0	**1**	0	0	**0**	**460**
15:00 - 15:15	182	9	**191**	6	0	**6**	35	0	**35**	4	0	**4**	23	1	**24**	19	1	**20**	0	0	**0**	0	0	**0**	**454**
15:15 - 15:30	194	4	**198**	3	1	**4**	29	0	**29**	1	0	**1**	27	6	**33**	13	4	**17**	0	0	**0**	0	0	**0**	**492**
15:30 - 15:45	259	8	**267**	3	0	**3**	24	2	**26**	2	0	**2**	23	1	**24**	13	2	**15**	0	0	**0**	0	0	**0**	**533**
15:45 - 16:00	247	13	**260**	5	1	**6**	40	2	**42**	4	0	**4**	21	3	**24**	13	1	**14**	0	0	**0**	0	0	**0**	**537**
16:00 - 16:15	273	8	**281**	6	0	**6**	35	1	**36**	6	0	**6**	17	0	**17**	17	0	**17**	0	0	**0**	0	0	**0**	**551**
16:15 - 16:30	218	6	**224**	6	0	**6**	30	0	**30**	4	0	**4**	21	1	**22**	13	1	**14**	0	0	**0**	0	0	**0**	**496**
16:30 - 16:45	235	6	**241**	8	0	**8**	41	1	**42**	3	0	**3**	16	1	**17**	23	1	**24**	0	0	**0**	0	0	**0**	**511**
16:45 - 17:00	219	5	**224**	3	0	**3**	26	0	**26**	2	0	**2**	13	1	**14**	20	1	**21**	0	0	**0**	0	0	**0**	**444**
17:00 - 17:15	269	5	**274**	2	0	**2**	53	0	**53**	2	0	**2**	26	1	**27**	14	4	**18**	1	0	**1**	0	0	**0**	**542**
17:15 - 17:30	283	3	**286**	4	1	**5**	42	0	**42**	1	0	**1**	14	0	**14**	14	1	**15**	0	0	**0**	0	0	**0**	**507**
17:30 - 17:45	192	5	**197**	3	0	**3**	34	0	**34**	5	0	**5**	17	0	**17**	19	0	**19**	0	0	**0**	0	0	**0**	**435**
17:45 - 18:00	156	5	**161**	1	0	**1**	21	0	**21**	1	0	**1**	9	2	**11**	14	1	**15**	1	0	**1**	0	0	**0**	**315**
Total	**3387**	**106**	**3493**	**73**	**3**	**76**	**530**	**11**	**541**	**48**	**2**	**50**	**307**	**24**	**331**	**243**	**29**	**272**	**6**	**0**	**6**	**0**	**0**	**0**	**7491**
PM Peak	**997**	**35**	**1032**	**20**	**1**	**21**	**129**	**5**	**134**	**16**	**0**	**16**	**82**	**5**	**87**	**56**	**4**	**60**	**0**	**0**	**0**	**0**	**0**	**0**	**2117**

Peak Hour Volume Determination	
14:00 - 15:00	1674
14:15 - 15:15	1748
14:30 - 15:30	1839
14:45 - 15:45	1939
15:00 - 16:00	2016
15:15 - 16:15	2113
15:30 - 16:30	2117
15:45 - 16:45	2095
16:00 - 17:00	2002
16:15 - 17:15	1993
16:30 - 17:30	2004
16:45 - 17:45	1928
17:00 - 18:00	1799
PM Peak	2117

HOURLY FLOW

TIME PERIOD	Movement 1 Light	Heavy	Total	Movement 2 Light	Heavy	Total	Movement 3 Light	Heavy	Total	Movement 3A Light	Heavy	Total	Movement 4 Light	Heavy	Total	Movement 5 Light	Heavy	Total	Movement 6 Light	Heavy	Total	Movement 6A Light	Heavy	Total
6:00 - 7:00	1	0	**1**	3	0	**3**	0	0	**0**	0	0	**0**	1	0	**1**	25	4	**29**	392	24	**416**	1	0	**1**
6:15 - 7:15	1	0	**1**	4	0	**4**	1	0	**1**	0	0	**0**	0	0	**0**	27	6	**33**	446	29	**475**	1	0	**1**
6:30 - 7:30	1	0	**1**	3	0	**3**	2	0	**2**	0	0	**0**	0	0	**0**	35	11	**46**	505	30	**535**	0	0	**0**
6:45 - 7:45	2	0	**2**	3	0	**3**	2	1	**3**	0	0	**0**	0	0	**0**	37	13	**50**	585	30	**615**	0	0	**0**
7:00 - 8:00	1	0	**1**	3	0	**3**	2	1	**3**	1	0	**1**	3	0	**3**	40	15	**55**	744	29	**773**	0	0	**0**
7:15 - 8:15	1	0	**1**	4	1	**5**	3	1	**4**	1	0	**1**	3	0	**3**	48	13	**61**	936	28	**964**	1	0	**1**
7:30 - 8:30	1	0	**1**	5	1	**6**	4	1	**5**	1	0	**1**	8	0	**8**	62	12	**74**	1087	36	**1123**	1	0	**1**
7:45 - 8:45	0	0	**0**	6	2	**8**	6	0	**6**	1	0	**1**	13	0	**13**	72	12	**84**	1112	35	**1147**	1	0	**1**
8:00 - 9:00	0	0	**0**	11	2	**13**	8	0	**8**	0	0	**0**	12	0	**12**	82	10	**92**	1013	34	**1047**	1	0	**1**

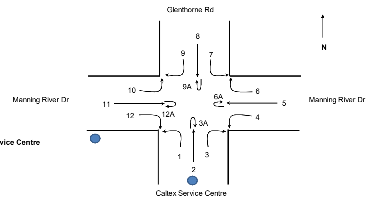
TIME PERIOD	Movement 7 Light	Heavy	Total	Movement 8 Light	Heavy	Total	Movement 9 Light	Heavy	Total	Movement 9A Light	Heavy	Total	Movement 10 Light	Heavy	Total	Movement 11 Light	Heavy	Total	Movement 12 Light	Heavy	Total	Movement 12A Light	Heavy	Total	Grand Total Light	Heavy	Total
6:00 - 7:00	216	37	**253**	2	0	**2**	16	6	**22**	2	1	**3**	56	4	**60**	45	11	**56**	1	0	**1**	0	0	**0**	761	87	**848**
6:15 - 7:15	223	45	**268**	4	0	**4**	16	9	**25**	1	1	**2**	60	3	**63**	45	8	**53**	1	0	**1**	0	0	**0**	830	101	**931**
6:30 - 7:30	255	49	**304**	3	0	**3**	20	10	**30**	1	1	**2**	65	3	**68**	48	8	**56**	2	0	**2**	0	0	**0**	940	112	**1052**
6:45 - 7:45	299	58	**357**	5	2	**7**	25	11	**36**	4	0	**4**	78	6	**84**	56	8	**64**	1	0	**1**	0	0	**0**	1097	129	**1226**
7:00 - 8:00	335	58	**393**	11	2	**13**	33	13	**46**	6	1	**7**	101	9	**110**	75	9	**84**	2	0	**2**	0	0	**0**	1357	137	**1494**
7:15 - 8:15	375	54	**429**	15	2	**17**	47	11	**58**	7	2	**9**	124	10	**134**	98	10	**108**	2	0	**2**	0	0	**0**	1665	132	**1797**
7:30 - 8:30	364	53	**417**	22	2	**24**	50	7	**57**	9	2	**11**	151	11	**162**	105	9	**114**	3	0	**3**	0	0	**0**	1873	134	**2007**
7:45 - 8:45	368	44	**412**	29	1	**30**	53	9	**62**	12	2	**14**	166	11	**177**	108	7	**115**	4	0	**4**	0	0	**0**	1951	123	**2074**
8:00 - 9:00	375	43	**418**	29	2	**31**	61	8	**69**	16	1	**17**	158	9	**167**	97	6	**103**	3	0	**3**	0	0	**0**	1866	115	**1981**

HOURLY FLOW

TIME PERIOD	Movement 1 Light	Heavy	Total	Movement 2 Light	Heavy	Total	Movement 3 Light	Heavy	Total	Movement 3A Light	Heavy	Total	Movement 4 Light	Heavy	Total	Movement 5 Light	Heavy	Total	Movement 6 Light	Heavy	Total	Movement 6A Light	Heavy	Total
14:00 - 15:00	1	0	**1**	22	0	**22**	9	0	**9**	0	0	**0**	9	0	**9**	52	8	**60**	519	47	**566**	1	0	**1**
14:15 - 15:15	0	0	**0**	26	1	**27**	7	0	**7**	0	0	**0**	7	0	**7**	55	14	**69**	537	45	**582**	2	0	**2**
14:30 - 15:30	1	0	**1**	33	2	**35**	6	0	**6**	0	0	**0**	7	0	**7**	73	12	**85**	572	39	**611**	3	0	**3**
14:45 - 15:45	1	0	**1**	28	2	**30**	6	0	**6**	0	0	**0**	6	0	**6**	80	15	**95**	581	40	**621**	4	0	**4**
15:00 - 16:00	1	0	**1**	24	2	**26**	4	0	**4**	0	0	**0**	7	0	**7**	84	14	**98**	597	30	**627**	4	0	**4**
15:15 - 16:15	3	0	**3**	24	1	**25**	6	0	**6**	0	0	**0**	8	0	**8**	90	10	**100**	606	30	**636**	3	0	**3**
15:30 - 16:30	2	0	**2**	23	0	**23**	7	0	**7**	1	0	**1**	13	0	**13**	89	9	**98**	591	30	**621**	2	0	**2**
15:45 - 16:45	3	0	**3**	28	0	**28**	7	0	**7**	2	0	**2**	11	0	**11**	87	6	**93**	572	30	**602**	1	0	**1**
16:00 - 17:00	3	0	**3**	29	0	**29**	11	0	**11**	2	0	**2**	9	0	**9**	86	5	**91**	538	30	**568**	1	0	**1**
16:15 - 17:15	2	0	**2**	31	0	**31**	11	0	**11**	2	0	**2**	9	0	**9**	88	3	**91**	513	31	**544**	1	0	**1**
16:30 - 17:30	3	0	**3**	27	0	**27**	10	0	**10**	1	0	**1**	3	0	**3**	82	2	**84**	481	29	**510**	1	0	**1**
16:45 - 17:45	4	0	**4**	28	0	**28**	11	0	**11**	0	0	**0**	5	0	**5**	81	2	**83**	467	24	**491**	1	0	**1**
17:00 - 18:00	4	0	**4**	26	0	**26**	10	0	**10**	0	0	**0**	5	0	**5**	78	2	**80**	425	22	**447**	1	0	**1**

TIME PERIOD	Movement 7 Light	Heavy	Total	Movement 8 Light	Heavy	Total	Movement 9 Light	Heavy	Total	Movement 9A Light	Heavy	Total	Movement 10 Light	Heavy	Total	Movement 11 Light	Heavy	Total	Movement 12 Light	Heavy	Total	Movement 12A Light	Heavy	Total	Grand Total Light	Heavy	Total
14:00 - 15:00	660	29	**689**	23	0	**23**	120	5	**125**	13	2	**15**	80	7	**87**	51	12	**63**	4	0	**4**	0	0	**0**	1564	110	**1674**
14:15 - 15:15	685	31	**716**	22	0	**22**	127	4	**131**	12	2	**14**	89	8	**97**	61	12	**73**	1	0	**1**	0	0	**0**	1631	117	**1748**
14:30 - 15:30	719	26	**745**	21	1	**22**	129	4	**133**	10	1	**11**	98	12	**110**	61	8	**69**	1	0	**1**	0	0	**0**	1734	105	**1839**
14:45 - 15:45	813	29	**842**	19	1	**20**	125	3	**128**	9	0	**9**	97	9	**106**	60	10	**70**	1	0	**1**	0	0	**0**	1830	109	**1939**
15:00 - 16:00	882	34	**916**	17	2	**19**	128	4	**132**	11	0	**11**	94	11	**105**	58	8	**66**	0	0	**0**	0	0	**0**	1911	105	**2016**
15:15 - 16:15	973	33	**1006**	17	2	**19**	128	5	**133**	13	0	**13**	88	10	**98**	56	7	**63**	0	0	**0**	0	0	**0**	2015	98	**2113**
15:30 - 16:30	997	35	**1032**	20	1	**21**	129	5	**134**	16	0	**16**	82	5	**87**	56	4	**60**	0	0	**0**	0	0	**0**	2028	89	**2117**
15:45 - 16:45	973	33	**1006**	25	1	**26**	146	4	**150**	17	0	**17**	75	5	**80**	66	3	**69**	0	0	**0**	0	0	**0**	2013	82	**2095**
16:00 - 17:00	945	25	**970**	23	0	**23**	132	2	**134**	15	0	**15**	67	3	**70**	73	3	**76**	0	0	**0**	0	0	**0**	1934	68	**2002**
16:15 - 17:15	941	22	**963**	19	0	**19**	150	1	**151**	11	0	**11**	76	4	**80**	70	7	**77**	1	0	**1**	0	0	**0**	1925	68	**1993**
16:30 - 17:30	1006	19	**1025**	17	1	**18**	162	1	**163**	8	0	**8**	69	3	**72**	71	7	**78**	1	0	**1**	0	0	**0**	1942	62	**2004**
16:45 - 17:45	963	18	**981**	12	1	**13**	155	0	**155**	10	0	**10**	70	2	**72**	67	6	**73**	1	0	**1**	0	0	**0**	1875	53	**1928**
17:00 - 18:00	900	18	**918**	10	1	**11**	150	0	**150**	9	0	**9**	66	3	**69**	61	6	**67**	2	0	**2**	0	0	**0**	1747	52	**1799**

Client : SLR Consulting
Job : SLR Taree Traffic Counts Counts Survey
Day/Date : Thursday, 26 July 2018
Survey Location : Manning River Dr & Glenthorne Rd & McDonalds & Caltex Service Centre
Weather : Fine



AM

Time Period	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 6:15	5	1	6	0	0	0	21	7	28	0	1	1	20	4	24	43	4	47	0	0	0	0	0	0
6:15 - 6:30	18	2	20	0	0	0	21	8	29	0	0	0	25	6	31	65	4	69	0	0	0	0	0	0
6:30 - 6:45	16	4	20	0	0	0	27	6	33	0	0	0	36	6	42	117	3	120	0	0	0	0	0	0
6:45 - 7:00	23	4	27	0	0	0	21	7	28	0	0	0	26	2	28	123	7	130	0	0	0	0	0	0
7:00 - 7:15	12	2	14	0	0	0	17	4	21	0	0	0	26	4	30	101	9	110	0	0	0	0	0	0
7:15 - 7:30	9	1	10	0	0	0	22	2	24	0	0	0	29	5	34	141	10	151	1	0	1	0	0	0
7:30 - 7:45	15	2	17	0	0	0	42	5	47	0	0	0	30	3	33	199	9	208	1	0	1	1	0	1
7:45 - 8:00	20	3	23	0	0	0	34	6	40	0	0	0	41	3	44	281	8	289	0	0	0	0	0	0
8:00 - 8:15	30	0	30	0	0	0	33	4	37	0	0	0	37	2	39	284	9	293	0	0	0	0	0	0
8:15 - 8:30	21	2	23	2	0	2	34	3	37	0	0	0	30	1	31	293	17	310	0	1	1	1	0	1
8:30 - 8:45	14	2	16	1	0	1	25	3	28	0	0	0	34	7	41	249	7	256	0	0	0	1	0	1
8:45 - 9:00	12	2	14	0	0	0	25	2	27	0	0	0	37	2	39	205	6	211	1	0	1	0	0	0
Total	195	25	220	3	0	3	322	57	379	0	1	1	371	45	416	2101	93	2194	3	1	4	3	0	3
AM Peak	85	7	92	3	0	3	126	16	142	0	0	0	142	13	155	1107	41	1148	0	1	1	2	0	2

Time Period	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Total of all Movements	Peak Hour Volume Determination	
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
6:00 - 6:15	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	48	8	56	16	3	19	0	0	0	182	6:00 - 7:00	993
6:15 - 6:30	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	50	11	61	15	4	19	0	0	0	231	6:15 - 7:15	1076
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	12	68	15	1	16	0	0	0	299	6:30 - 7:30	1181
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	9	47	19	1	20	1	0	1	281	6:45 - 7:45	1334
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	15	76	13	1	14	0	0	0	265	7:00 - 8:00	1577
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	14	96	18	2	20	0	0	0	336	7:15 - 8:15	1856
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	18	113	28	4	32	0	0	0	452	7:30 - 8:30	2046
7:45 - 8:00	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	94	12	106	17	2	19	0	0	0	524	7:45 - 8:45	2076
8:00 - 8:15	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	114	10	124	19	0	19	1	0	1	544	8:00 - 9:00	1972
8:15 - 8:30	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	91	18	109	10	0	10	0	0	0	526	AM Peak	2076
8:30 - 8:45	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	107	11	118	18	0	18	0	0	0	482		
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	106	6	112	12	3	15	0	0	0	420		
Total	4	0	4	1	0	1	5	0	5	0	0	0	3	0	3	942	144	1086	200	21	221	2	0	2	4542		
AM Peak	4	0	4	0	0	0	4	0	4	0	0	0	1	0	1	406	51	457	64	2	66	1	0	1	2076		

PM

Time Period	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 14:15	23	0	23	0	0	0	51	4	55	0	0	0	39	2	41	108	10	118	0	0	0	1	0	1
14:15 - 14:30	13	0	13	0	0	0	44	3	47	0	0	0	37	5	42	115	16	131	1	0	1	0	0	0
14:30 - 14:45	19	1	20	0	0	0	44	5	49	0	0	0	41	5	46	144	8	152	0	0	0	0	0	0
14:45 - 15:00	9	2	11	0	0	0	48	5	53	0	0	0	25	5	30	144	16	160	0	0	0	0	0	0
15:00 - 15:15	13	3	16	0	0	0	48	8	56	0	0	0	25	4	29	138	13	151	0	0	0	0	0	0
15:15 - 15:30	19	2	21	0	0	0	39	2	41	0	0	0	24	6	30	159	7	166	0	0	0	2	0	2
15:30 - 15:45	19	4	23	0	0	0	46	4	50	0	0	0	37	0	37	149	6	155	0	0	0	0	0	0
15:45 - 16:00	14	0	14	0	0	0	51	0	51	0	0	0	41	2	43	162	11	173	0	0	0	0	0	0
16:00 - 16:15	18	1	19	0	0	0	49	0	49	0	0	0	28	4	32	152	8	160	0	0	0	0	0	0
16:15 - 16:30	19	0	19	0	0	0	50	1	51	0	0	0	27	2	29	149	8	157	1	0	1	0	0	0
16:30 - 16:45	19	1	20	0	0	0	35	1	36	0	0	0	33	5	38	136	10	146	0	0	0	0	0	0
16:45 - 17:00	22	1	23	0	0	0	51	7	58	0	0	0	29	4	33	119	5	124	0	0	0	0	0	0
17:00 - 17:15	17	0	17	0	0	0	31	1	32	0	0	0	21	4	25	124	10	134	0	0	0	0	0	0
17:15 - 17:30	12	0	12	0	0	0	43	4	47	0	0	0	38	6	44	116	4	120	0	0	0	0	0	0
17:30 - 17:45	18	1	19	0	0	0	30	6	36	0	0	0	34	2	36	122	5	127	0	0	0	0	0	0
17:45 - 18:00	14	0	14	0	0	0	35	3	38	0	0	0	19	1	20	80	4	84	0	0	0	0	0	0
Total	268	16	284	0	0	0	695	54	749	0	0	0	498	57	555	2117	141	2258	2	0	2	3	0	3
PM Peak	70	5	75	0	0	0	196	5	201	0	0	0	133	8	141	612	33	645	1	0	1	0	0	0

Time Period	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Total of all Movements	Peak Hour Volume Determination	
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
14:00 - 14:15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	140	6	146	30	2	32	1	0	1	419	14:00 - 15:00	1767
14:15 - 14:30	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	152	12	164	20	3	23	1	0	1	423	14:15 - 15:15	1820
14:30 - 14:45	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	171	6	177	14	1	15	0	0	0	461	14:30 - 15:30	1870
14:45 - 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174	10	184	25	1	26	0	0	0	464	14:45 - 15:45	1960
15:00 - 15:15	0	0	0	0	0	0	2	0	2	0	0	0	1	0	1	185	6	191	22	4	26	0	0	0	472	15:00 - 16:00	2057
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	184	6	190	19	2	21	1	0	1	473	15:15 - 16:15	2135
15:30 - 15:45	1	0	1	0	0	0	2	0	2	0	0	0	5	0	5	231	10	241	37	0	37	0	0	0	551	15:30 - 16:30	2166
15:45 - 16:00	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	227	14	241	35	0	35	1	0	1	561	15:45 - 16:45	2115
16:00 - 16:15	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	248	7	255	32	1	33	1	0	1	550	16:00 - 17:00	2034
16:15 - 16:30	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	207	6	213	30	0	30	1	0	1	504	16:15 - 17:15	1999
16:30 - 16:45	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	228	8	236	21	0	21	1	0	1	500	16:30 - 17:30	2014
16:45 - 17:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	206	6	212	29	0	29	0	0	0	480	16:45 - 17:45	1953
17:00 - 17:15	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	272	9	281	23	0	23	0	0	0	515	17:00 - 18:00	1804
17:15 - 17:30	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	262	3	265	29	1	30	0	0	0	519	PM Peak	2166
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	190	5	195	26	0	26	0	0	0	439		
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	146	6	152	22	0	22	0	0	0	331		
Total	5	1	6	0	0	0	11	0	11	0	0	0	15	0	15	3223	120	3343	414	15	429	7	0	7	7662		
PM Peak	2	1	3	0	0	0	4	0	4	0	0	0	8	0	8	913	37	950	134	1	135	3	0	3	2166		

HOURLY FLOW

TIME PERIOD	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 7:00	62	11	73	0	0	0	90	28	118	0	1	1	107	18	125	348	18	366	0	0	0	0	0	0
6:15 - 7:15	69	12	81	0	0	0	86	25	111	0	0	0	113	18	131	406	23	429	0	0	0	0	0	0
6:30 - 7:30	60	11	71	0	0	0	87	19	106	0	0	0	117	17	134	482	29	511	1	0	1	0	0	0
6:45 - 7:45	59	9	68	0	0	0	102	18	120	0	0	0	111	14	125	564	35	599	2	0	2	1	0	1
7:00 - 8:00	56	8	64	0	0	0	115	17	132	0	0	0	126	15	141	722	36	758	2	0	2	1	0	1
7:15 - 8:15	74	6	80	0	0	0	131	17	148	0	0	0	137	13	150	905	36	941	2	0	2	1	0	1
7:30 - 8:30	86	7	93	2	0	2	143	18	161	0	0	0	138	9	147	1057	43	1100	1	1	2	2	0	2
7:45 - 8:45	85	7	92	3	0	3	126	16	142	0	0	0	142	13	155	1107	41	1148	0	1	1	2	0	2
8:00 - 9:00	77	6	83	3	0	3	117	12	129	0	0	0	138	12	150	1031	39	1070	1	1	2	2	0	2

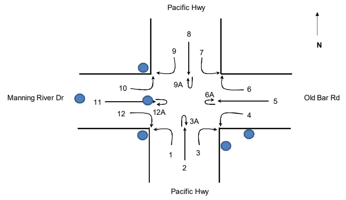
TIME PERIOD	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Grand Total		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 7:00	0	0	0	1	0	1	1	0	1	0	0	0	1	0	1	192	40	232	65	9	74	1	0	1	868	125	993
6:15 - 7:15	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	205	47	252	62	7	69	1	0	1	944	132	1076
6:30 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	237	50	287	65	5	70	1	0	1	1050	131	1181
6:45 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	276	56	332	78	8	86	1	0	1	1194	140	1334
7:00 - 8:00	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	332	59	391	76	9	85	0	0	0	1433	144	1577
7:15 - 8:15	1	0	1	0	0	0	2	0	2	0	0	0	1	0	1	385	54	439	82	8	90	1	0	1	1722	134	1856
7:30 - 8:30	1	0	1	0	0	0	4	0	4	0	0	0	1	0	1	394	58	452	74	6	80	1	0	1	1904	142	2046
7:45 - 8:45	4	0	4	0	0	0	4	0	4	0	0	0	1	0	1	406	51	457	64	2	66	1	0	1	1945	131	2076
8:00 - 9:00	3	0	3	0	0	0	3	0	3	0	0	0	1	0	1	418	45	463	59	3	62	1	0	1	1854	118	1972

HOURLY FLOW

TIME PERIOD	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 15:00	64	3	67	0	0	0	187	17	204	0	0	0	142	17	159	511	50	561	1	0	1	1	0	1
14:15 - 15:15	54	6	60	0	0	0	184	21	205	0	0	0	128	19	147	541	53	594	1	0	1	0	0	0
14:30 - 15:30	60	8	68	0	0	0	179	20	199	0	0	0	115	20	135	585	44	629	0	0	0	2	0	2
14:45 - 15:45	60	11	71	0	0	0	181	19	200	0	0	0	111	15	126	590	42	632	0	0	0	2	0	2
15:00 - 16:00	65	9	74	0	0	0	184	14	198	0	0	0	127	12	139	608	37	645	0	0	0	2	0	2
15:15 - 16:15	70	7	77	0	0	0	185	6	191	0	0	0	130	12	142	622	32	654	0	0	0	2	0	2
15:30 - 16:30	70	5	75	0	0	0	196	5	201	0	0	0	133	8	141	612	33	645	1	0	1	0	0	0
15:45 - 16:45	70	2	72	0	0	0	185	2	187	0	0	0	129	13	142	599	37	636	1	0	1	0	0	0
16:00 - 17:00	78	3	81	0	0	0	185	9	194	0	0	0	117	15	132	556	31	587	1	0	1	0	0	0
16:15 - 17:15	77	2	79	0	0	0	167	10	177	0	0	0	110	15	125	528	33	561	1	0	1	0	0	0
16:30 - 17:30	70	2	72	0	0	0	160	13	173	0	0	0	121	19	140	495	29	524	0	0	0	0	0	0
16:45 - 17:45	69	2	71	0	0	0	155	18	173	0	0	0	122	16	138	481	24	505	0	0	0	0	0	0
17:00 - 18:00	61	1	62	0	0	0	139	14	153	0	0	0	112	13	125	442	23	465	0	0	0	0	0	0

TIME PERIOD	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Grand Total		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 15:00	2	0	2	0	0	0	1	0	1	0	0	0	2	0	2	637	34	671	89	7	96	2	0	2	1639	128	1767
14:15 - 15:15	2	0	2	0	0	0	3	0	3	0	0	0	1	0	1	682	34	716	81	9	90	1	0	1	1678	142	1820
14:30 - 15:30	1	0	1	0	0	0	3	0	3	0	0	0	2	0	2	714	28	742	80	8	88	1	0	1	1742	128	1870
14:45 - 15:45	1	0	1	0	0	0	4	0	4	0	0	0	7	0	7	774	32	806	103	7	110	1	0	1	1834	126	1960
15:00 - 16:00	2	0	2	0	0	0	6	0	6	0	0	0	7	0	7	827	36	863	113	6	119	2	0	2	1943	114	2057
15:15 - 16:15	2	1	3	0	0	0	4	0	4	0	0	0	6	0	6	890	37	927	123	3	126	3	0	3	2037	98	2135
15:30 - 16:30	2	1	3	0	0	0	4	0	4	0	0	0	8	0	8	913	37	950	134	1	135	3	0	3	2076	90	2166
15:45 - 16:45	1	1	2	0	0	0	4	0	4	0	0	0	3	0	3	910	35	945	118	1	119	4	0	4	2024	91	2115
16:00 - 17:00	0	1	1	0	0	0	3	0	3	0	0	0	3	0	3	889	27	916	112	1	113	3	0	3	1947	87	2034
16:15 - 17:15	0	0	0	0	0	0	4	0	4	0	0	0	5	0	5	913	29	942	103	0	103	2	0	2	1910	89	1999
16:30 - 17:30	1	0	1	0	0	0	4	0	4	0	0	0	2	0	2	968	26	994	102	1	103	1	0	1	1924	90	2014
16:45 - 17:45	1	0	1	0	0	0	2	0	2	0	0	0	2	0	2	930	23	953	107	1	108	0	0	0	1869	84	1953
17:00 - 18:00	1	0	1	0	0	0	1	0	1	0	0	0	3	0	3	870	23	893	100	1	101	0	0	0	1729	75	1804

Client : SLR Consulting
Job : SLR Taree Traffic Counts Counts Survey
Day/Date : Thursday, 26 July 2018
Survey Location : Manning River Dr & Old Bar Rd & Pacific Hwy
Weather : Fine



AM

Time Period	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 6:15	26	5	31	0	0	0	1	1	2	0	0	0	14	0	14	23	1	24	12	3	15	0	0	0
6:15 - 6:30	49	7	56	0	0	0	3	0	3	0	0	0	7	0	7	37	2	39	6	0	6	0	0	0
6:30 - 6:45	71	3	74	0	0	0	1	0	1	0	0	0	15	0	15	65	4	69	8	0	8	0	0	0
6:45 - 7:00	66	7	73	0	0	0	3	2	5	0	0	0	10	0	10	62	1	63	7	0	7	0	0	0
7:00 - 7:15	60	11	71	0	0	0	3	2	5	0	0	0	15	0	15	54	2	56	12	1	13	0	0	0
7:15 - 7:30	79	8	87	0	0	0	7	0	7	0	0	0	15	0	15	83	3	86	9	1	10	0	0	0
7:30 - 7:45	122	7	129	0	0	0	4	2	6	0	0	0	24	0	24	102	2	104	8	0	8	0	0	0
7:45 - 8:00	154	5	159	0	0	0	9	2	11	0	0	0	15	2	17	144	2	146	21	1	22	0	0	0
8:00 - 8:15	167	6	173	0	0	0	11	2	13	0	0	0	24	2	26	137	4	141	21	1	22	0	0	0
8:15 - 8:30	157	8	165	0	0	0	4	2	6	0	0	0	15	3	18	156	12	168	31	1	32	0	0	0
8:30 - 8:45	132	8	140	0	0	0	10	1	11	0	0	0	14	1	15	115	1	116	17	0	17	0	0	0
8:45 - 9:00	136	6	142	0	0	0	5	1	6	0	0	0	12	0	12	97	1	98	16	1	17	0	0	0
Total	1219	81	1300	0	0	0	61	15	76	0	0	0	180	8	188	1075	35	1110	168	9	177	0	0	0
AM Peak	610	27	637	0	0	0	34	7	41	0	0	0	68	8	76	552	19	571	90	3	93	0	0	0

Time Period	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Total of all Movements	Peak Hour Volume Determination	
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
6:00 - 6:15	1	0	1	0	0	0	15	1	16	0	0	0	18	7	25	18	0	18	41	7	48	0	0	0	194	6:00 - 7:00	962
6:15 - 6:30	3	0	3	0	0	0	11	2	13	0	0	0	8	3	11	10	4	14	55	13	68	0	0	0	220	6:15 - 7:15	1040
6:30 - 6:45	3	0	3	0	0	0	21	3	24	0	0	0	11	7	18	22	5	27	51	7	58	0	0	0	297	6:30 - 7:30	1173
6:45 - 7:00	3	0	3	0	0	0	15	0	15	0	0	0	9	5	14	20	5	25	30	6	36	0	0	0	251	6:45 - 7:45	1337
7:00 - 7:15	4	1	5	0	0	0	12	1	13	0	0	0	12	5	17	16	0	16	48	13	61	0	0	0	272	7:00 - 8:00	1627
7:15 - 7:30	6	1	7	0	0	0	14	1	15	0	0	0	12	2	14	31	6	37	66	9	75	0	0	0	353	7:15 - 8:15	1925
7:30 - 7:45	6	0	6	0	0	0	20	3	23	0	0	0	22	3	25	29	9	38	87	11	98	0	0	0	461	7:30 - 8:30	2137
7:45 - 8:00	9	3	12	0	0	0	27	4	31	0	0	0	21	1	22	27	4	31	79	11	90	0	0	0	541	7:45 - 8:45	2159
8:00 - 8:15	5	3	8	0	0	0	18	1	19	0	0	0	29	6	35	44	2	46	79	8	87	0	0	0	570	8:00 - 9:00	2055
8:15 - 8:30	12	0	12	0	0	0	17	3	20	0	0	0	35	4	39	19	3	22	71	12	83	0	0	0	565	AM Peak	2159
8:30 - 8:45	9	1	10	0	0	0	19	2	21	0	0	0	36	2	38	48	1	49	54	12	66	0	0	0	483		
8:45 - 9:00	7	0	7	0	0	0	17	2	19	0	0	0	15	1	16	36	2	38	76	6	82	0	0	0	437		
Total	68	9	77	0	0	0	206	23	229	0	0	0	228	46	274	320	41	361	737	115	852	0	0	0	4644		
AM Peak	35	7	42	0	0	0	81	10	91	0	0	0	121	13	134	138	10	148	283	43	326	0	0	0	2159		

PM

Time Period	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 14:15	86	8	94	0	0	0	12	0	12	0	0	0	14	1	15	38	4	42	7	0	7	0	0	0
14:15 - 14:30	103	14	117	0	0	0	13	0	13	0	0	0	4	0	4	42	4	46	6	0	6	0	0	0
14:30 - 14:45	104	10	114	0	0	0	13	2	15	0	0	0	8	0	8	62	2	64	15	2	17	0	0	0
14:45 - 15:00	94	15	109	0	0	0	18	1	19	0	0	0	8	2	10	52	6	58	12	0	12	0	0	0
15:00 - 15:15	78	6	84	0	0	0	16	2	18	0	0	0	6	0	6	71	4	75	7	0	7	0	0	0
15:15 - 15:30	105	6	111	0	0	0	18	0	18	0	0	0	10	0	10	65	4	69	9	0	9	0	0	0
15:30 - 15:45	113	4	117	0	0	0	14	1	15	0	0	0	14	2	16	61	2	63	5	0	5	0	0	0
15:45 - 16:00	106	7	113	0	0	0	29	0	29	0	0	0	7	1	8	61	2	63	6	2	8	0	0	0
16:00 - 16:15	95	6	101	0	0	0	12	1	13	0	0	0	12	0	12	60	5	65	10	1	11	0	0	0
16:15 - 16:30	113	5	118	0	0	0	19	4	23	0	0	0	9	2	11	49	4	53	8	0	8	0	0	0
16:30 - 16:45	100	11	111	0	0	0	17	2	19	0	0	0	9	0	9	42	4	46	11	0	11	0	0	0
16:45 - 17:00	83	9	92	0	0	0	20	0	20	0	0	0	10	0	10	37	1	38	12	0	12	0	0	0
17:00 - 17:15	91	5	96	0	0	0	20	2	22	0	0	0	6	1	7	45	4	49	5	1	6	0	0	0
17:15 - 17:30	85	6	91	0	0	0	17	0	17	0	0	0	12	0	12	49	1	50	10	0	10	0	0	0
17:30 - 17:45	89	4	93	0	0	0	13	0	13	0	0	0	11	0	11	48	1	49	12	0	12	0	0	0
17:45 - 18:00	57	3	60	0	0	0	13	0	13	0	0	0	6	0	6	26	1	27	5	2	7	0	0	0
Total	1502	119	1621	0	0	0	264	15	279	0	0	0	146	9	155	808	49	857	140	8	148	0	0	0
PM Peak	427	22	449	0	0	0	74	6	80	0	0	0	42	5	47	231	13	244	29	3	32	0	0	0

Time Period	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Total of all Movements	Peak Hour Volume Determination	
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
14:00 - 14:15	8	2	10	0	0	0	22	1	23	0	0	0	31	3	34	64	2	66	103	6	109	0	0	0	412	14:00 - 15:00	1779
14:15 - 14:30	9	2	11	0	0	0	15	3	18	0	0	0	35	10	45	73	5	78	95	3	98	0	0	0	436	14:15 - 15:15	1831
14:30 - 14:45	10	2	12	0	0	0	21	4	25	0	0	0	29	2	31	70	0	70	98	5	103	0	0	0	459	14:30 - 15:30	1885
14:45 - 15:00	14	0	14	0	0	0	20	1	21	0	0	0	29	6	35	74	4	78	110	6	116	0	0	0	472	14:45 - 15:45	1983
15:00 - 15:15	8	0	8	0	0	0	13	4	17	0	0	0	33	3	36	89	0	89	114	10	124	0	0	0	464	15:00 - 16:00	2058
15:15 - 15:30	21	3	24	0	0	0	19	3	22	0	0	0	22	2	24	77	2	79	120	4	124	0	0	0	490	15:15 - 16:15	2147
15:30 - 15:45	19	0	19	0	0	0	19	2	21	0	0	0	40	4	44	130	3	133	117	7	124	0	0	0	557	15:30 - 16:30	2159
15:45 - 16:00	17	0	17	0	0	0	26	1	27	0	0	0	17	3	20	113	5	118	137	7	144	0	0	0	547	15:45 - 16:45	2108
16:00 - 16:15	9	1	10	0	0	0	17	2	19	0	0	0	37	1	38	126	5	131	150	3	153	0	0	0	553	16:00 - 17:00	2047
16:15 - 16:30	18	1	19	0	0	0	15	1	16	0	0	0	19	1	20	104	0	104	124	6	130	0	0	0	502	16:15 - 17:15	2021
16:30 - 16:45	9	2	11	0	0	0	23	0	23	0	0	0	30	1	31	101	5	106	137	2	139	0	0	0	506	16:30 - 17:30	2053
16:45 - 17:00	16	0	16	0	0	0	20	0	20	0	0	0	27	6	33	118	2	120	119	6	125	0	0	0	486	16:45 - 17:45	1984
17:00 - 17:15	16	1	17	0	0	0	15	4	19	0	0	0	18	5	23	117	0	117	165	6	171	0	0	0	527	17:00 - 18:00	1835
17:15 - 17:30	17	0	17	0	0	0	18	3	21	0	0	0	26	0	26	145	1	146	140	4	144	0	0	0	534	PM Peak	2159
17:30 - 17:45	15	0	15	0	0	0	14	2	16	0	0	0	16	6	22	91	1	92	110	4	114	0	0	0	437		
17:45 - 18:00	11	0	11	0	0	0	23	1	24	0	0	0	25	5	30	80	0	80	74	5	79	0	0	0	337		
Total	217	14	231	0	0	0	300	32	332	0	0	0	434	58	492	1572	35	1607	1913	84	1997	0	0	0	7719		
PM Peak	63	2	65	0	0	0	77	6	83	0	0	0	113	9	122	473	13	486	528	23	551	0	0	0	2159		

HOURLY FLOW

TIME PERIOD	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 7:00	212	22	234	0	0	0	8	3	11	0	0	0	46	0	46	187	8	195	33	3	36	0	0	0
6:15 - 7:15	246	28	274	0	0	0	10	4	14	0	0	0	47	0	47	218	9	227	33	1	34	0	0	0
6:30 - 7:30	276	29	305	0	0	0	14	4	18	0	0	0	55	0	55	264	10	274	36	2	38	0	0	0
6:45 - 7:45	327	33	360	0	0	0	17	6	23	0	0	0	64	0	64	301	8	309	36	2	38	0	0	0
7:00 - 8:00	415	31	446	0	0	0	23	6	29	0	0	0	69	2	71	383	9	392	50	3	53	0	0	0
7:15 - 8:15	522	26	548	0	0	0	31	6	37	0	0	0	78	4	82	466	11	477	59	3	62	0	0	0
7:30 - 8:30	600	26	626	0	0	0	28	8	36	0	0	0	78	7	85	539	20	559	81	3	84	0	0	0
7:45 - 8:45	610	27	637	0	0	0	34	7	41	0	0	0	68	8	76	552	19	571	90	3	93	0	0	0
8:00 - 9:00	592	28	620	0	0	0	30	6	36	0	0	0	65	6	71	505	18	523	85	3	88	0	0	0

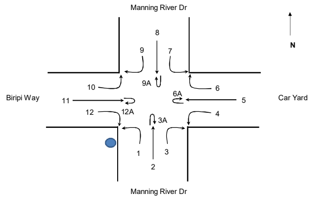
TIME PERIOD	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Grand Total		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 7:00	10	0	10	0	0	0	62	6	68	0	0	0	46	22	68	70	14	84	177	33	210	0	0	0	851	111	962
6:15 - 7:15	13	1	14	0	0	0	59	6	65	0	0	0	40	20	60	68	14	82	184	39	223	0	0	0	918	122	1040
6:30 - 7:30	16	2	18	0	0	0	62	5	67	0	0	0	44	19	63	89	16	105	195	35	230	0	0	0	1051	122	1173
6:45 - 7:45	19	2	21	0	0	0	61	5	66	0	0	0	55	15	70	96	20	116	231	39	270	0	0	0	1207	130	1337
7:00 - 8:00	25	5	30	0	0	0	73	9	82	0	0	0	67	11	78	103	19	122	280	44	324	0	0	0	1488	139	1627
7:15 - 8:15	26	7	33	0	0	0	79	9	88	0	0	0	84	12	96	131	21	152	311	39	350	0	0	0	1787	138	1925
7:30 - 8:30	32	6	38	0	0	0	82	11	93	0	0	0	107	14	121	119	18	137	316	42	358	0	0	0	1982	155	2137
7:45 - 8:45	35	7	42	0	0	0	81	10	91	0	0	0	121	13	134	138	10	148	283	43	326	0	0	0	2012	147	2159
8:00 - 9:00	33	4	37	0	0	0	71	8	79	0	0	0	115	13	128	147	8	155	280	38	318	0	0	0	1923	132	2055

HOURLY FLOW

TIME PERIOD	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 15:00	387	47	434	0	0	0	56	3	59	0	0	0	34	3	37	194	16	210	40	2	42	0	0	0
14:15 - 15:15	379	45	424	0	0	0	60	5	65	0	0	0	26	2	28	227	16	243	40	2	42	0	0	0
14:30 - 15:30	381	37	418	0	0	0	65	5	70	0	0	0	32	2	34	250	16	266	43	2	45	0	0	0
14:45 - 15:45	390	31	421	0	0	0	66	4	70	0	0	0	38	4	42	249	16	265	33	0	33	0	0	0
15:00 - 16:00	402	23	425	0	0	0	77	3	80	0	0	0	37	3	40	258	12	270	27	2	29	0	0	0
15:15 - 16:15	419	23	442	0	0	0	73	2	75	0	0	0	43	3	46	247	13	260	30	3	33	0	0	0
15:30 - 16:30	427	22	449	0	0	0	74	6	80	0	0	0	42	5	47	231	13	244	29	3	32	0	0	0
15:45 - 16:45	414	29	443	0	0	0	77	7	84	0	0	0	37	3	40	212	15	227	35	3	38	0	0	0
16:00 - 17:00	391	31	422	0	0	0	68	7	75	0	0	0	40	2	42	188	14	202	41	1	42	0	0	0
16:15 - 17:15	387	30	417	0	0	0	76	8	84	0	0	0	34	3	37	173	13	186	36	1	37	0	0	0
16:30 - 17:30	359	31	390	0	0	0	74	4	78	0	0	0	37	1	38	173	10	183	38	1	39	0	0	0
16:45 - 17:45	348	24	372	0	0	0	70	2	72	0	0	0	39	1	40	179	7	186	39	1	40	0	0	0
17:00 - 18:00	322	18	340	0	0	0	63	2	65	0	0	0	35	1	36	168	7	175	32	3	35	0	0	0

TIME PERIOD	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Grand Total		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 15:00	41	6	47	0	0	0	78	9	87	0	0	0	124	21	145	281	11	292	406	20	426	0	0	0	1641	138	1779
14:15 - 15:15	41	4	45	0	0	0	69	12	81	0	0	0	126	21	147	306	9	315	417	24	441	0	0	0	1691	140	1831
14:30 - 15:30	53	5	58	0	0	0	73	12	85	0	0	0	113	13	126	310	6	316	442	25	467	0	0	0	1762	123	1885
14:45 - 15:45	62	3	65	0	0	0	71	10	81	0	0	0	124	15	139	370	9	379	461	27	488	0	0	0	1864	119	1983
15:00 - 16:00	65	3	68	0	0	0	77	10	87	0	0	0	112	12	124	409	10	419	488	28	516	0	0	0	1952	106	2058
15:15 - 16:15	66	4	70	0	0	0	81	8	89	0	0	0	116	10	126	446	15	461	524	21	545	0	0	0	2045	102	2147
15:30 - 16:30	63	2	65	0	0	0	77	6	83	0	0	0	113	9	122	473	13	486	528	23	551	0	0	0	2057	102	2159
15:45 - 16:45	53	4	57	0	0	0	81	4	85	0	0	0	103	6	109	444	15	459	548	18	566	0	0	0	2004	104	2108
16:00 - 17:00	52	4	56	0	0	0	75	3	78	0	0	0	113	9	122	449	12	461	530	17	547	0	0	0	1947	100	2047
16:15 - 17:15	59	4	63	0	0	0	73	5	78	0	0	0	94	13	107	440	7	447	545	20	565	0	0	0	1917	104	2021
16:30 - 17:30	58	3	61	0	0	0	76	7	83	0	0	0	101	12	113	481	8	489	561	18	579	0	0	0	1958	95	2053
16:45 - 17:45	64	1	65	0	0	0	67	9	76	0	0	0	87	17	104	471	4	475	534	20	554	0	0	0	1898	86	1984
17:00 - 18:00	59	1	60	0	0	0	70	10	80	0	0	0	85	16	101	433	2	435	489	19	508	0	0	0	1756	79	1835

austraffic



Client : SLR Consulting
Job : SLR Taree Traffic Counts Counts Survey
Day/Date : Thursday, 26 July 2018
Survey Location : Biripi Way& Manning River Dr at Masters Site & Car Yard
Weather : Fine

AM

Time Period	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 6:15	0	0	0	51	5	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 - 6:30	0	0	0	101	8	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 - 6:45	0	0	0	156	7	163	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6:45 - 7:00	0	0	0	148	8	156	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 - 7:15	0	0	0	112	9	121	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
7:15 - 7:30	0	0	0	154	7	161	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7:30 - 7:45	1	0	1	245	9	254	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 - 8:00	1	0	1	309	10	319	14	0	14	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0
8:00 - 8:15	0	0	0	330	10	340	4	0	4	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0
8:15 - 8:30	0	0	0	319	17	336	1	0	1	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0
8:30 - 8:45	0	0	0	271	11	282	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
8:45 - 9:00	0	0	0	251	8	259	4	1	5	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0
Total	2	0	2	2447	109	2556	31	1	32	4	2	6	1	0	1	0	0	0	9	0	9	0	0	0
AM Peak	1	0	1	1229	48	1277	19	0	19	3	0	3	1	0	1	0	0	0	7	0	7	0	0	0

Time Period	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Total of all Movements	Peak Hour Volume Determination	
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
6:00 - 6:15	0	0	0	52	8	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	116	6:00 - 7:00	760
6:15 - 6:30	0	0	0	54	14	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	177	6:15 - 7:15	866
6:30 - 6:45	1	0	1	78	15	93	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	260	6:30 - 7:30	969
6:45 - 7:00	0	0	0	45	4	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207	6:45 - 7:45	1104
7:00 - 7:15	0	0	0	75	24	99	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	222	7:00 - 8:00	1370
7:15 - 7:30	2	0	2	95	20	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	280	7:15 - 8:15	1627
7:30 - 7:45	4	0	4	109	21	130	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	395	7:30 - 8:30	1815
7:45 - 8:00	9	0	9	114	7	121	0	0	0	4	0	4	1	0	1	0	0	0	1	0	1	0	0	0	473	7:45 - 8:45	1844
8:00 - 8:15	2	1	3	110	13	123	1	0	1	4	0	4	1	0	1	0	0	0	0	0	0	0	0	0	479	8:00 - 9:00	1764
8:15 - 8:30	1	0	1	106	18	124	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	468	AM Peak	1844
8:30 - 8:45	2	0	2	122	15	137	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	424		
8:45 - 9:00	4	0	4	115	8	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	393		
Total	25	1	26	1075	167	1242	1	0	1	16	0	16	2	0	2	0	0	0	1	0	1	0	0	0	3894		
AM Peak	14	1	15	452	53	505	1	0	1	12	0	12	2	0	2	0	0	0	1	0	1	0	0	0	1844		

PM

Time Period	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 14:15	0	0	0	144	11	155	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
14:15 - 14:30	0	1	1	136	15	151	0	0	0	0	1	1	2	0	2	0	0	0	7	0	7	0	0	0
14:30 - 14:45	0	0	0	173	10	183	1	0	1	1	0	1	1	0	1	0	0	0	3	0	3	0	0	0
14:45 - 15:00	0	0	0	166	19	185	0	0	0	2	0	2	1	0	1	0	0	0	1	0	1	0	0	0
15:00 - 15:15	0	0	0	169	10	179	1	0	1	2	0	2	2	0	2	0	0	0	1	0	1	0	0	0
15:15 - 15:30	0	0	0	180	12	192	2	0	2	2	0	2	1	0	1	0	0	0	3	0	3	0	0	0
15:30 - 15:45	0	0	0	179	9	188	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0
15:45 - 16:00	0	0	0	182	10	192	3	0	3	0	0	0	1	0	1	0	0	0	3	0	3	0	0	0
16:00 - 16:15	0	0	0	165	8	173	4	0	4	1	0	1	3	0	3	0	0	0	3	0	3	0	0	0
16:15 - 16:30	0	0	0	173	8	181	1	0	1	0	0	0	2	0	2	0	0	0	3	0	3	0	0	0
16:30 - 16:45	0	0	0	159	11	170	1	0	1	1	0	1	1	0	1	0	0	0	3	0	3	0	0	0
16:45 - 17:00	0	0	0	142	7	149	0	0	0	1	0	1	2	0	2	0	0	0	4	0	4	0	0	0
17:00 - 17:15	0	0	0	153	9	162	0	0	0	2	0	2	1	0	1	0	0	0	6	0	6	0	0	0
17:15 - 17:30	0	0	0	138	4	142	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	141	4	145	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
17:45 - 18:00	0	0	0	96	4	100	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Total	0	1	1	2496	151	2647	15	1	16	14	1	15	17	0	17	0	0	0	40	1	41	0	0	0
PM Peak	0	0	0	699	35	734	9	0	9	1	0	1	6	0	6	0	0	0	11	0	11	0	0	0

Time Period	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Total of all Movements	Peak Hour Volume Determination	
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
14:00 - 14:15	2	0	2	178	10	188	0	0	0	2	0	2	0	0	0	0	0	0	1	0	1	0	0	0	350	14:00 - 15:00	1532
14:15 - 14:30	3	0	3	197	9	206	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	373	14:15 - 15:15	1606
14:30 - 14:45	1	0	1	196	7	203	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	395	14:30 - 15:30	1682
14:45 - 15:00	0	0	0	214	10	224	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	414	14:45 - 15:45	1784
15:00 - 15:15	2	0	2	226	6	232	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	424	15:00 - 16:00	1885
15:15 - 15:30	1	0	1	240	5	245	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	449	15:15 - 16:15	1973
15:30 - 15:45	2	0	2	281	15	296	0	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	497	15:30 - 16:30	1977
15:45 - 16:00	2	0	2	297	11	308	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	515	15:45 - 16:45	1941
16:00 - 16:15	2	0	2	313	8	321	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	512	16:00 - 17:00	1838
16:15 - 16:30	1	0	1	261	4	265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	453	16:15 - 17:15	1838
16:30 - 16:45	1	0	1	273	9	282	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	461	16:30 - 17:30	1839
16:45 - 17:00	0	0	0	249	4	253	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	412	16:45 - 17:45	1754
17:00 - 17:15	0	0	0	328	5	333	0	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	512	17:00 - 18:00	1609
17:15 - 17:30	0	0	0	296	3	299	0	0	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	454	PM Peak	1977
17:30 - 17:45	0	0	0	223	5	228	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	376		
17:45 - 18:00	0	0	0	156	6	162	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	267		
Total	17	0	17	3928	117	4045	1	0	1	62	0	62	0	0	0	0	0	0	2	0	2	0	0	0	6864		
PM Peak	7	0	7	1152	38	1190	0	0	0	19	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1977		

HOURLY FLOW

TIME PERIOD	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 7:00	0	0	0	456	28	484	2	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6:15 - 7:15	0	0	0	517	32	549	2	0	2	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0
6:30 - 7:30	0	0	0	570	31	601	3	0	3	0	2	2	0	0	0	0	0	0	1	0	1	0	0	0
6:45 - 7:45	1	0	1	659	33	692	8	0	8	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0
7:00 - 8:00	2	0	2	820	35	855	20	0	20	0	1	1	1	0	1	0	0	0	3	0	3	0	0	0
7:15 - 8:15	2	0	2	1038	36	1074	24	0	24	0	1	1	1	0	1	0	0	0	5	0	5	0	0	0
7:30 - 8:30	2	0	2	1203	46	1249	24	0	24	1	0	1	1	0	1	0	0	0	7	0	7	0	0	0
7:45 - 8:45	1	0	1	1229	48	1277	19	0	19	3	0	3	1	0	1	0	0	0	7	0	7	0	0	0
8:00 - 9:00	0	0	0	1171	46	1217	9	1	10	4	0	4	0	0	0	0	0	0	6	0	6	0	0	0

TIME PERIOD	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Grand Total		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
6:00 - 7:00	1	0	1	229	41	270	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	690	70	760
6:15 - 7:15	1	0	1	252	57	309	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	776	90	866
6:30 - 7:30	3	0	3	293	63	356	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	873	96	969
6:45 - 7:45	6	0	6	324	69	393	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1001	103	1104
7:00 - 8:00	15	0	15	393	72	465	0	0	0	6	0	6	1	0	1	0	0	0	1	0	1	0	0	0	1262	108	1370
7:15 - 8:15	17	1	18	428	61	489	1	0	1	9	0	9	2	0	2	0	0	0	1	0	1	0	0	0	1528	99	1627
7:30 - 8:30	16	1	17	439	59	498	1	0	1	12	0	12	2	0	2	0	0	0	1	0	1	0	0	0	1709	106	1815
7:45 - 8:45	14	1	15	452	53	505	1	0	1	12	0	12	2	0	2	0	0	0	1	0	1	0	0	0	1742	102	1844
8:00 - 9:00	9	1	10	453	54	507	1	0	1	8	0	8	1	0	1	0	0	0	0	0	0	0	0	0	1662	102	1764

HOURLY FLOW

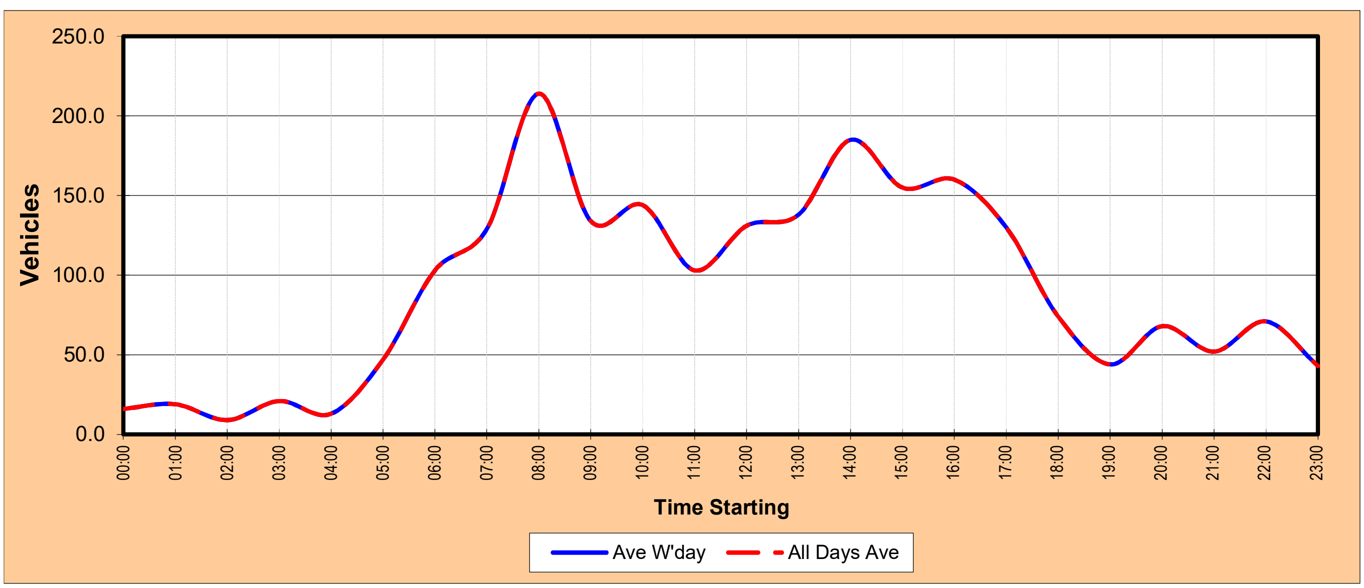
TIME PERIOD	Movement 1			Movement 2			Movement 3			Movement 3A			Movement 4			Movement 5			Movement 6			Movement 6A		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 15:00	0	1	1	619	55	674	2	0	2	4	1	5	4	0	4	0	0	0	11	0	11	0	0	0
14:15 - 15:15	0	1	1	644	54	698	2	0	2	5	1	6	6	0	6	0	0	0	12	0	12	0	0	0
14:30 - 15:30	0	0	0	688	51	739	4	0	4	7	0	7	5	0	5	0	0	0	8	0	8	0	0	0
14:45 - 15:45	0	0	0	694	50	744	4	0	4	6	0	6	4	0	4	0	0	0	7	0	7	0	0	0
15:00 - 16:00	0	0	0	710	41	751	7	0	7	4	0	4	4	0	4	0	0	0	9	0	9	0	0	0
15:15 - 16:15	0	0	0	706	39	745	10	0	10	3	0	3	5	0	5	0	0	0	11	0	11	0	0	0
15:30 - 16:30	0	0	0	699	35	734	9	0	9	1	0	1	6	0	6	0	0	0	11	0	11	0	0	0
15:45 - 16:45	0	0	0	679	37	716	9	0	9	2	0	2	7	0	7	0	0	0	12	0	12	0	0	0
16:00 - 17:00	0	0	0	639	34	673	6	0	6	3	0	3	8	0	8	0	0	0	13	0	13	0	0	0
16:15 - 17:15	0	0	0	627	35	662	2	0	2	4	0	4	6	0	6	0	0	0	16	0	16	0	0	0
16:30 - 17:30	0	0	0	592	31	623	1	1	2	5	0	5	4	0	4	0	0	0	13	0	13	0	0	0
16:45 - 17:45	0	0	0	574	24	598	0	1	1	4	0	4	3	0	3	0	0	0	10	1	11	0	0	0
17:00 - 18:00	0	0	0	528	21	549	0	1	1	3	0	3	1	0	1	0	0	0	7	1	8	0	0	0

TIME PERIOD	Movement 7			Movement 8			Movement 9			Movement 9A			Movement 10			Movement 11			Movement 12			Movement 12A			Grand Total		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
14:00 - 15:00	6	0	6	785	36	821	0	0	0	6	0	6	0	0	0	0	0	0	2	0	2	0	0	0	1439	93	1532
14:15 - 15:15	6	0	6	833	32	865	0	0	0	9	0	9	0	0	0	0	0	0	1	0	1	0	0	0	1518	88	1606
14:30 - 15:30	4	0	4	876	28	904	0	0	0	10	0	10	0	0	0	0	0	0	1	0	1	0	0	0	1603	79	1682
14:45 - 15:45	5	0	5	961	36	997	0	0	0	17	0	17	0	0	0	0	0	0	0	0	0	0	0	0	1698	86	1784
15:00 - 16:00	7	0	7	1044	37	1081	0	0	0	22	0	22	0	0	0	0	0	0	0	0	0	0	0	0	1807	78	1885
15:15 - 16:15	7	0	7	1131	39	1170	0	0	0	22	0	22	0	0	0	0	0	0	0	0	0	0	0	0	1895	78	1973
15:30 - 16:30	7	0	7	1152	38	1190	0	0	0	19	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1904	73	1977
15:45 - 16:45	6	0	6	1144	32	1176	0	0	0	13	0	13	0	0	0	0	0	0	0	0	0	0	0	0	1872	69	1941
16:00 - 17:00	4	0	4	1096	25	1121	1	0	1	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	1779	59	1838
16:15 - 17:15	2	0	2	1111	22	1133	1	0	1	12	0	12	0	0	0	0	0	0	0	0	0	0	0	0	1781	57	1838
16:30 - 17:30	1	0	1	1146	21	1167	1	0	1	23	0	23	0	0	0	0	0	0	0	0	0	0	0	0	1786	53	1839
16:45 - 17:45	0	0	0	1096	17	1113	1	0	1	23	0	23	0	0	0	0	0	0	0	0	0	0	0	0	1711	43	1754
17:00 - 18:00	0	0	0	1003	19	1022	0	0	0	25	0	25	0	0	0	0	0	0	0	0	0	0	0	0	1567	42	1609

austraffic

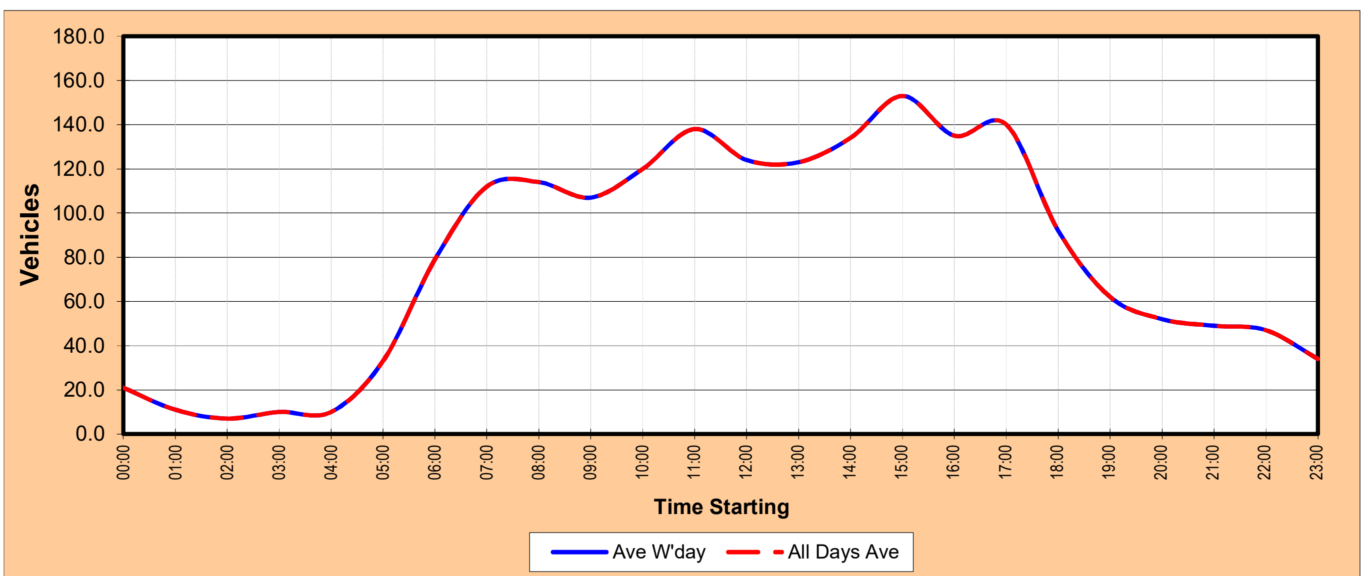
Road	Pacific Highway at the Manning River Drive/Old Bar Road interchange		
Location		Average Weekday	2203
Suburb	Taree South	All Day Average	2203
Site No.	02	Weekday Heavy's	12.2%
Start Date	Thursday 26/07/2018	All Day Heavy's	12.2%
Direction	Two ways		

Starting Time	Day of Week							Ave W'day	All Days Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
				26-Jul					
AM Peak				**214**					
PM Peak				**185**					
00:00				16				16	16
01:00				19				19	19
02:00				9				9	9
03:00				21				21	21
04:00				13				13	13
05:00				47				47	47
06:00				103				103	103
07:00				129				129	129
08:00				214				214	214
09:00				134				134	134
10:00				144				144	144
11:00				103				103	103
12:00				131				131	131
13:00				138				138	138
14:00				185				185	185
15:00				155				155	155
16:00				160				160	160
17:00				130				130	130
18:00				74				74	74
19:00				44				44	44
20:00				68				68	68
21:00				52				52	52
22:00				71				71	71
23:00				43				43	43
Total				**2203**				**2203**	**2203**
% Heavies				**12.2%**				**12.2%**	**12.2%**



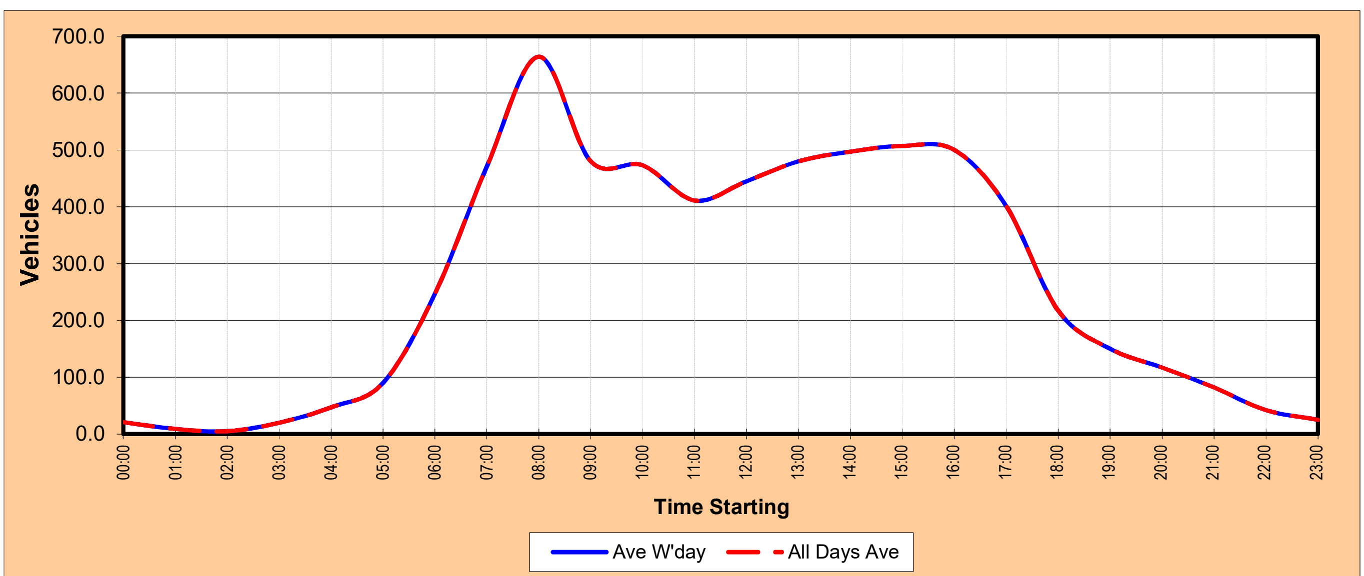
Road	Pacific Highway at the Manning River Drive/Old Bar Road interchange		
Location		Average Weekday	1907
Suburb	Taree South	All Day Average	1907
Site No.	03	Weekday Heavy's	10.5%
Start Date	Thursday 26/07/2018	All Day Heavy's	10.5%
Direction	Two ways		

Starting Time	Mon	Tue	Wed	Thu 26-Jul	Fri	Sat	Sun	Ave W'day	All Days Ave
				Day of Week					
AM Peak				**138**					
PM Peak				**153**					
00:00				21				21	21
01:00				11				11	11
02:00				7				7	7
03:00				10				10	10
04:00				10				10	10
05:00				33				33	33
06:00				79				79	79
07:00				112				112	112
08:00				114				114	114
09:00				107				107	107
10:00				120				120	120
11:00				138				138	138
12:00				124				124	124
13:00				123				123	123
14:00				134				134	134
15:00				153				153	153
16:00				135				135	135
17:00				140				140	140
18:00				92				92	92
19:00				62				62	62
20:00				52				52	52
21:00				49				49	49
22:00				47				47	47
23:00				34				34	34
Total				**1907**				**1907**	**1907**
% Heavies				**10.5%**				**10.5%**	**10.5%**



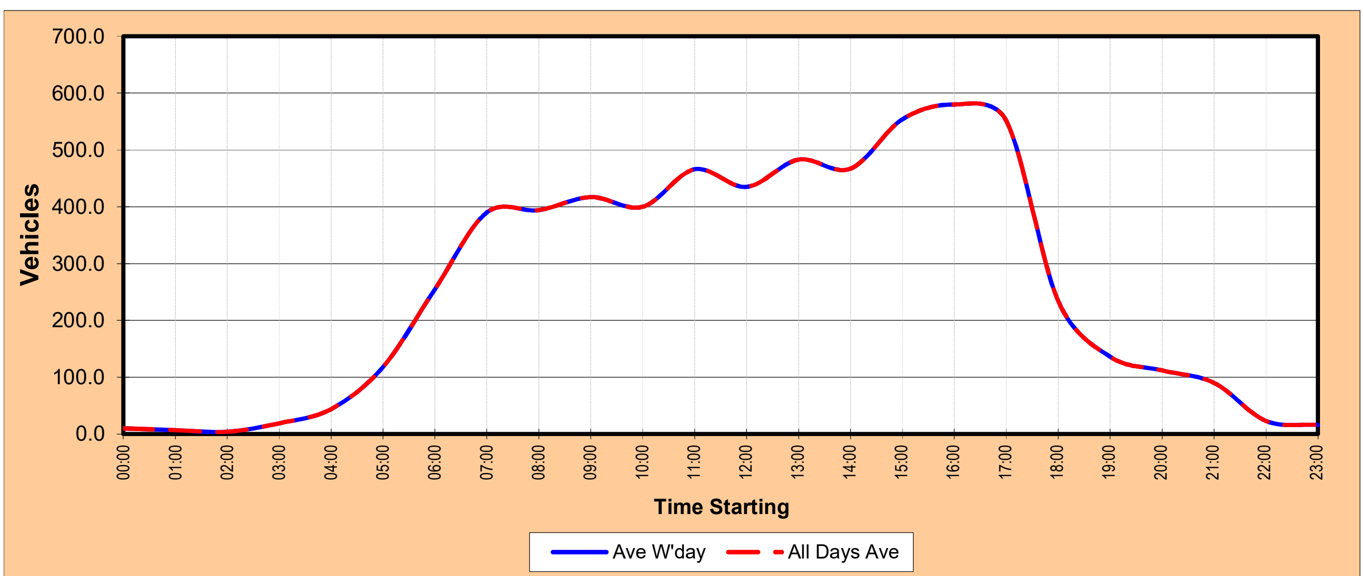
Road	Pacific Highway at the Manning River Drive/Old Bar Road interchange		
Location		Average Weekday	6401
Suburb	Taree South	All Day Average	6401
Site No.	01	Weekday Heavy's	8.7%
Start Date	Thursday 26/07/2018	All Day Heavy's	8.7%
Direction	Two ways		

Starting Time	Day of Week Mon	Tue	Wed	Thu 26-Jul	Fri	Sat	Sun	Ave W'day	All Days Ave
AM Peak				**664**					
PM Peak				**507**					
00:00				21				21	21
01:00				9				9	9
02:00				5				5	5
03:00				20				20	20
04:00				47				47	47
05:00				90				90	90
06:00				247				247	247
07:00				471				471	471
08:00				664				664	664
09:00				480				480	480
10:00				473				473	473
11:00				411				411	411
12:00				445				445	445
13:00				480				480	480
14:00				497				497	497
15:00				507				507	507
16:00				500				500	500
17:00				401				401	401
18:00				217				217	217
19:00				150				150	150
20:00				117				117	117
21:00				82				82	82
22:00				42				42	42
23:00				25				25	25
Total				**6401**				**6401**	**6401**
% Heavies				**8.7%**				**8.7%**	**8.7%**



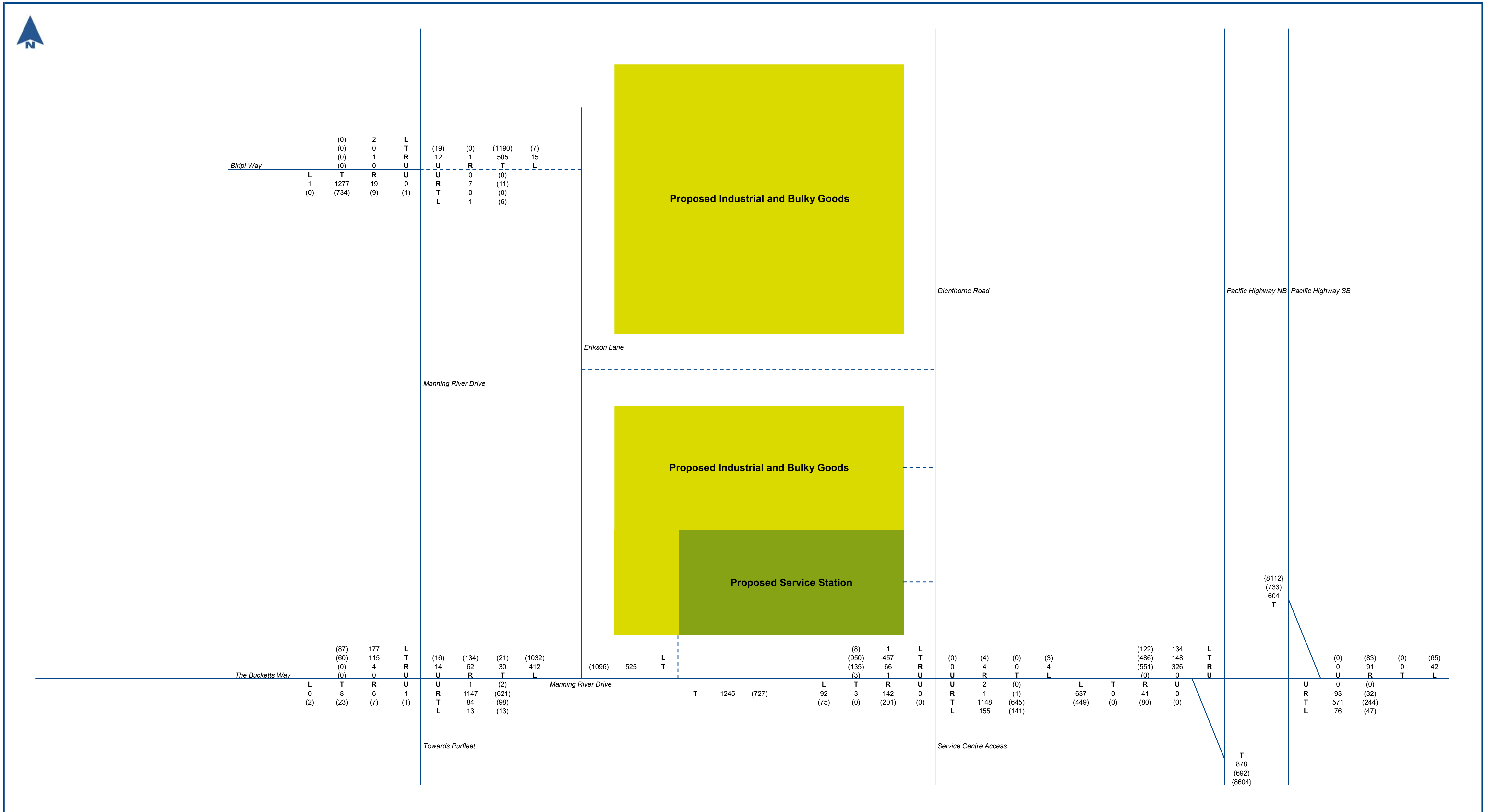
Road	Pacific Highway at the Manning River Drive/Old Bar Road interchange				
Location		Average Weekday	6205		
Suburb	Taree South	All Day Average	6205		
Site No.	04	Weekday Heavy's	10.1%		
Start Date	Thursday 26/07/2018	All Day Heavy's	10.1%		
Direction	Two ways				

Starting Time	**Day of Week** Mon	Tue	Wed	Thu	Fri	Sat	Sun	**Ave W'day**	**All Days Ave**
				26-Jul					
AM Peak				**466**					
PM Peak				**580**					
00:00				10				10	10
01:00				7				7	7
02:00				4				4	4
03:00				19				19	19
04:00				44				44	44
05:00				118				118	118
06:00				255				255	255
07:00				390				390	390
08:00				394				394	394
09:00				417				417	417
10:00				400				400	400
11:00				466				466	466
12:00				435				435	435
13:00				483				483	483
14:00				467				467	467
15:00				554				554	554
16:00				580				580	580
17:00				551				551	551
18:00				234				234	234
19:00				136				136	136
20:00				112				112	112
21:00				90				90	90
22:00				23				23	23
23:00				16				16	16
Total				**6205**				**6205**	**6205**
% Heavies				**10.1%**				**10.1%**	**10.1%**



APPENDIX C

Assessed Traffic Volumes



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

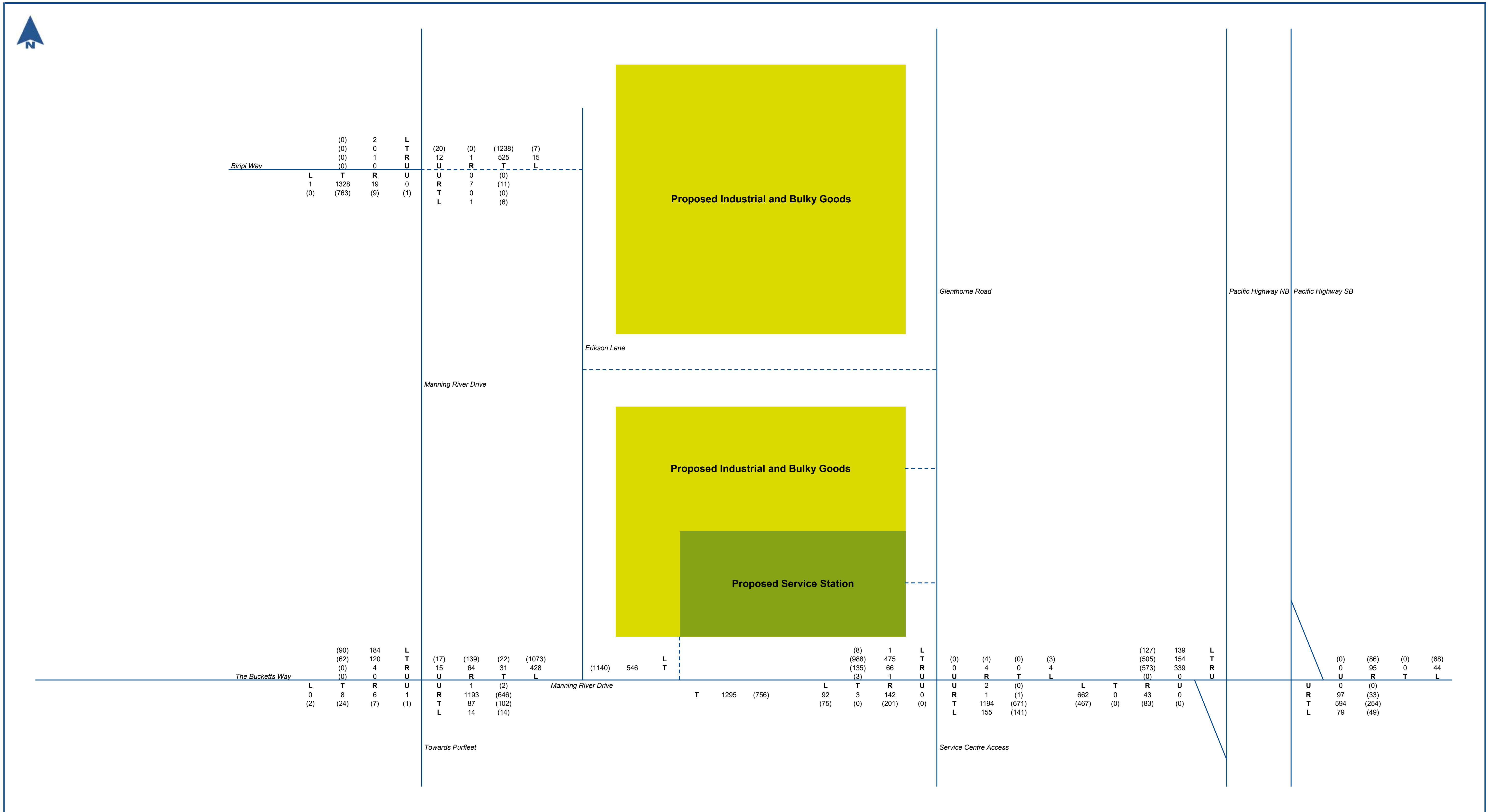
Figure: A1

2018 Total Survey Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	**00**	Weekday AM Peak Hour Volumes
T	Through	**(00)**	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A2

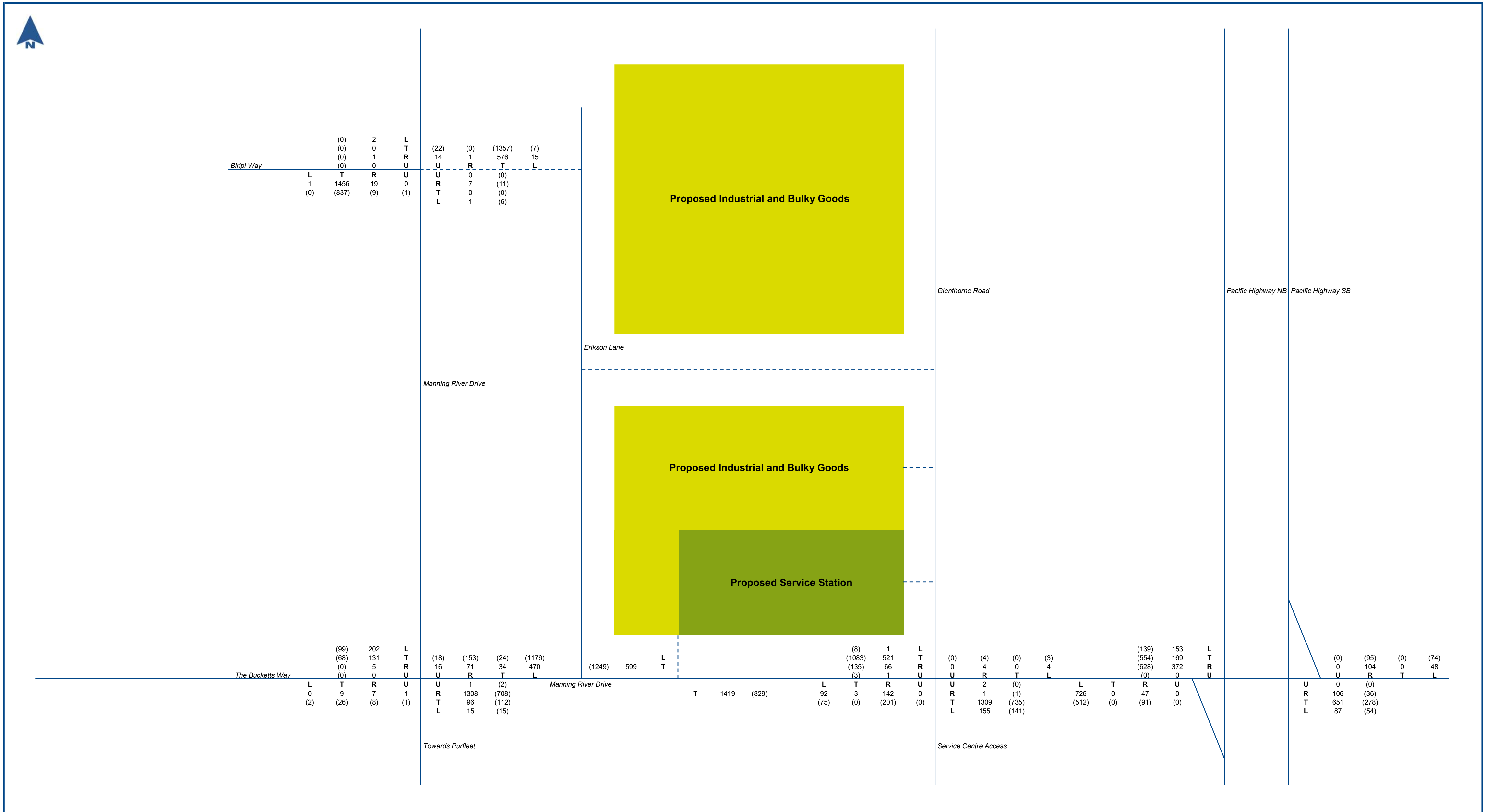
2020 Total Traffic Volumes (Traffic Growth)

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

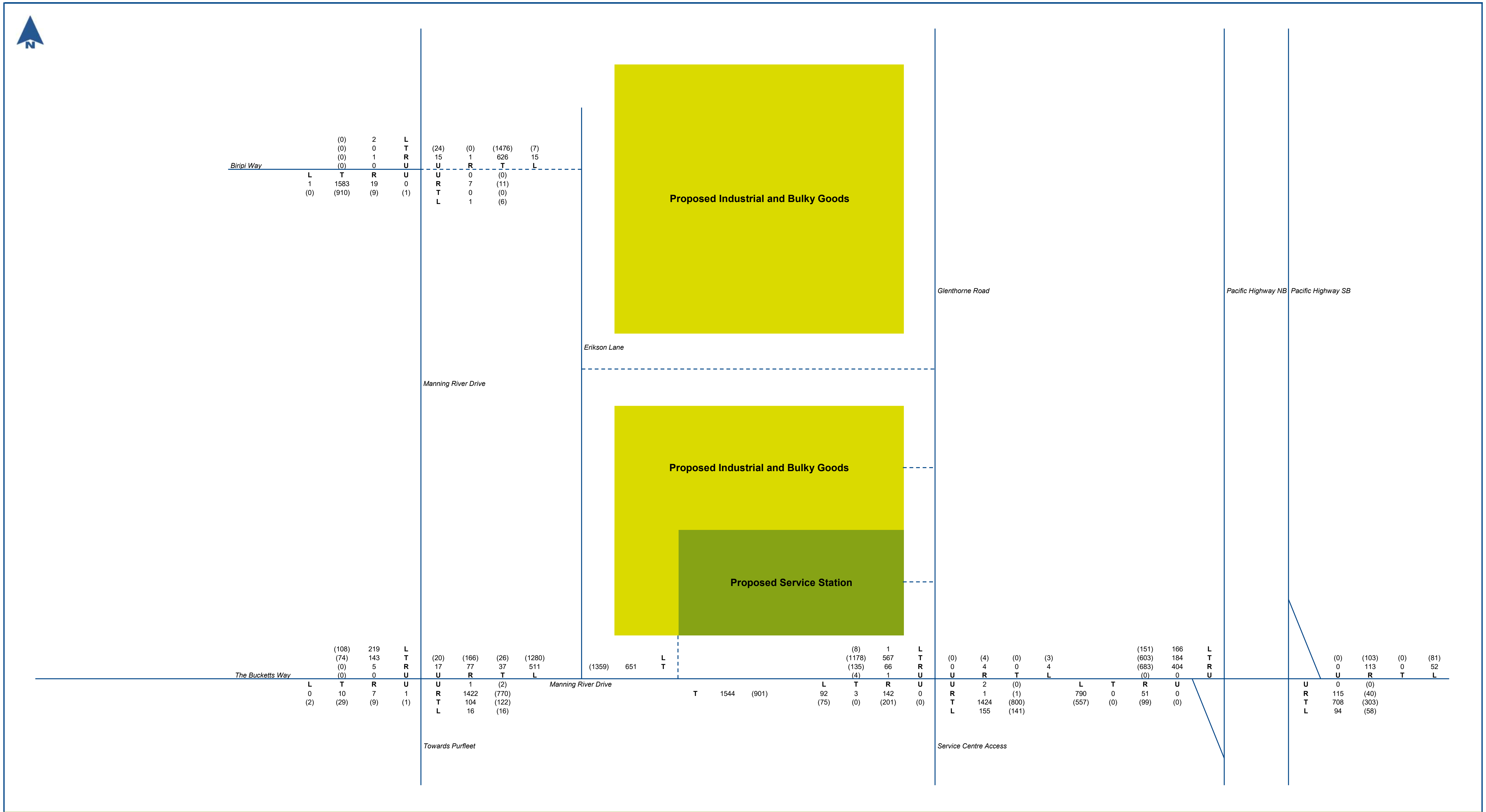
Figure: A3

2025 Total Traffic Volumes (Traffic Growth)

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A4

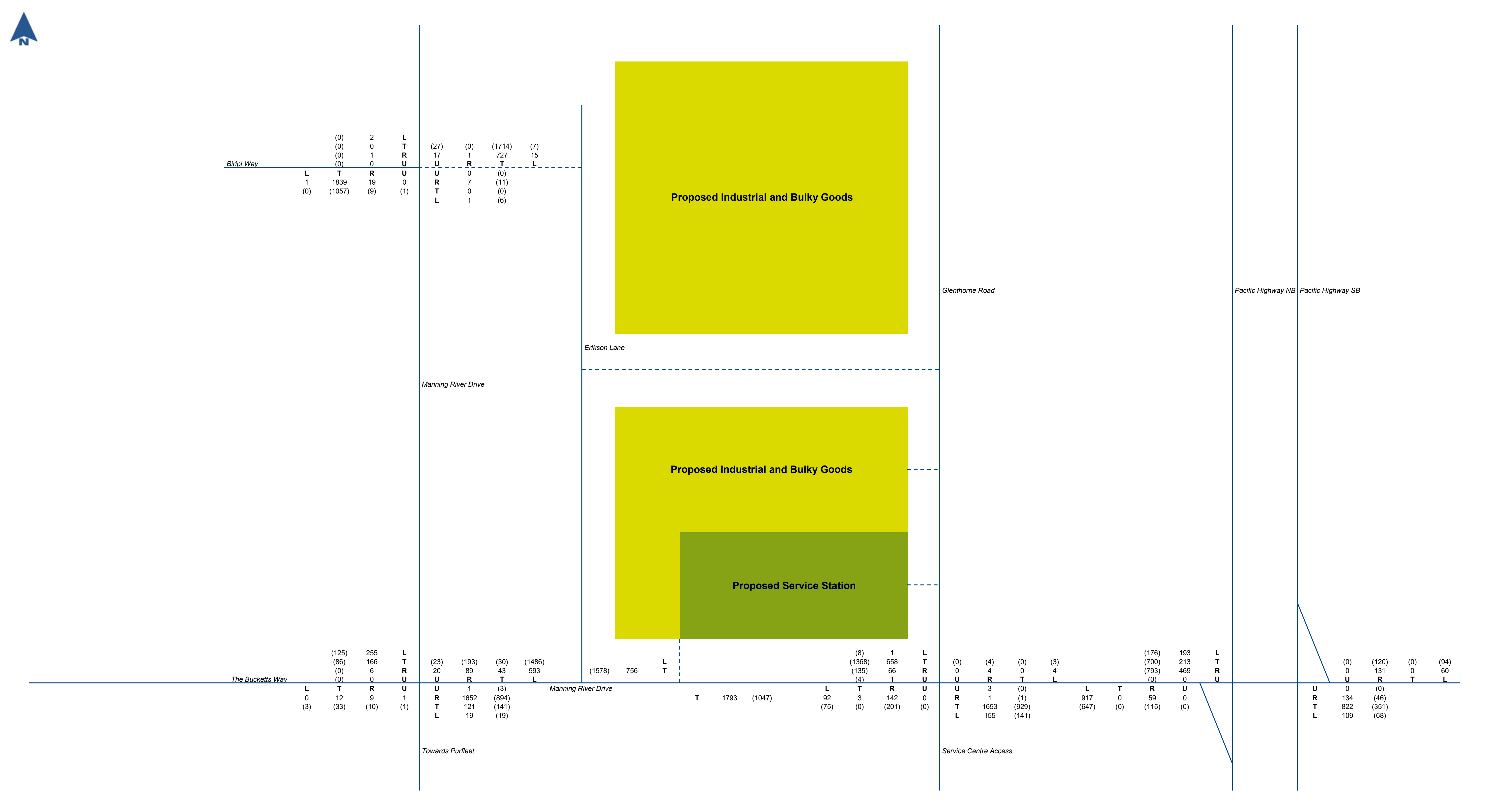
2030 Total Traffic Volumes (Traffic Growth)

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A5

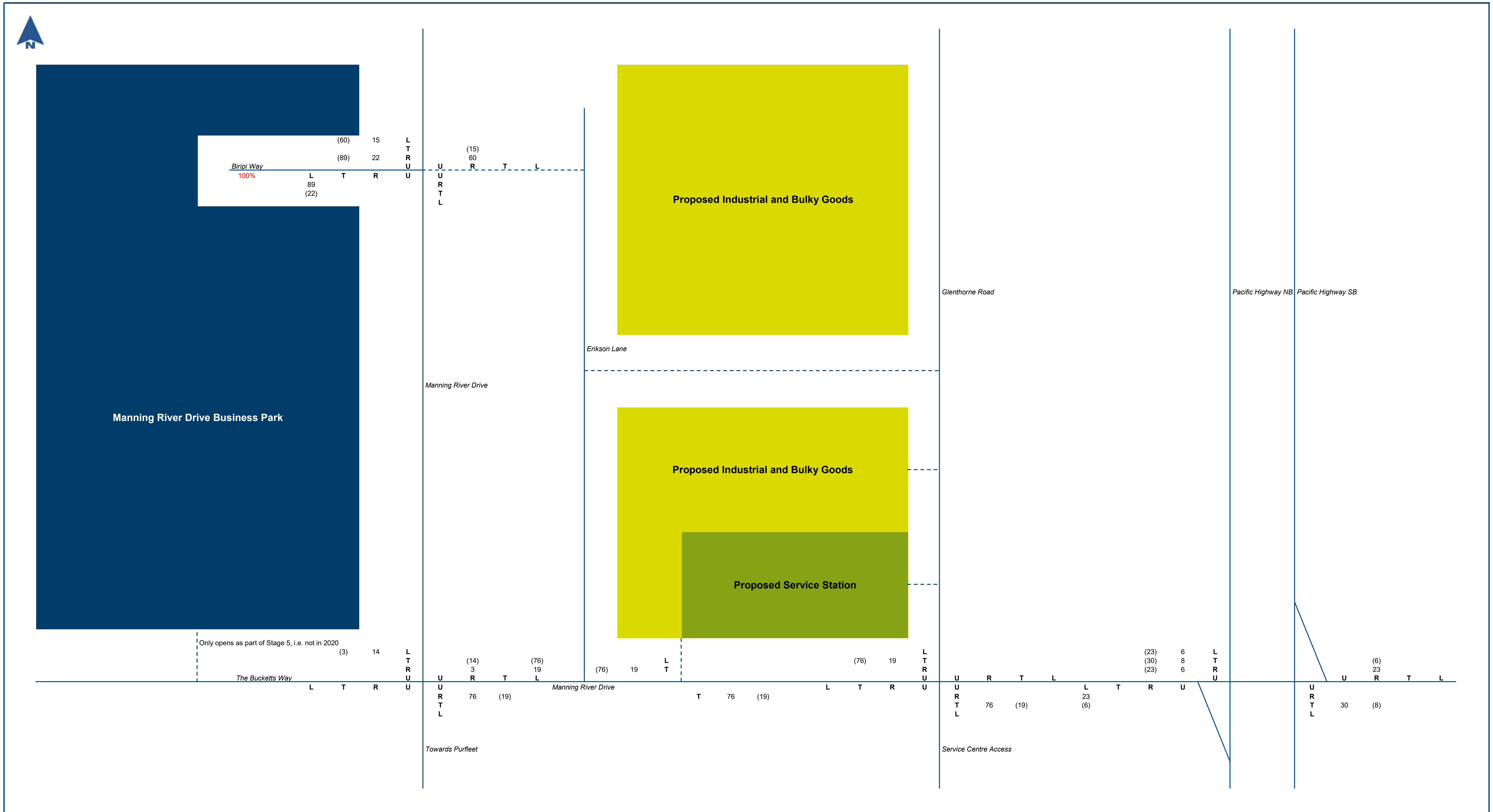
2040 Total Traffic Volumes (Traffic Growth)

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A6

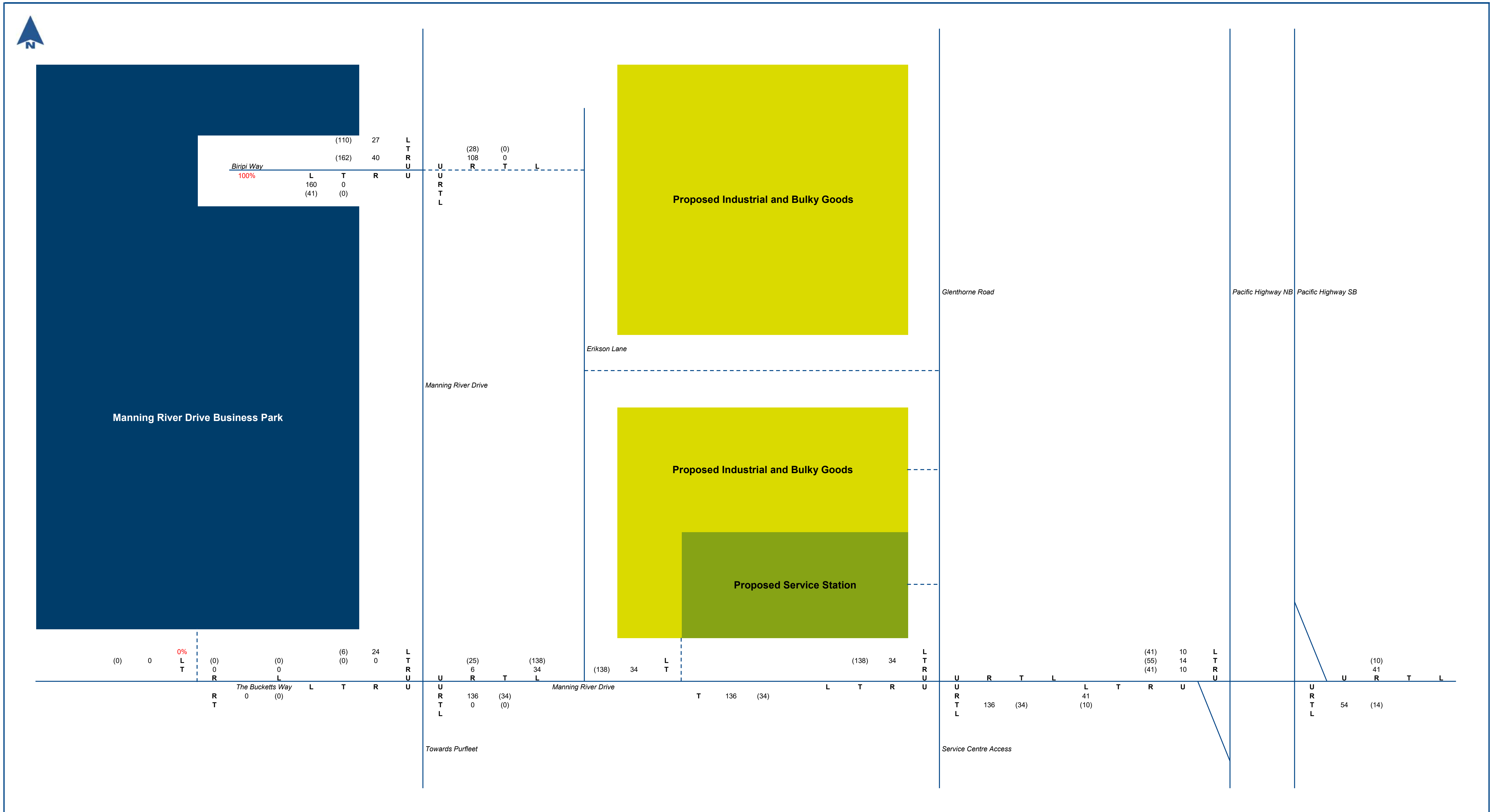
2020 Traffic Generation: Background Development

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn
T	Through
R	Right turn
U	U-turn

00 Weekday AM Peak Hour Volumes

(00) Weekday PM Peak Hour Volumes

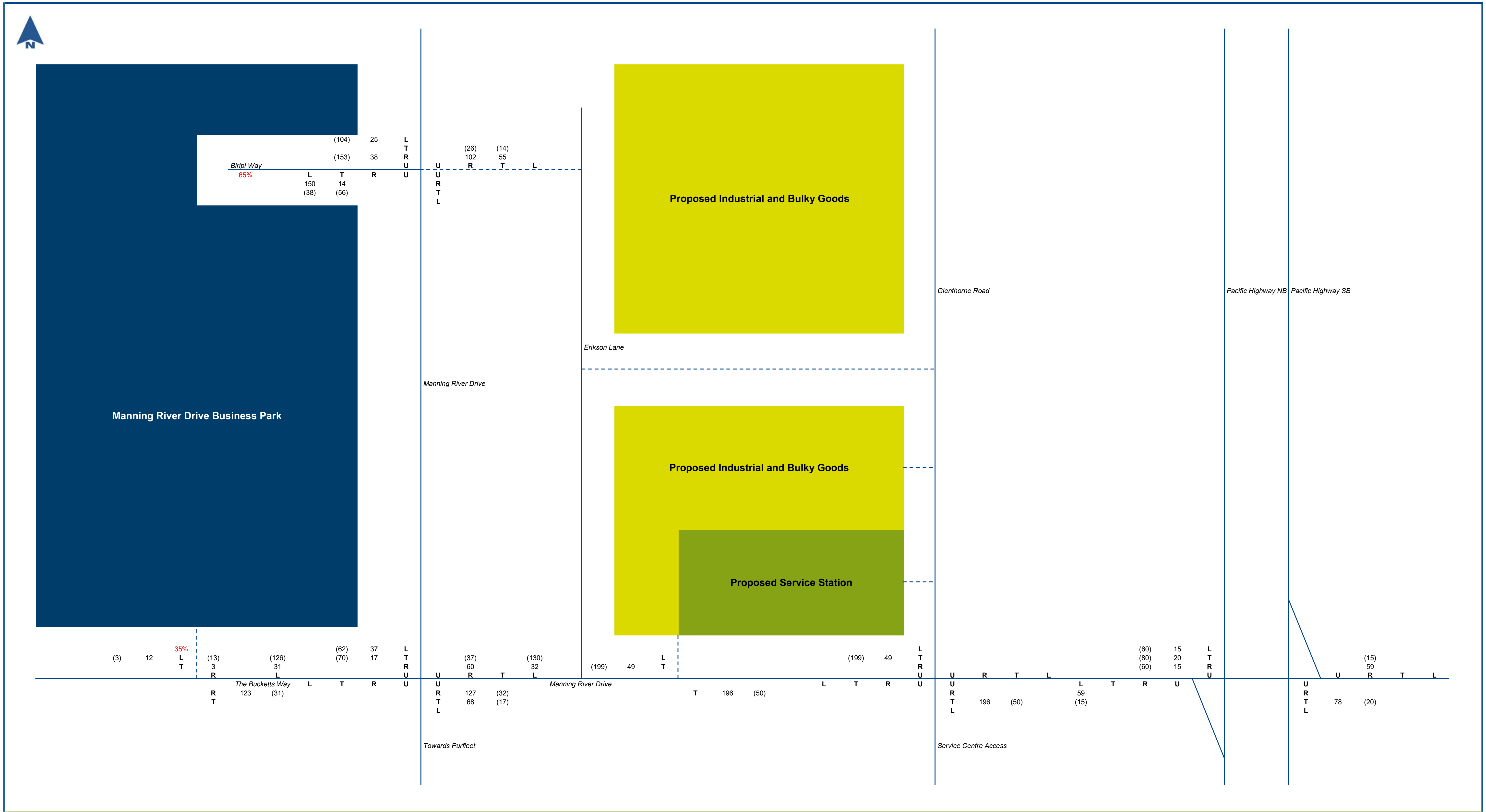
Figure: A7

2025 Traffic Generation: Background Development

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A8

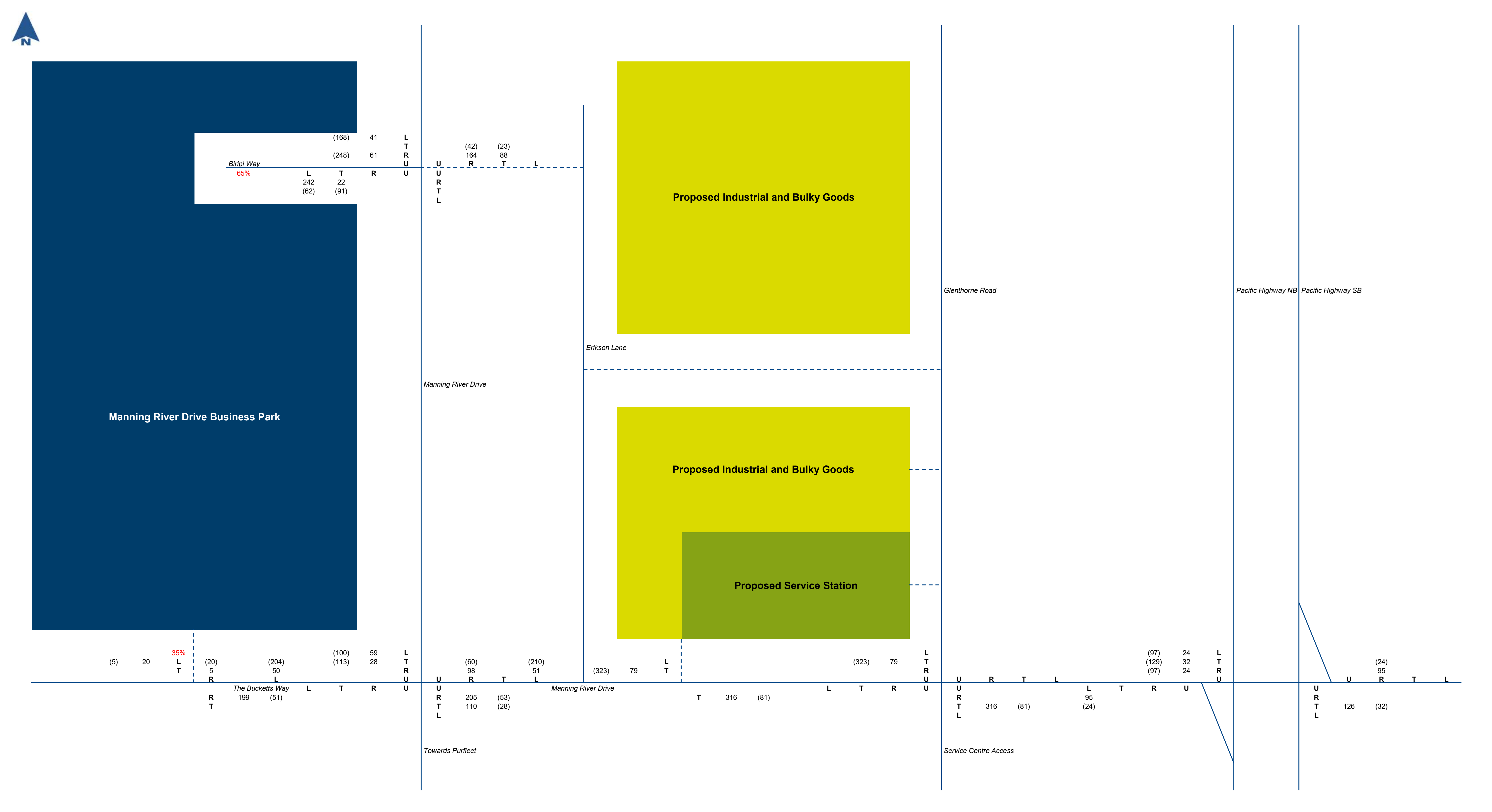
2030 Traffic Generation: Background Development

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

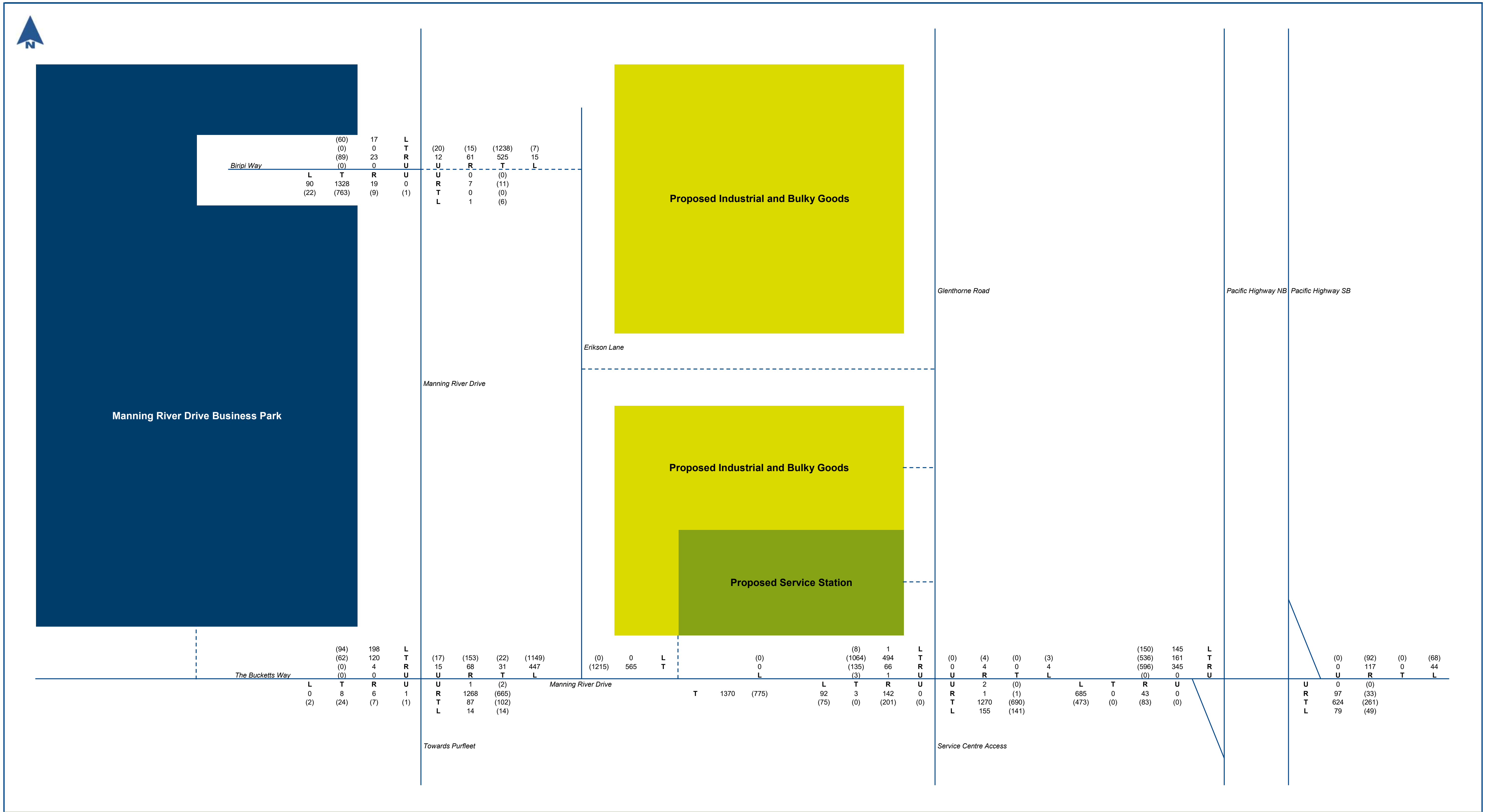
Figure: A9

2040 Traffic Generation: Background Development

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L Left Turn
T Through
R Right turn
U U-turn

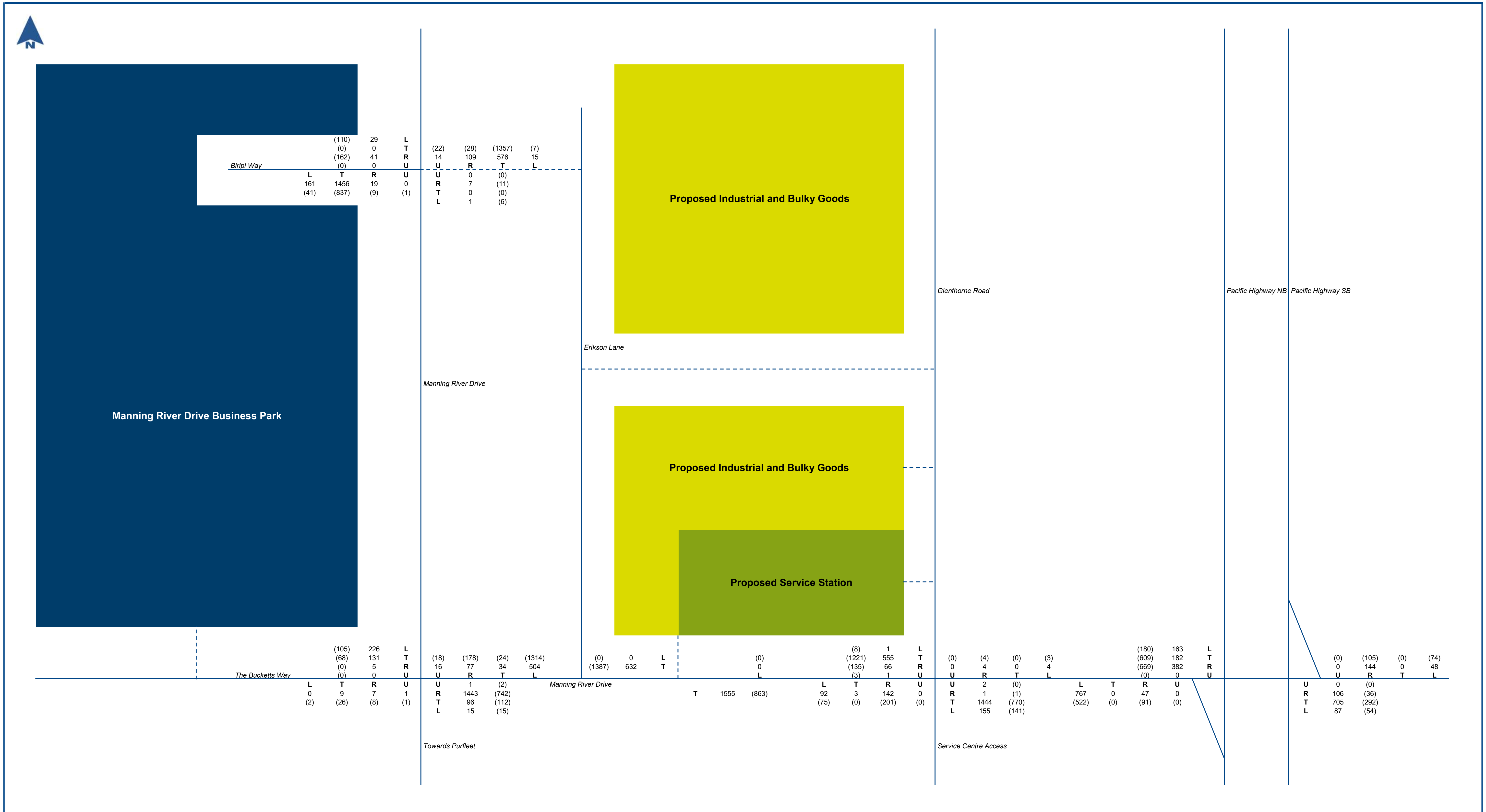
00 Weekday AM Peak Hour Volumes
(00) Weekday PM Peak Hour Volumes

Figure: A10

2020 All Background Traffic Volumes

620.12373
Taree Glenthorne Service Station and Industrial
08/11/2018

SLR



Legend

L	Left Turn	**00**	Weekday AM Peak Hour Volumes
T	Through	**(00)**	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A11

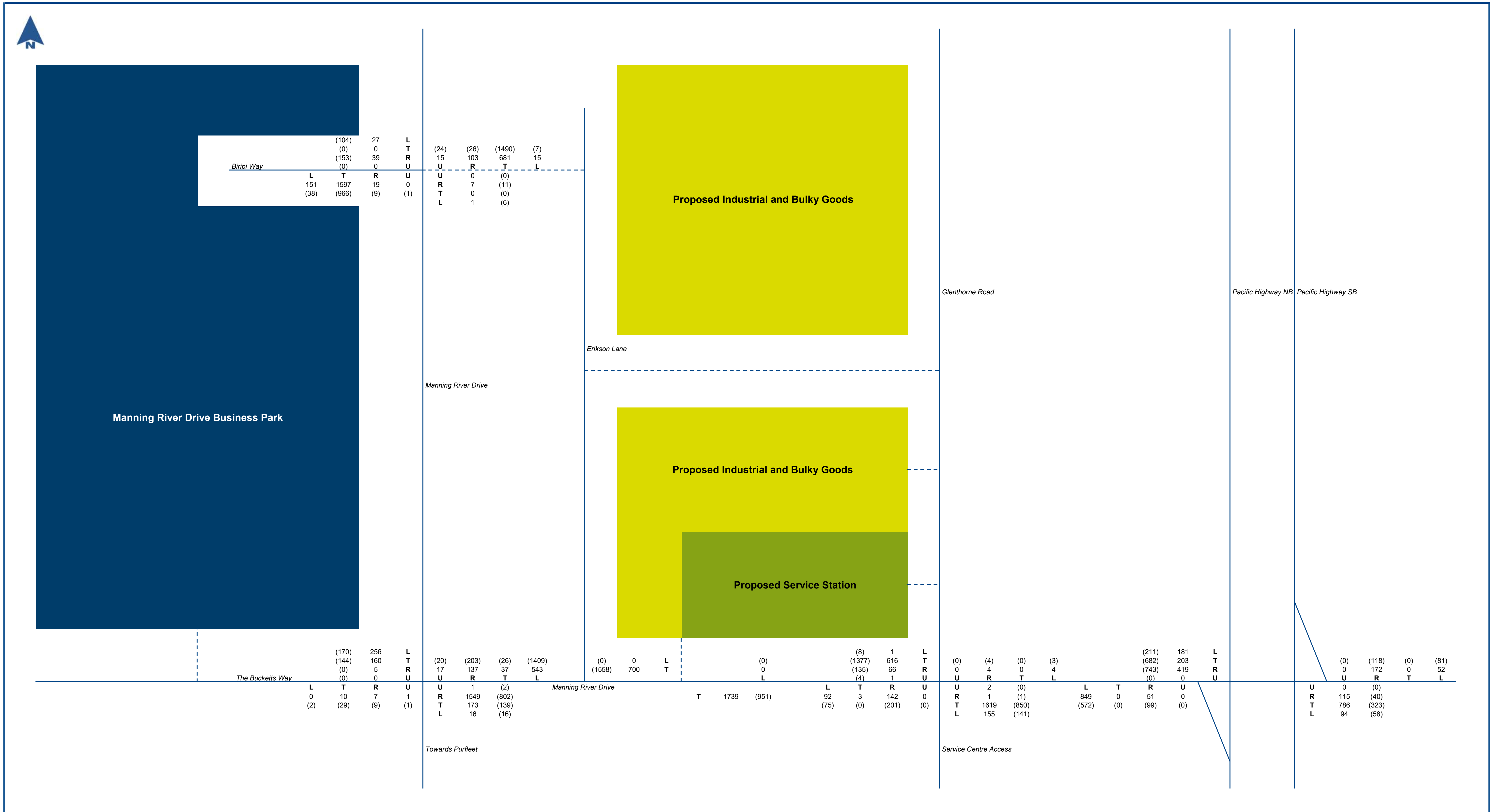
2025 All Background Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A12

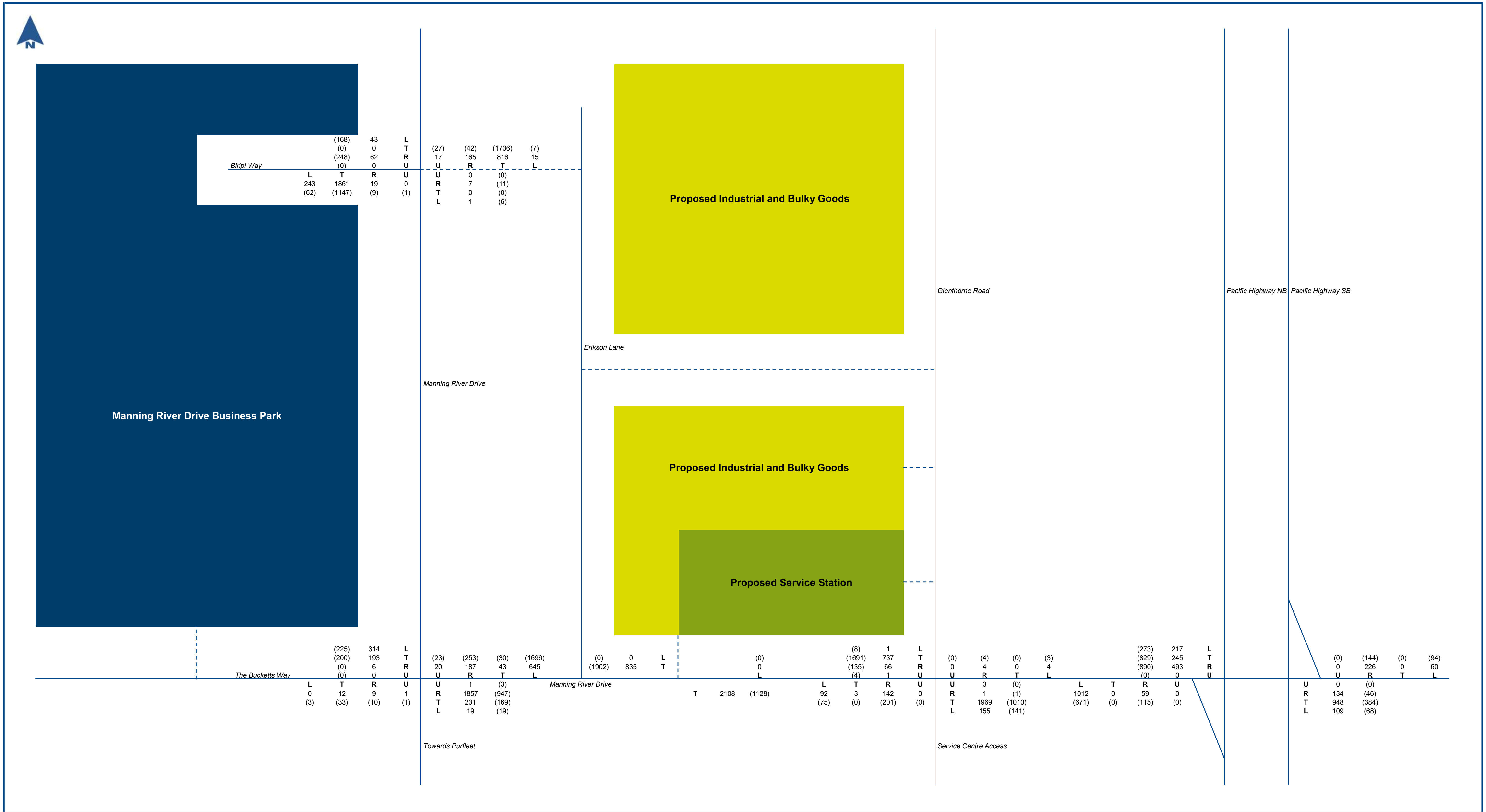
2030 All Background Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn
T	Through
R	Right turn
U	U-turn

00 Weekday AM Peak Hour Volumes

(00) Weekday PM Peak Hour Volumes

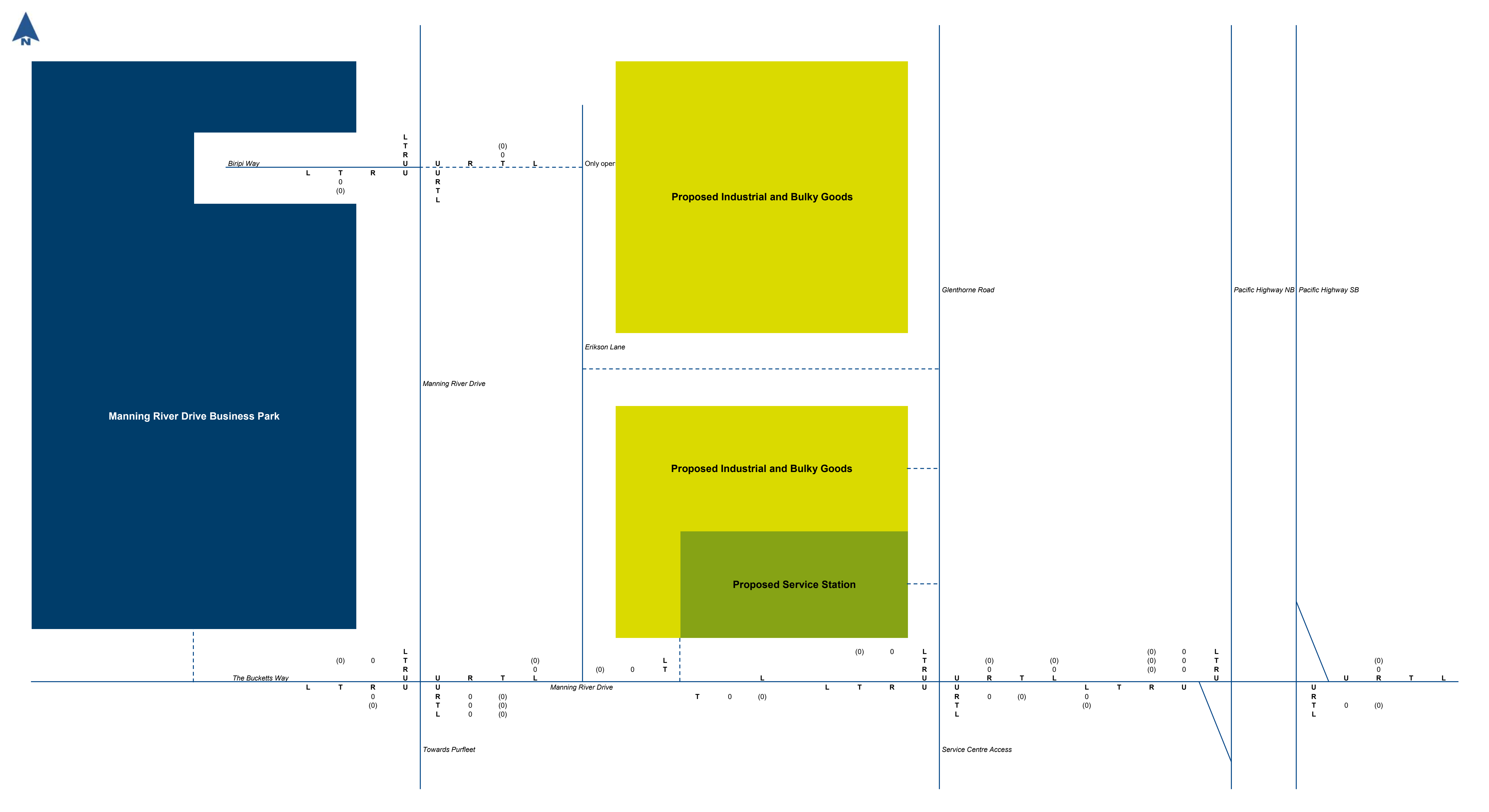
Figure: A13

2040 All Background Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A14

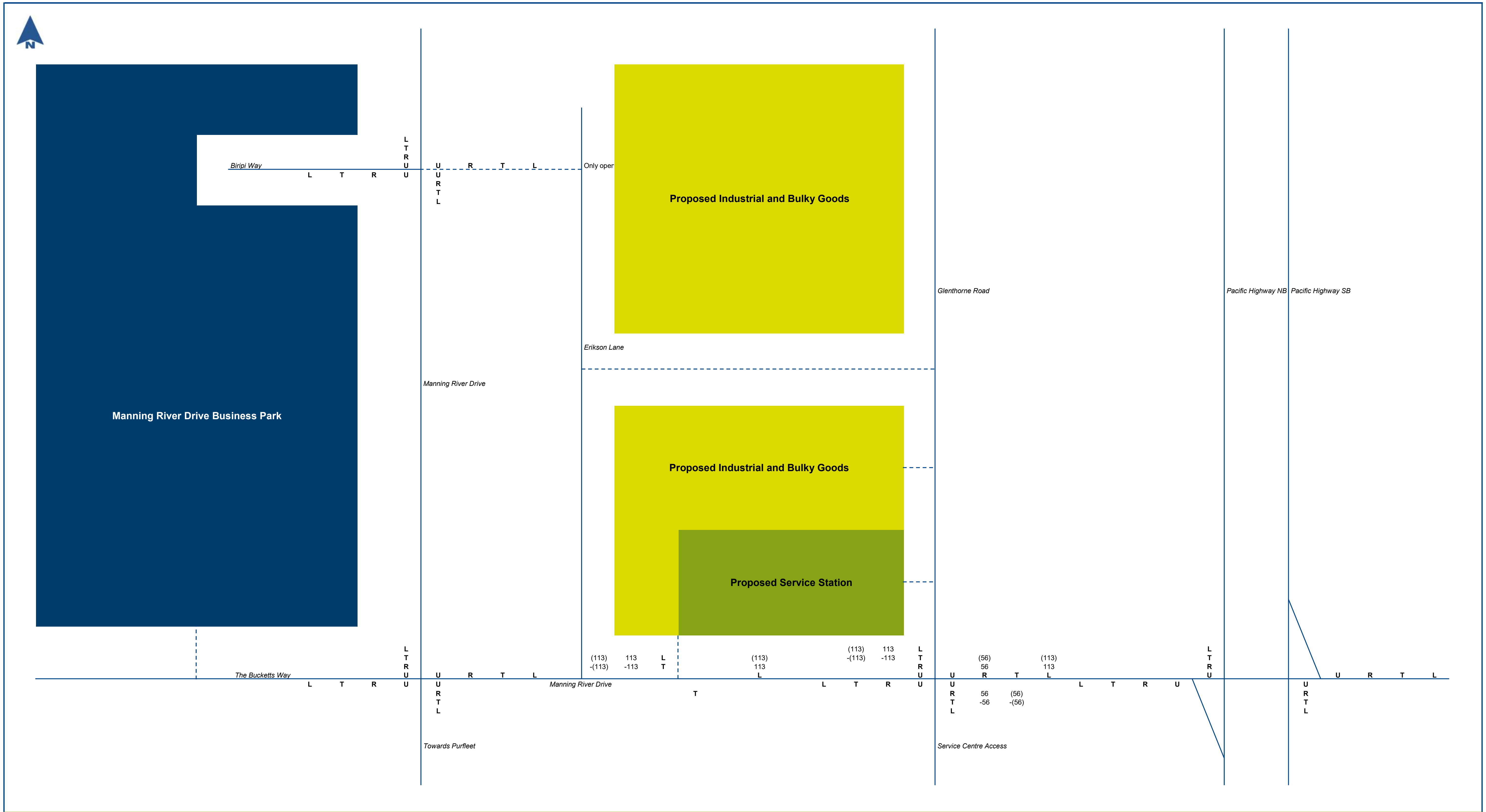
2020 Industrial and Bulky Goods Develoment Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A15

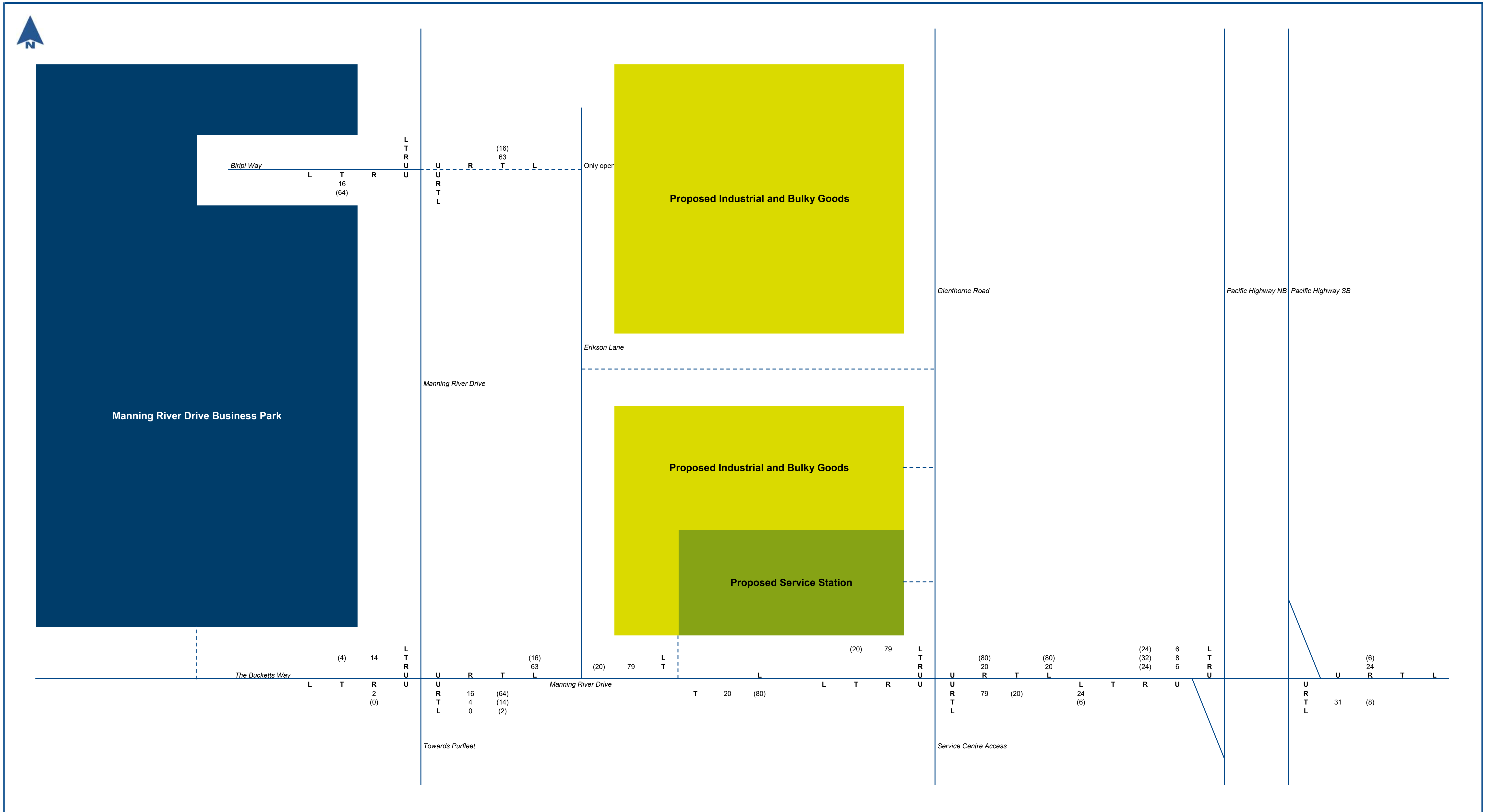
2020 Service Station Development Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00**	Weekday AM Peak Hour Volumes
T	Through	**(00)**	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

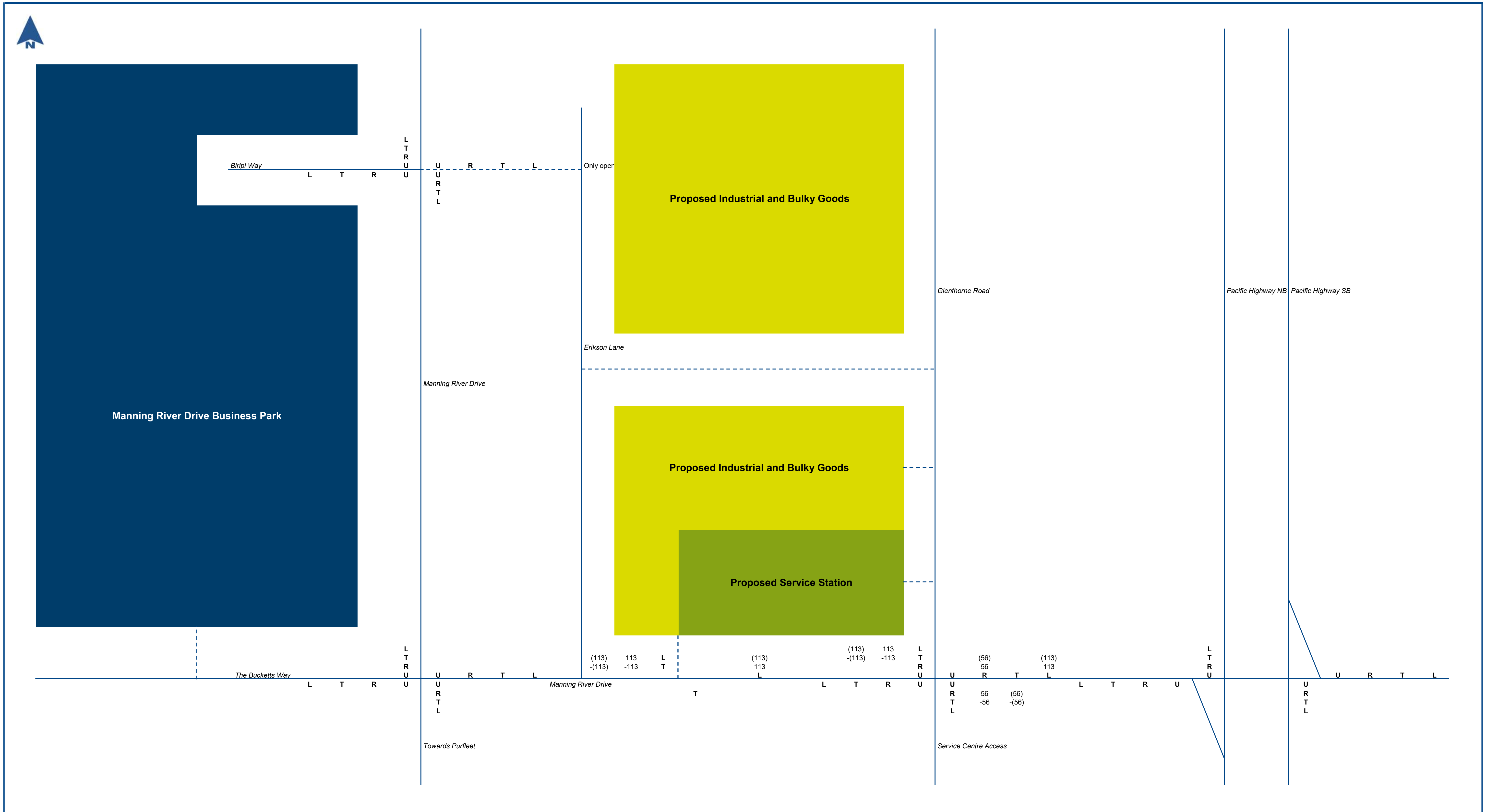
Figure: A16

2025 Industrial and Bulky Goods Develoment Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

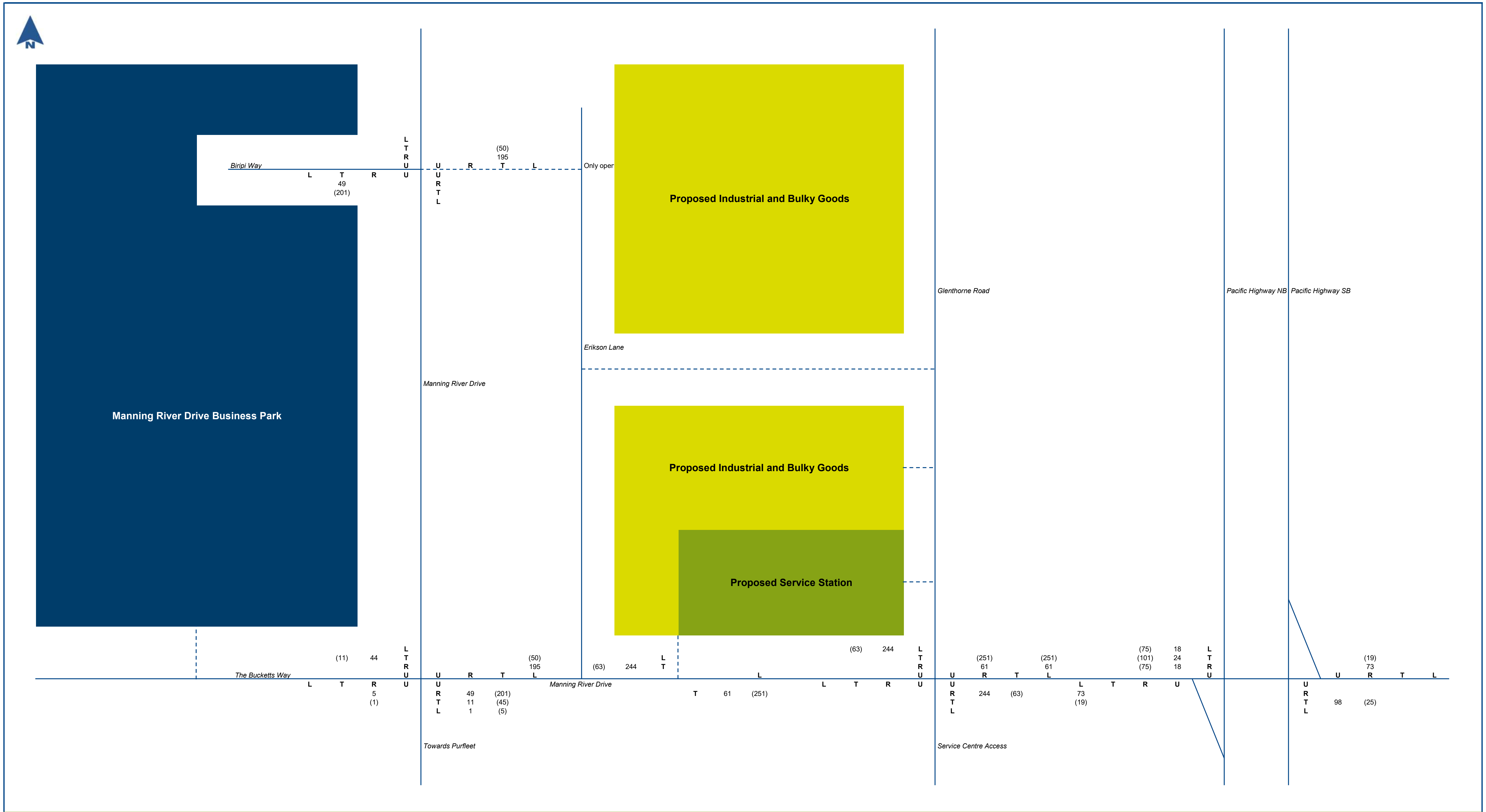
Figure: A17

2025 Service Station Development Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L Left Turn

T Through

R Right turn

U U-turn

00 Weekday AM Peak Hour Volumes

(00) Weekday PM Peak Hour Volumes

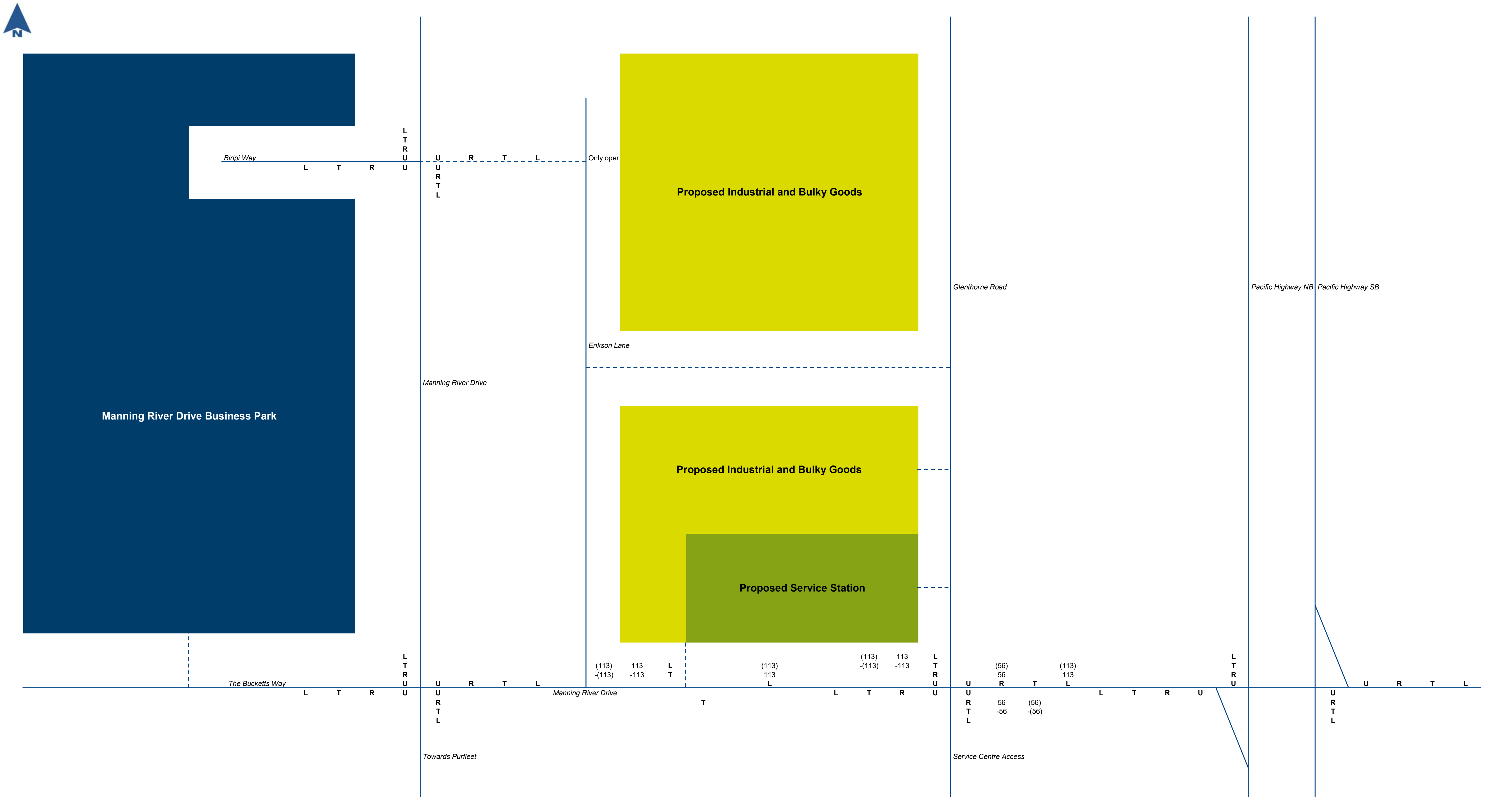
Figure: A18

2030 Industrial and Bulky Goods Develoment Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

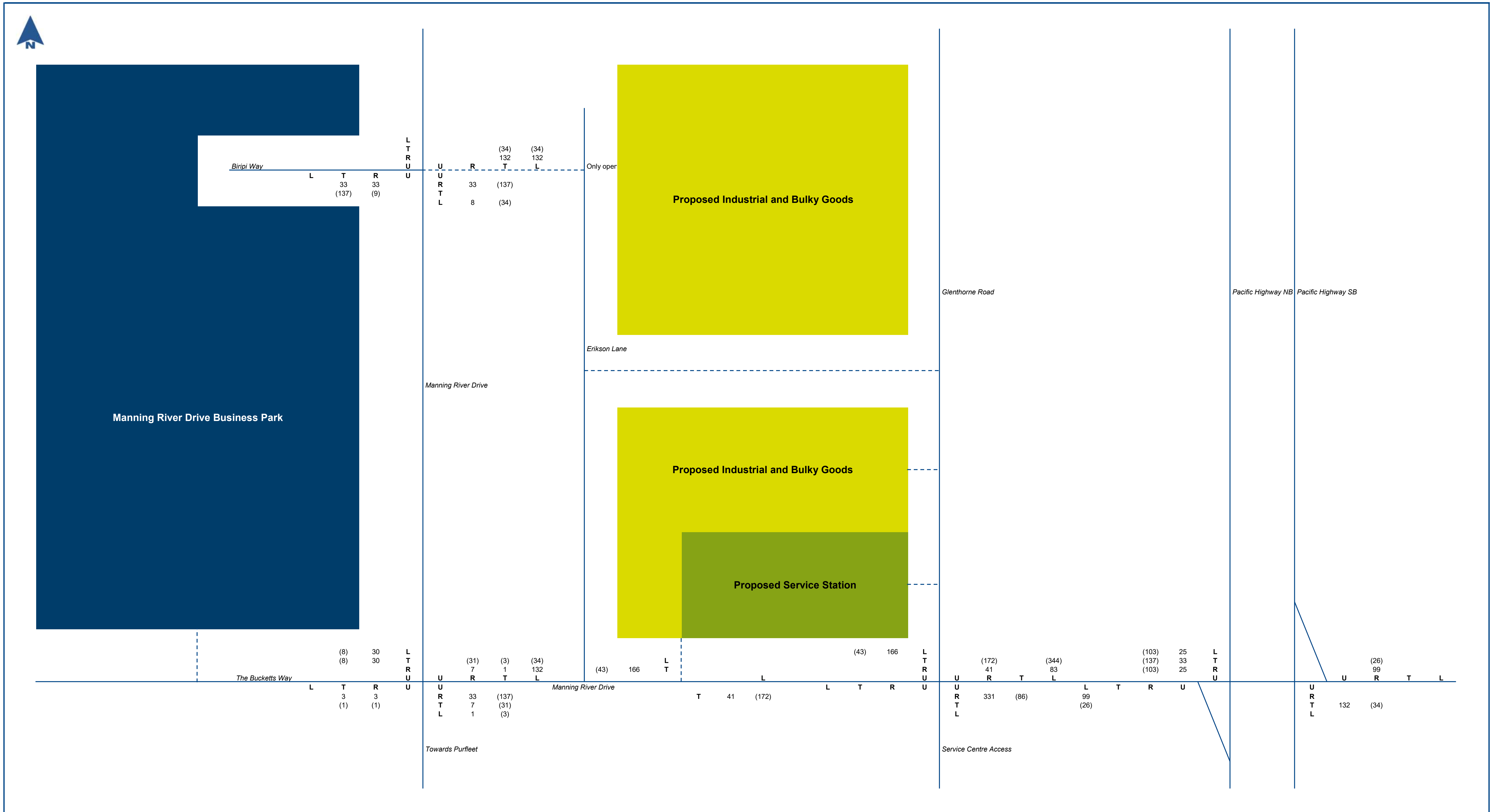
Figure: A19

2030 Service Station Development Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn
T	Through
R	Right turn
U	U-turn

00 Weekday AM Peak Hour Volumes
(00) Weekday PM Peak Hour Volumes

Figure: A20

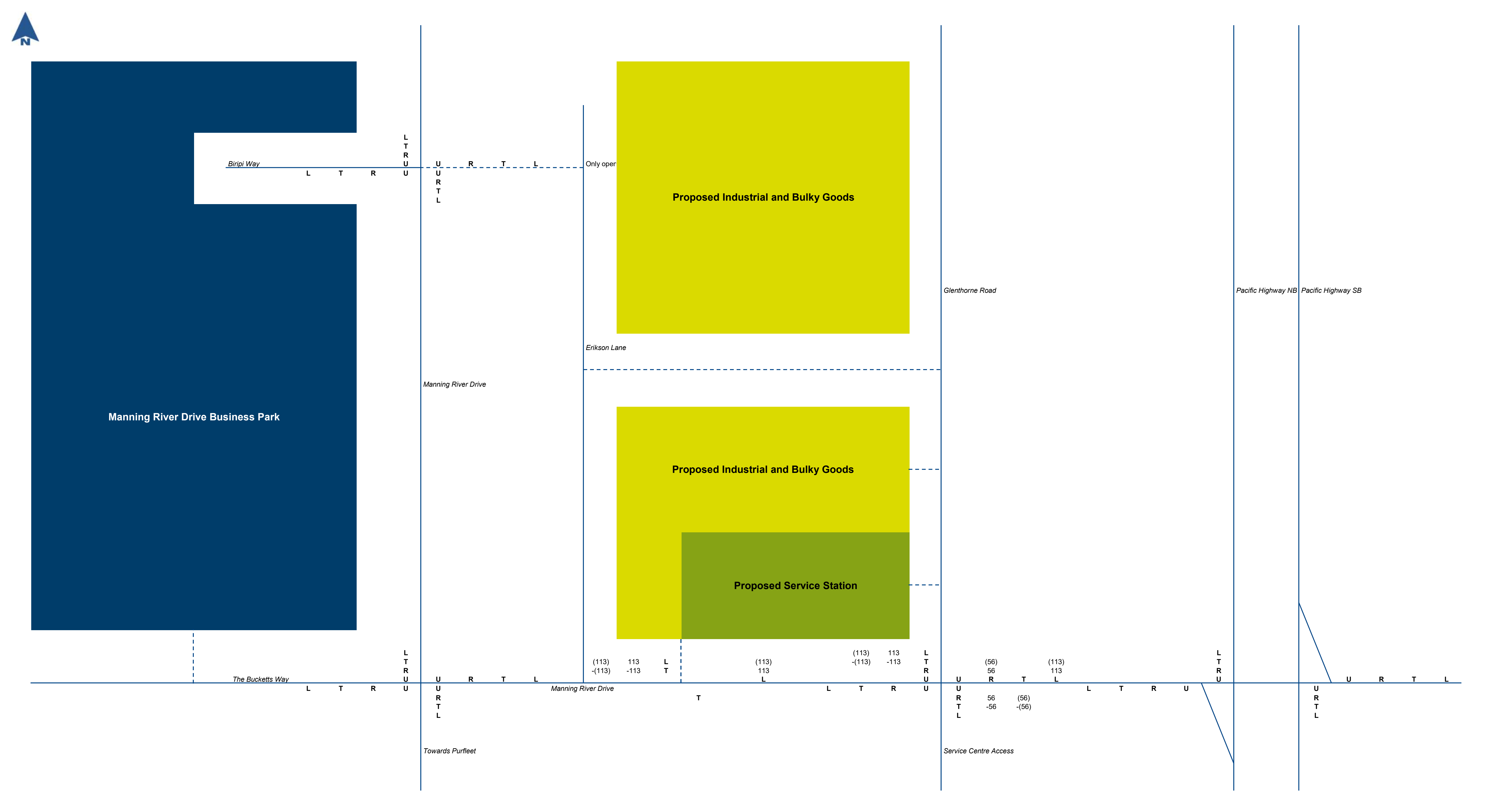
2040 Industrial and Bulky Goods Develoment Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

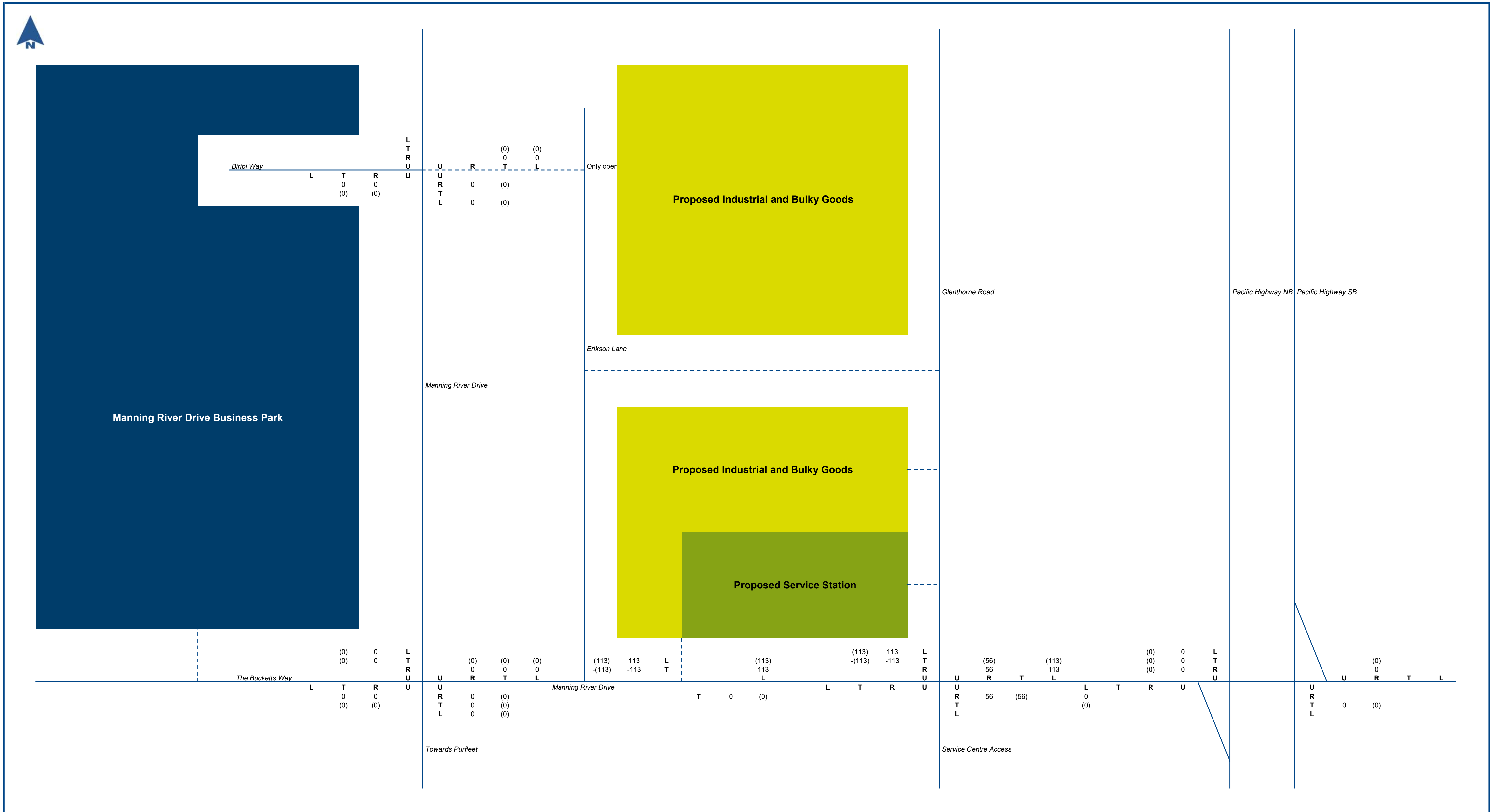
Figure: A21

2040 Service Station Development Traffic

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn
T	Through
R	Right turn
U	U-turn

00 Weekday AM Peak Hour Volumes

(00) Weekday PM Peak Hour Volumes

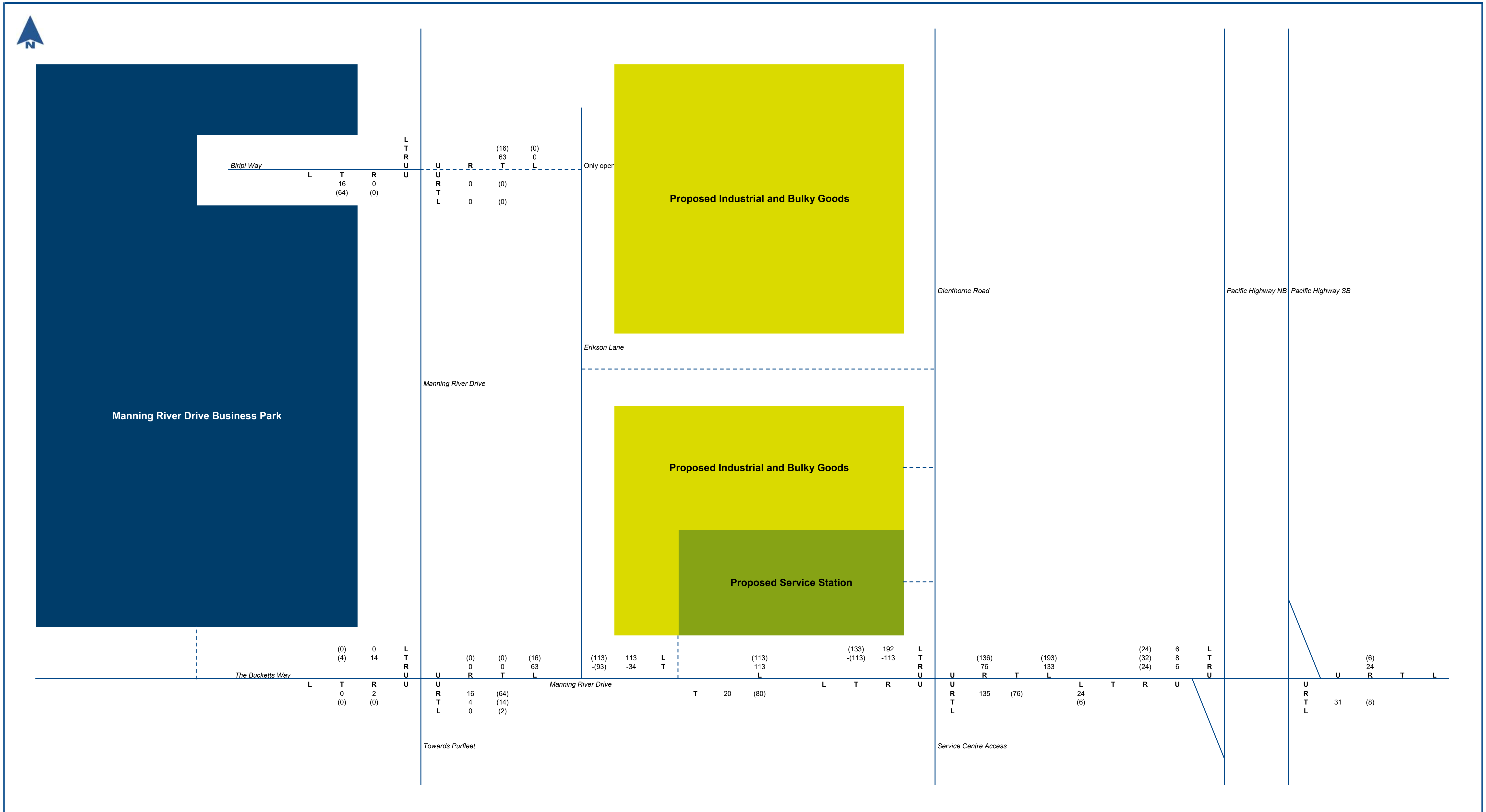
Figure: A22

2020 Total Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn	00	Weekday AM Peak Hour Volumes
T	Through	(00)	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

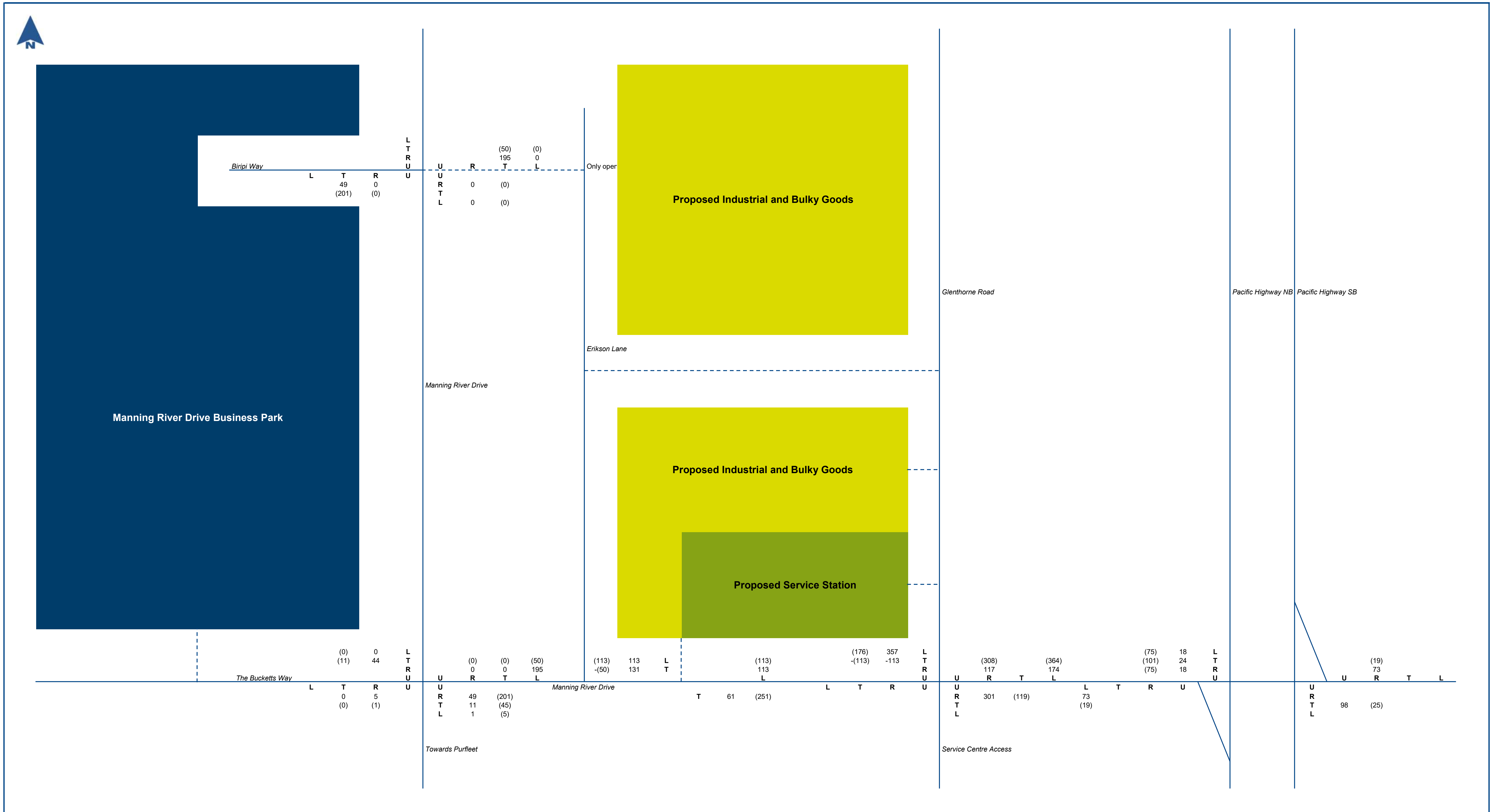
Figure: A23

2025 Total Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018



Legend

L	Left Turn
T	Through
R	Right turn
U	U-turn

00 Weekday AM Peak Hour Volumes

(00) Weekday PM Peak Hour Volumes

Figure: A24

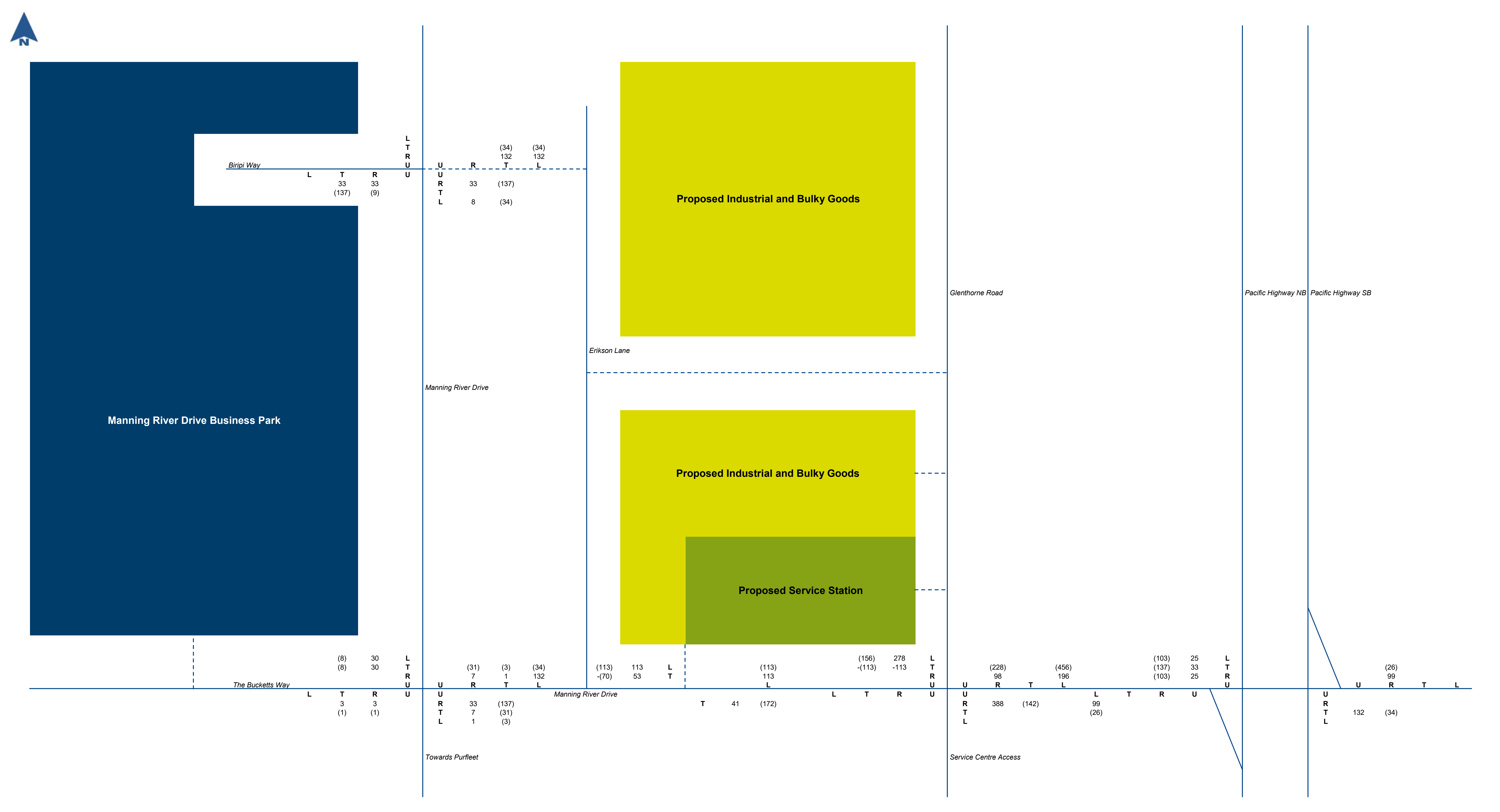
2030 Total Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00**	Weekday AM Peak Hour Volumes
T	Through	**(00)**	Weekday PM Peak Hour Volumes
R	Right turn		
U	U-turn		

Figure: A25

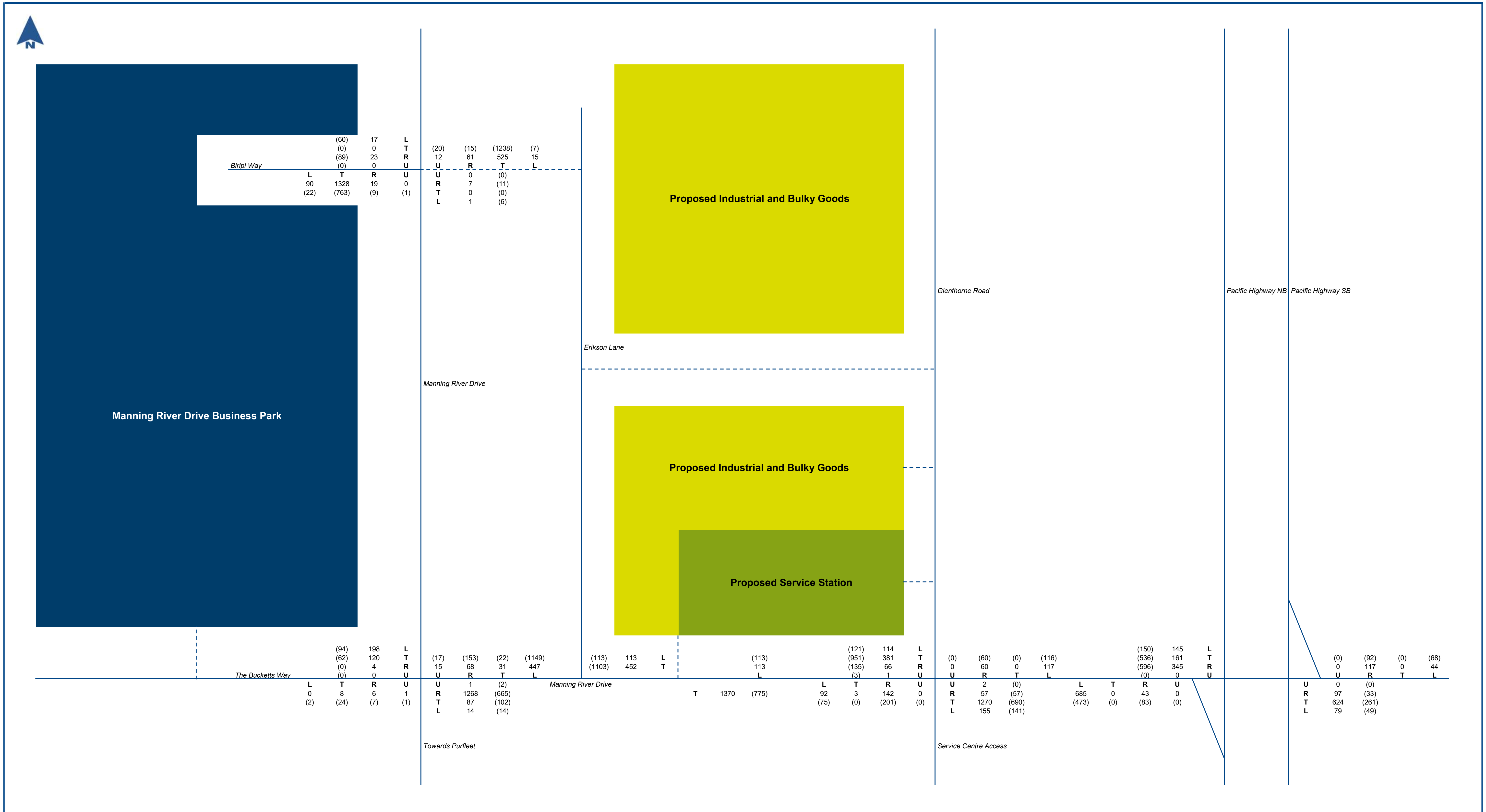
2040 Total Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A26

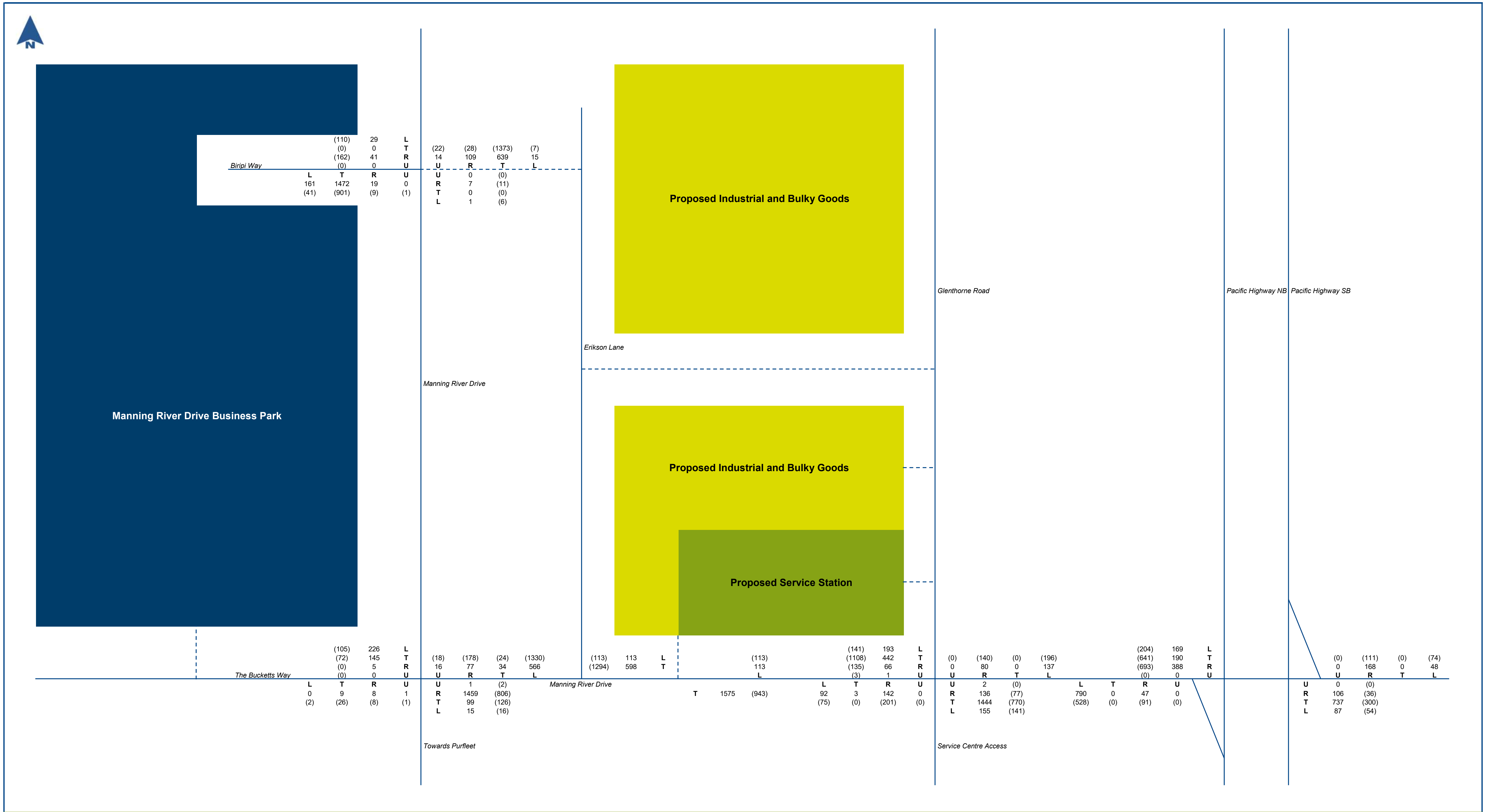
2020 All Background plus Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A27

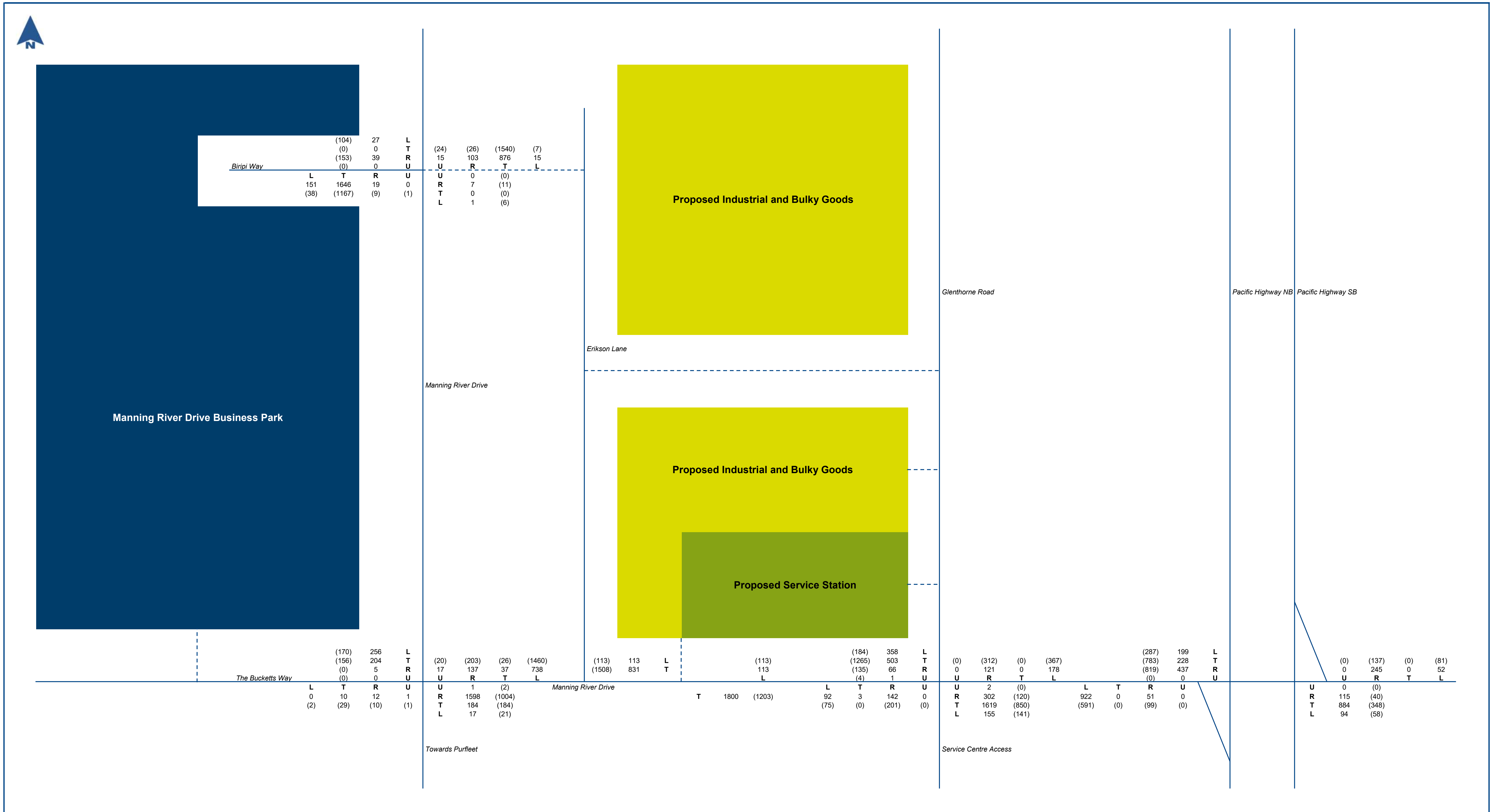
2025 All Background plus Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A28

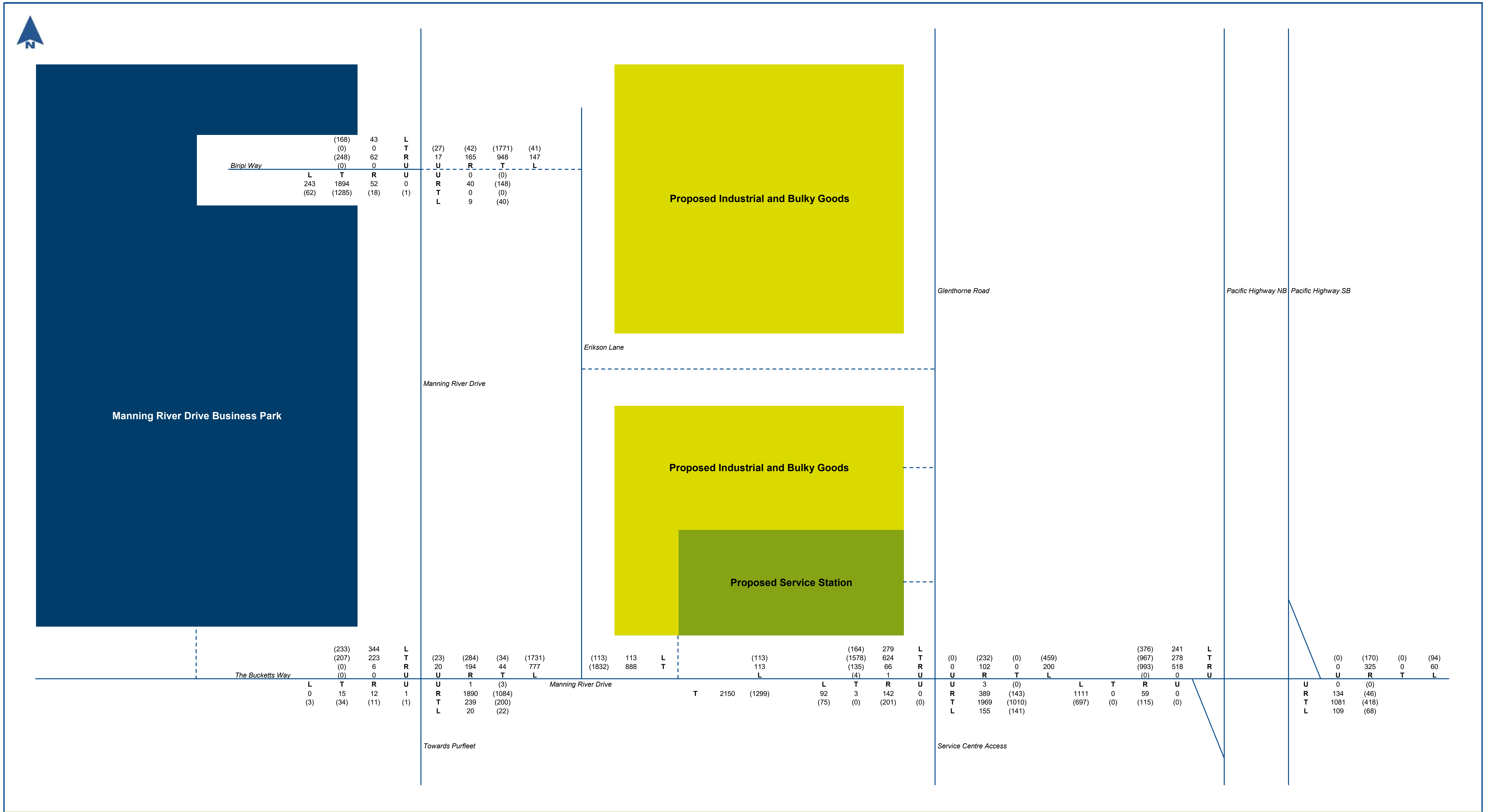
2030 All Background plus Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR



Legend

L	Left Turn	**00** Weekday AM Peak Hour Volumes
T	Through	**(00)** Weekday PM Peak Hour Volumes
R	Right turn	
U	U-turn	

Figure: A29

2040 All Background plus Development Traffic Volumes

620.12373

Taree Glenthorne Service Station and Industrial

08/11/2018

SLR

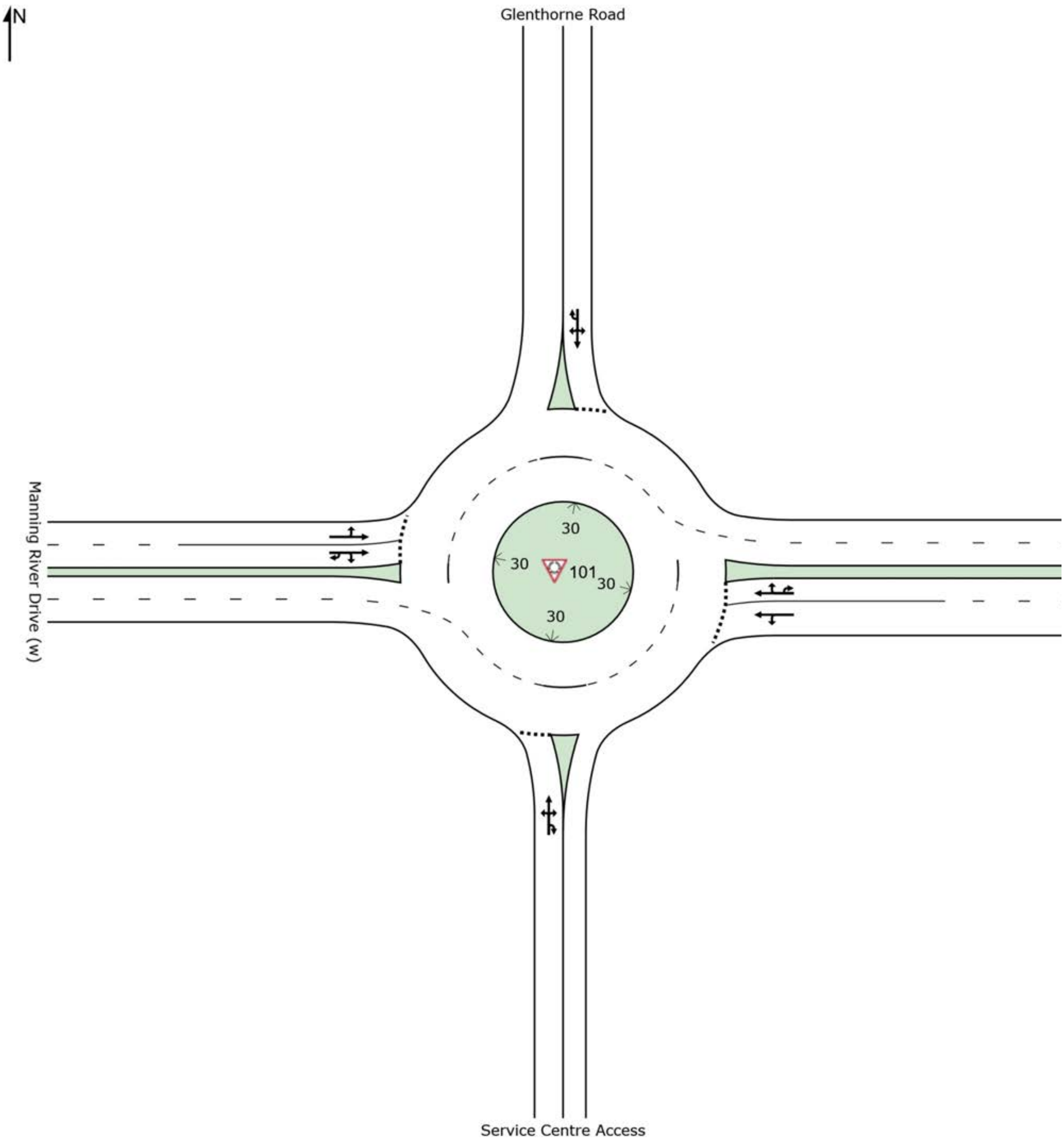
APPENDIX D

SIDRA Assessment Outputs

SITE LAYOUT

Site: 101 [2018 BG - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout



Organisation: SLR CONSULTING AUSTRALIA | Created: 08 November 2018 09:57:40
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Glenthorne Road v2.sip7

LANE SUMMARY

Site: 101 [2018 BG - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	801	0.313	100	10.0	LOS B	1.2	8.9	Full	250	0.0	0.0
Approach	251	6.0		0.313		10.0	LOS B	1.2	8.9				
East: Manning River Drive (e)													
Lane 1[d]	728	6.0	1540	0.473	100	3.9	LOS A	2.5	18.1	Full	300	0.0	0.0
Lane 2	647	6.0	1369	0.473	100	3.9	LOS A	2.4	17.9	Full	300	0.0	0.0
Approach	1375	6.0		0.473		3.9	LOS A	2.5	18.1				
North: Glenthorne Road													
Lane 1[d]	11	6.0	953	0.011	100	7.9	LOS A	0.0	0.2	Full	500	0.0	0.0
Approach	11	6.0		0.011		7.9	LOS A	0.0	0.2				
West: Manning River Drive (w)													
Lane 1[d]	289	6.0	1327	0.218	100	4.1	LOS A	1.2	8.7	Full	500	0.0	0.0
Lane 2	263	6.0	1207	0.218	100	5.8	LOS A	1.2	8.5	Full	500	0.0	0.0
Approach	553	6.0		0.218		4.9	LOS A	1.2	8.7				
Intersection	2188	6.0		0.473		4.9	LOS A	2.5	18.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2018 BG - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	295	4.0	975	0.302	100	9.3	LOS A	1.1	7.7	Full	250	0.0	0.0
Approach	295	4.0		0.302		9.3	LOS A	1.1	7.7				
East: Manning River Drive (e)													
Lane 1[d]	436	4.0	1422	0.306	100	4.0	LOS A	1.4	10.0	Full	300	0.0	0.0
Lane 2	394	4.0	1286	0.306	100	4.0	LOS A	1.4	9.8	Full	300	0.0	0.0
Approach	829	4.0		0.306		4.0	LOS A	1.4	10.0				
North: Glenthorne Road													
Lane 1[d]	9	4.0	695	0.014	100	9.7	LOS A	0.1	0.4	Full	500	0.0	0.0
Approach	9	4.0		0.014		9.7	LOS A	0.1	0.4				
West: Manning River Drive (w)													
Lane 1[d]	610	4.0	1317	0.463	100	4.6	LOS A	3.1	22.5	Full	500	0.0	0.0
Lane 2	544	4.0	1176	0.463	100	6.3	LOS A	3.0	22.0	Full	500	0.0	0.0
Approach	1154	4.0		0.463		5.4	LOS A	3.1	22.5				
Intersection	2287	4.0		0.463		5.4	LOS A	3.1	22.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 11:51:17
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Glenthorne Road v2.sip7

LANE SUMMARY

Site: 101 [2020 BG - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	758	0.331	100	10.5	LOS B	1.3	9.9	Full	250	0.0	0.0
Approach	251	6.0		0.331		10.5	LOS B	1.3	9.9				
East: Manning River Drive (e)													
Lane 1[d]	797	6.0	1545	0.516	100	3.9	LOS A	2.9	21.2	Full	300	0.0	0.0
Lane 2	706	6.0	1370	0.516	100	3.9	LOS A	2.8	21.0	Full	300	0.0	0.0
Approach	1503	6.0		0.516		3.9	LOS A	2.9	21.2				
North: Glenthorne Road													
Lane 1[d]	11	6.0	939	0.011	100	8.0	LOS A	0.0	0.2	Full	500	0.0	0.0
Approach	11	6.0		0.011		8.0	LOS A	0.0	0.2				
West: Manning River Drive (w)													
Lane 1[d]	310	6.0	1329	0.233	100	4.1	LOS A	1.3	9.5	Full	500	0.0	0.0
Lane 2	281	6.0	1206	0.233	100	5.7	LOS A	1.3	9.3	Full	500	0.0	0.0
Approach	592	6.0		0.233		4.9	LOS A	1.3	9.5				
Intersection	2356	6.0		0.516		4.9	LOS A	2.9	21.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 11:51:18
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LANE SUMMARY

Site: 101 [2020 BG - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1 [d]	293	4.0	960	0.305	100	9.4	LOS A	1.1	7.9	Full	250	0.0	0.0
Approach	293	4.0		0.305		9.4	LOS A	1.1	7.9				
East: Manning River Drive (e)													
Lane 1 [d]	461	4.0	1424	0.324	100	4.0	LOS A	1.5	10.9	Full	300	0.0	0.0
Lane 2	416	4.0	1286	0.324	100	4.1	LOS A	1.5	10.6	Full	300	0.0	0.0
Approach	877	4.0		0.324		4.0	LOS A	1.5	10.9				
North: Glenthorne Road													
Lane 1 [d]	9	4.0	650	0.015	100	10.0	LOS B	0.1	0.4	Full	500	0.0	0.0
Approach	9	4.0		0.015		10.0	LOS B	0.1	0.4				
West: Manning River Drive (w)													
Lane 1 [d]	674	4.0	1323	0.509	100	4.7	LOS A	3.6	26.3	Full	500	0.0	0.0
Lane 2	600	4.0	1179	0.509	100	6.2	LOS A	3.5	25.6	Full	500	0.0	0.0
Approach	1274	4.0		0.509		5.4	LOS A	3.6	26.3				
Intersection	2453	4.0		0.509		5.4	LOS A	3.6	26.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 DEV - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	687	0.364	100	11.3	LOS B	1.6	12.0	Full	250	0.0	0.0
Approach	251	6.0		0.364		11.3	LOS B	1.6	12.0				
East: Manning River Drive (e)													
Lane 1[d]	826	6.0	1474	0.560	100	4.1	LOS A	3.2	23.4	Full	300	0.0	0.0
Lane 2	736	6.0	1313	0.560	100	4.7	LOS A	3.1	23.2	Full	300	0.0	0.0
Approach	1562	6.0		0.560		4.4	LOS A	3.2	23.4				
North: Glenthorne Road													
Lane 1[d]	188	6.0	962	0.196	100	7.0	LOS A	0.7	5.0	Full	500	0.0	0.0
Approach	188	6.0		0.196		7.0	LOS A	0.7	5.0				
West: Manning River Drive (w)													
Lane 1[d]	310	6.0	1267	0.245	100	4.4	LOS A	1.3	9.7	Full	500	0.0	0.0
Lane 2	281	6.0	1147	0.245	100	6.0	LOS A	1.3	9.5	Full	500	0.0	0.0
Approach	592	6.0		0.245		5.2	LOS A	1.3	9.7				
Intersection	2593	6.0		0.560		5.4	LOS A	3.2	23.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 DEV - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance														
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Service Centre Access													
Lane 1[d]	295	4.0	906	0.325	100	9.7	LOS A	1.2	8.9	Full	250	0.0	0.0
Approach	295	4.0		0.325		9.7	LOS A	1.2	8.9				
East: Manning River Drive (e)													
Lane 1[d]	492	4.0	1375	0.358	100	4.2	LOS A	1.7	12.2	Full	300	0.0	0.0
Lane 2	444	4.0	1239	0.358	100	5.0	LOS A	1.6	11.9	Full	300	0.0	0.0
Approach	936	4.0		0.358		4.6	LOS A	1.7	12.2				
North: Glenthorne Road													
Lane 1[d]	187	4.0	655	0.286	100	9.1	LOS A	1.3	9.1	Full	500	0.0	0.0
Approach	187	4.0		0.286		9.1	LOS A	1.3	9.1				
West: Manning River Drive (w)													
Lane 1[d]	675	4.0	1264	0.534	100	5.0	LOS A	3.8	27.7	Full	500	0.0	0.0
Lane 2	599	4.0	1121	0.534	100	6.7	LOS A	3.7	26.9	Full	500	0.0	0.0
Approach	1274	4.0		0.534		5.8	LOS A	3.8	27.7				
Intersection	2692	4.0		0.534		6.1	LOS A	3.8	27.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 BG - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	698	0.359	100	11.4	LOS B	1.6	11.5	Full	250	0.0	0.0
Approach	251	6.0		0.359		11.4	LOS B	1.6	11.5				
East: Manning River Drive (e)													
Lane 1[d]	895	6.0	1552	0.577	100	3.9	LOS A	3.6	26.4	Full	300	0.0	0.0
Lane 2	791	6.0	1373	0.577	100	4.0	LOS A	3.6	26.1	Full	300	0.0	0.0
Approach	1686	6.0		0.577		3.9	LOS A	3.6	26.4				
North: Glenthorne Road													
Lane 1[d]	11	6.0	915	0.012	100	8.1	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	11	6.0		0.012		8.1	LOS A	0.0	0.3				
West: Manning River Drive (w)													
Lane 1[d]	344	6.0	1332	0.258	100	4.2	LOS A	1.5	10.9	Full	500	0.0	0.0
Lane 2	312	6.0	1205	0.258	100	5.6	LOS A	1.4	10.6	Full	500	0.0	0.0
Approach	656	6.0		0.258		4.8	LOS A	1.5	10.9				
Intersection	2603	6.0		0.577		4.9	LOS A	3.6	26.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Glenthorne Road v2.sip7

LANE SUMMARY

Site: 101 [2025 BG - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance														
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Service Centre Access													
Lane 1[d]	293	4.0	930	0.315	100	9.6	LOS A	1.1	8.3	Full	250	0.0	0.0
Approach	293	4.0		0.315		9.6	LOS A	1.1	8.3				
East: Manning River Drive (e)													
Lane 1[d]	505	4.0	1426	0.355	100	4.0	LOS A	1.7	12.6	Full	300	0.0	0.0
Lane 2	456	4.0	1285	0.355	100	4.1	LOS A	1.7	12.2	Full	300	0.0	0.0
Approach	961	4.0		0.355		4.1	LOS A	1.7	12.6				
North: Glenthorne Road													
Lane 1[d]	9	4.0	588	0.016	100	10.6	LOS B	0.1	0.5	Full	500	0.0	0.0
Approach	9	4.0		0.016		10.6	LOS B	0.1	0.5				
West: Manning River Drive (w)													
Lane 1[d]	762	4.0	1327	0.574	100	4.8	LOS A	4.5	32.4	Full	500	0.0	0.0
Lane 2	677	4.0	1179	0.574	100	6.2	LOS A	4.4	31.6	Full	500	0.0	0.0
Approach	1439	4.0		0.574		5.4	LOS A	4.5	32.4				
Intersection	2702	4.0		0.574		5.4	LOS A	4.5	32.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2025 DEV - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	573	0.437	100	13.4	LOS B	2.2	16.4	Full	250	0.0	0.0
Approach	251	6.0		0.437		13.4	LOS B	2.2	16.4				
East: Manning River Drive (e)													
Lane 1[d]	968	6.0	1456	0.665	100	4.4	LOS A	4.6	34.1	Full	300	0.0	0.0
Lane 2	860	6.0	1294	0.665	100	5.4	LOS A	4.6	33.7	Full	300	0.0	0.0
Approach	1828	6.0		0.665		4.9	LOS A	4.6	34.1				
North: Glenthorne Road													
Lane 1[d]	231	6.0	920	0.250	100	7.4	LOS A	0.9	7.0	Full	500	0.0	0.0
Approach	231	6.0		0.250		7.4	LOS A	0.9	7.0				
West: Manning River Drive (w)													
Lane 1[d]	390	6.0	1202	0.324	100	4.9	LOS A	1.9	13.6	Full	500	0.0	0.0
Lane 2	349	6.0	1077	0.324	100	6.2	LOS A	1.8	13.3	Full	500	0.0	0.0
Approach	739	6.0		0.324		5.5	LOS A	1.9	13.6				
Intersection	3048	6.0		0.665		5.9	LOS A	4.6	34.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 DEV - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	295	4.0	807	0.365	100	10.6	LOS B	1.6	11.5	Full	250	0.0	0.0
Approach	295	4.0		0.365		10.6	LOS B	1.6	11.5				
East: Manning River Drive (e)													
Lane 1[d]	549	4.0	1303	0.421	100	4.6	LOS A	2.2	15.9	Full	300	0.0	0.0
Lane 2	492	4.0	1167	0.421	100	5.6	LOS A	2.1	15.4	Full	300	0.0	0.0
Approach	1041	4.0		0.421		5.1	LOS A	2.2	15.9				
North: Glenthorne Road													
Lane 1[d]	356	4.0	573	0.621	100	13.6	LOS B	3.9	28.3	Full	500	0.0	0.0
Approach	356	4.0		0.621		13.6	LOS B	3.9	28.3				
West: Manning River Drive (w)													
Lane 1[d]	775	4.0	1245	0.623	100	5.7	LOS A	5.3	38.6	Full	500	0.0	0.0
Lane 2	685	4.0	1100	0.623	100	7.4	LOS A	5.3	38.6	Full	500	0.0	0.0
Approach	1460	4.0		0.623		6.5	LOS A	5.3	38.6				
Intersection	3152	4.0		0.623		7.2	LOS A	5.3	38.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	639	0.392	100	12.4	LOS B	1.8	13.4	Full	250	0.0	0.0
Approach	251	6.0		0.392		12.4	LOS B	1.8	13.4				
East: Manning River Drive (e)													
Lane 1[d]	994	6.0	1558	0.638	100	3.9	LOS A	4.5	32.9	Full	300	0.0	0.0
Lane 2	877	6.0	1375	0.638	100	4.0	LOS A	4.4	32.7	Full	300	0.0	0.0
Approach	1871	6.0		0.638		4.0	LOS A	4.5	32.9				
North: Glenthorne Road													
Lane 1[d]	11	6.0	887	0.012	100	8.2	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	11	6.0		0.012		8.2	LOS A	0.0	0.3				
West: Manning River Drive (w)													
Lane 1[d]	378	6.0	1334	0.284	100	4.2	LOS A	1.7	12.4	Full	500	0.0	0.0
Lane 2	342	6.0	1205	0.284	100	5.5	LOS A	1.6	12.1	Full	500	0.0	0.0
Approach	720	6.0		0.284		4.8	LOS A	1.7	12.4				
Intersection	2852	6.0		0.638		4.9	LOS A	4.5	32.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Service Centre Access													
Lane 1[d]	293	4.0	896	0.327	100	9.8	LOS A	1.2	8.9	Full	250	0.0	0.0
Approach	293	4.0		0.327		9.8	LOS A	1.2	8.9				
East: Manning River Drive (e)													
Lane 1[d]	550	4.0	1427	0.386	100	4.0	LOS A	2.0	14.5	Full	300	0.0	0.0
Lane 2	495	4.0	1284	0.386	100	4.1	LOS A	1.9	14.1	Full	300	0.0	0.0
Approach	1045	4.0		0.386		4.1	LOS A	2.0	14.5				
North: Glenthorne Road													
Lane 1[d]	9	4.0	526	0.018	100	11.2	LOS B	0.1	0.6	Full	500	0.0	0.0
Approach	9	4.0		0.018		11.2	LOS B	0.1	0.6				
West: Manning River Drive (w)													
Lane 1[d]	850	4.0	1330	0.639	100	4.9	LOS A	5.5	39.9	Full	500	0.0	0.0
Lane 2	753	4.0	1179	0.639	100	6.3	LOS A	5.4	39.4	Full	500	0.0	0.0
Approach	1603	4.0		0.639		5.6	LOS A	5.5	39.9				
Intersection	2951	4.0		0.639		5.5	LOS A	5.5	39.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2030 DEV - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	389	0.644	100	21.6	LOS C	4.1	30.4	Full	250	0.0	0.0
Approach	251	6.0		0.644		21.6	LOS C	4.1	30.4				
East: Manning River Drive (e)													
Lane 1[d]	1160	6.0	1412	0.822	100	5.8	LOS A	9.8	72.0	Full	300	0.0	0.0
Lane 2	1027	6.0	1250	0.822	100	8.1	LOS A	9.9	72.9	Full	300	0.0	0.0
Approach	2187	6.0		0.822		6.9	LOS A	9.9	72.9				
North: Glenthorne Road													
Lane 1[d]	317	6.0	847	0.374	100	8.3	LOS A	1.7	12.8	Full	500	0.0	0.0
Approach	317	6.0		0.374		8.3	LOS A	1.7	12.8				
West: Manning River Drive (w)													
Lane 1[d]	521	6.0	1053	0.495	100	6.4	LOS A	3.6	26.2	Full	500	0.0	0.0
Lane 2	455	6.0	920	0.495	100	7.8	LOS A	3.5	25.6	Full	500	0.0	0.0
Approach	977	6.0		0.495		7.1	LOS A	3.6	26.2				
Intersection	3732	6.0		0.822		8.0	LOS A	9.9	72.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance														
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Service Centre Access													
Lane 1[d]	295	4.0	698	0.422	100	11.8	LOS B	2.1	15.3	Full	250	0.0	0.0
Approach	295	4.0		0.422		11.8	LOS B	2.1	15.3				
East: Manning River Drive (e)													
Lane 1[d]	620	4.0	1230	0.504	100	5.0	LOS A	3.1	22.3	Full	300	0.0	0.0
Lane 2	551	4.0	1093	0.504	100	6.5	LOS A	3.0	21.7	Full	300	0.0	0.0
Approach	1171	4.0		0.504		5.7	LOS A	3.1	22.3				
North: Glenthorne Road													
Lane 1[d]	717	4.0	475	1.508	100	474.3	LOS F	161.4	1168.2	Full	500	0.0	43.6
Approach	717	4.0		1.508		474.3	LOS F	161.4	1168.2				
West: Manning River Drive (w)													
Lane 1[d]	890	4.0	1207	0.737	100	7.6	LOS A	8.7	62.8	Full	500	0.0	0.0
Lane 2	781	4.0	1059	0.737	100	9.4	LOS A	8.5	61.8	Full	500	0.0	0.0
Approach	1671	4.0		0.737		8.4	LOS A	8.7	62.8				
Intersection	3853	4.0		1.508		94.5	LOS F	161.4	1168.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 BG - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	514	0.487	100	15.8	LOS B	2.6	19.3	Full	250	0.0	0.0
Approach	251	6.0		0.487		15.8	LOS B	2.6	19.3				
East: Manning River Drive (e)													
Lane 1[d]	1192	6.0	1568	0.760	100	4.1	LOS A	7.4	54.4	Full	300	0.0	0.0
Lane 2	1048	6.0	1378	0.760	100	4.2	LOS A	7.3	53.4	Full	300	0.0	0.0
Approach	2240	6.0		0.760		4.1	LOS A	7.4	54.4				
North: Glenthorne Road													
Lane 1[d]	11	6.0	833	0.013	100	8.5	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	11	6.0		0.013		8.5	LOS A	0.0	0.3				
West: Manning River Drive (w)													
Lane 1[d]	446	6.0	1336	0.334	100	4.2	LOS A	2.1	15.8	Full	500	0.0	0.0
Lane 2	401	6.0	1202	0.334	100	5.3	LOS A	2.1	15.3	Full	500	0.0	0.0
Approach	847	6.0		0.334		4.7	LOS A	2.1	15.8				
Intersection	3348	6.0		0.760		5.2	LOS A	7.4	54.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 BG - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Service Centre Access													
Lane 1[d]	295	4.0	826	0.357	100	10.4	LOS B	1.5	10.7	Full	250	0.0	0.0
Approach	295	4.0		0.357		10.4	LOS B	1.5	10.7				
East: Manning River Drive (e)													
Lane 1[d]	640	4.0	1426	0.449	100	4.1	LOS A	2.7	19.2	Full	300	0.0	0.0
Lane 2	574	4.0	1279	0.449	100	4.1	LOS A	2.6	18.6	Full	300	0.0	0.0
Approach	1214	4.0		0.449		4.1	LOS A	2.7	19.2				
North: Glenthorne Road													
Lane 1[d]	9	4.0	400	0.024	100	12.9	LOS B	0.1	0.8	Full	500	0.0	0.0
Approach	9	4.0		0.024		12.9	LOS B	0.1	0.8				
West: Manning River Drive (w)													
Lane 1[d]	1027	4.0	1332	0.771	100	6.1	LOS A	9.6	69.6	Full	500	0.0	0.0
Lane 2	907	4.0	1176	0.771	100	7.7	LOS A	9.8	70.7	Full	500	0.0	0.0
Approach	1934	4.0		0.771		6.8	LOS A	9.8	70.7				
Intersection	3452	4.0		0.771		6.2	LOS A	9.8	70.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 DEV - AM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1[d]	251	6.0	209	1.197	100	238.3	LOS F	35.2	258.8	Full	250	0.0	6.0
Approach	251	6.0		1.197		238.3	LOS F	35.2	258.8				
East: Manning River Drive (e)													
Lane 1[d]	1407	6.0	1442	0.976	100	12.5	LOS B	32.7	240.5	Full	300	0.0	0.0
Lane 2	1241	6.0	1272	0.976	100	16.7	LOS B	32.1	236.0	Full	300	0.0	0.0
Approach	2648	6.0		0.976		14.5	LOS B	32.7	240.5				
North: Glenthorne Road													
Lane 1[d]	320	6.0	782	0.409	100	8.2	LOS A	2.0	15.0	Full	500	0.0	0.0
Approach	320	6.0		0.409		8.2	LOS A	2.0	15.0				
West: Manning River Drive (w)													
Lane 1[d]	548	6.0	949	0.577	100	7.9	LOS A	5.2	38.5	Full	500	0.0	0.0
Lane 2	473	6.0	820	0.577	100	9.4	LOS A	5.0	36.7	Full	500	0.0	0.0
Approach	1021	6.0		0.577		8.6	LOS A	5.2	38.5				
Intersection	4240	6.0		1.197		25.8	LOS C	35.2	258.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 11:51:32
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Glenthorne Road v2.sip7

LANE SUMMARY

Site: 101 [2040 DEV - PM Peak]

Manning River Drive / Glenthorne Road / Service Centre Access
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1 [d]	295	6.0	678	0.435	100	12.1	LOS B	2.1	15.8	Full	250	0.0	0.0
Approach	295	6.0		0.435		12.1	LOS B	2.1	15.8				
East: Manning River Drive (e)													
Lane 1 [d]	720	6.0	1320	0.546	100	4.6	LOS A	3.4	25.2	Full	300	0.0	0.0
Lane 2	643	6.0	1178	0.546	100	6.1	LOS A	3.3	24.4	Full	300	0.0	0.0
Approach	1363	6.0		0.546		5.3	LOS A	3.4	25.2				
North: Glenthorne Road													
Lane 1 [d]	729	6.0	324	2.252	100	1141.7	LOS F	266.3	1960.3	Full	500	0.0	100.0
Approach	729	6.0		2.252		1141.7	LOS F	266.3	1960.3				
West: Manning River Drive (w)													
Lane 1 [d]	1058	6.0	1177	0.898	100	13.7	LOS B	19.0	139.7	Full	500	0.0	0.0
Lane 2	922	6.0	1027	0.898	100	16.2	LOS B	18.5	135.9	Full	500	0.0	0.0
Approach	1980	6.0		0.898		14.9	LOS B	19.0	139.7				
Intersection	4367	6.0		2.252		199.9	LOS F	266.3	1960.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

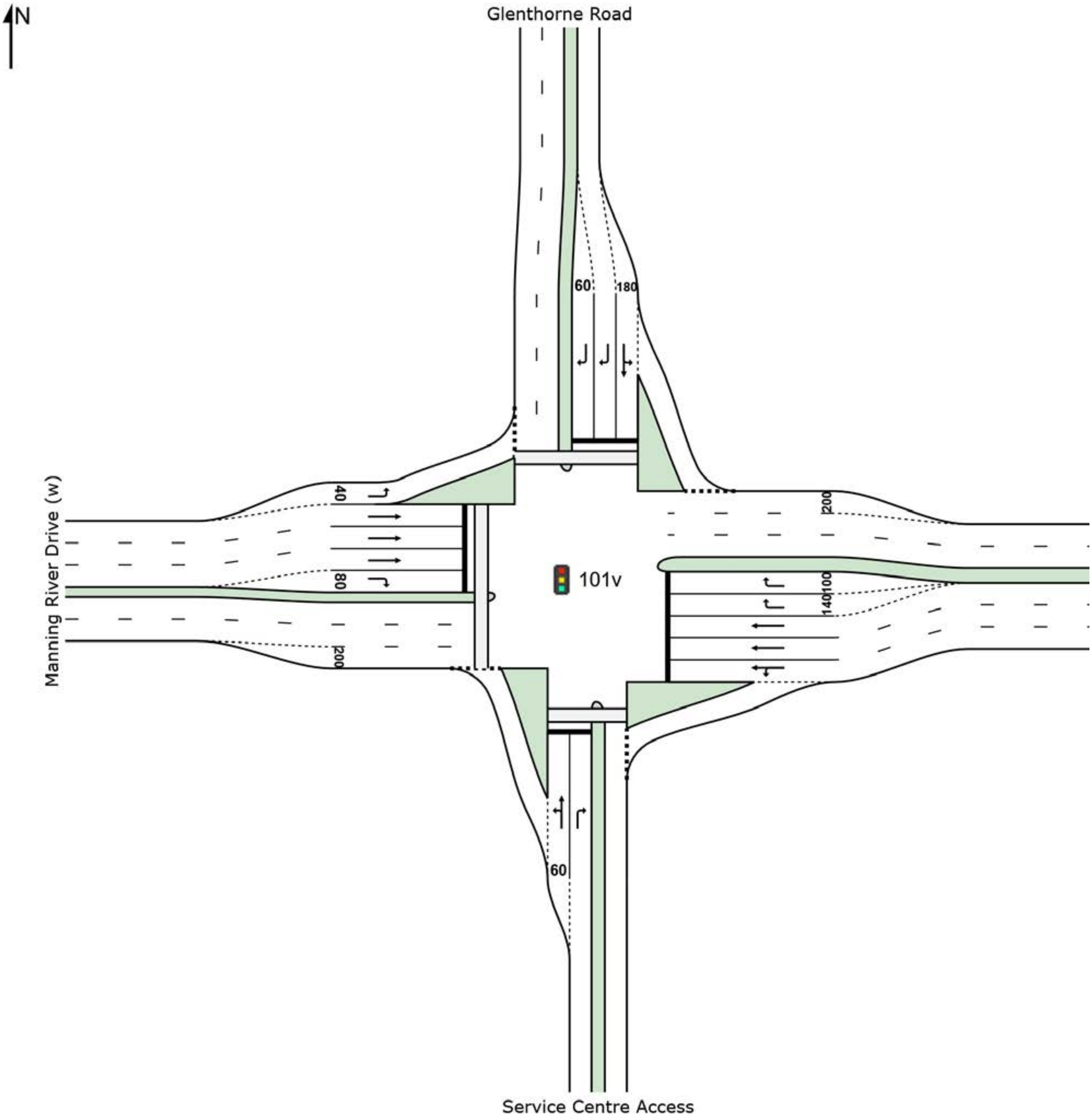
d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 11:51:33
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Glenthorne Road v2.sip7

SITE LAYOUT

Site: 101□ [20□0 DE□- AM Peak - Ultimate]

Manning River Drive / Glenthorne Road / Service Centre Access
Signals - Fixed Time Isolated



LANE SUMMARY

Site: 101v [2030 DEV - AM Peak - Ultimate]

Manning River Drive / Glenthorne Road / Service Centre Access
Signals - Fixed Time Isolated Cycle Time = 130 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1	100	6.0	832	0.120	100	15.5	LOS B	2.4	17.9	Short	60	0.0	NA
Lane 2	149	6.0	192	0.779	100	72.0	LOS E	10.0	73.3	Full	250	0.0	0.0
Approach	249	6.0		0.779		49.4	LOS D	10.0	73.3				
East: Manning River Drive (e)													
Lane 1	627	6.0	817	0.767	100	40.8	LOS D	32.6	240.1	Full	300	0.0	0.0
Lane 2	620	6.0	808	0.767	100	33.5	LOS C	33.1	244.0	Full	300	0.0	0.0
Lane 3	620	6.0	808	0.767	100	33.5	LOS C	33.1	244.0	Full	300	0.0	0.0
Lane 4	159	6.0	205	0.773	100	70.9	LOS E	10.5	77.4	Short	140	0.0	NA
Lane 5	159	6.0	205	0.773	100	70.9	LOS E	10.5	77.4	Short	100	0.0	NA
Approach	2185	6.0		0.773		41.1	LOS D	33.1	244.0				
North: Glenthorne Road													
Lane 1	188	6.0	1070	0.176	100	6.8	LOS A	1.5	10.9	Short	180	0.0	NA
Lane 2	64	6.0	192	0.332	100	65.2	LOS E	3.9	28.3	Full	500	0.0	0.0
Lane 3	64	6.0	192	0.332	100	65.2	LOS E	3.9	28.3	Short	60	0.0	NA
Approach	316	6.0		0.332		30.4	LOS C	3.9	28.3				
West: Manning River Drive (w)													
Lane 1	377	6.0	1115	0.338	100	18.0	LOS B	9.9	72.6	Short	40	0.0	NA
Lane 2	176	6.0	808	0.218	100	24.6	LOS C	6.9	50.9	Full	500	0.0	0.0
Lane 3	176	6.0	808	0.218	100	24.6	LOS C	6.9	50.9	Full	500	0.0	0.0
Lane 4	176	6.0	808	0.218	100	24.6	LOS C	6.9	50.9	Full	500	0.0	0.0
Lane 5	69	6.0	205	0.338	100	64.2	LOS E	4.2	30.7	Short	80	0.0	NA
Approach	976	6.0		0.338		24.9	LOS C	9.9	72.6				
Intersection	3726	6.0		0.779		36.5	LOS D	33.1	244.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 101v [2030 DEV - PM Peak - Ultimate]

Manning River Drive / Glenthorne Road / Service Centre Access
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1	82	4.0	977	0.084	100	9.2	LOS A	0.9	6.7	Short	60	0.0	NA
Lane 2	212	4.0	261	0.811	100	52.0	LOS D	10.1	73.1	Full	250	0.0	0.0
Approach	294	4.0		0.811		40.0	LOS D	10.1	73.1				
East: Manning River Drive (e)													
Lane 1	363	4.0	607	0.597	100	35.5	LOS D	13.3	96.0	Full	300	0.0	0.0
Lane 2	340	4.0	570	0.597	100	29.3	LOS C	12.9	93.4	Full	300	0.0	0.0
Lane 3	340	4.0	570	0.597	100	29.3	LOS C	12.9	93.4	Full	300	0.0	0.0
Lane 4	63	4.0	181	0.350	100	48.5	LOS D	2.7	19.7	Short	140	0.0	NA
Lane 5	63	4.0	181	0.350	100	48.5	LOS D	2.7	19.7	Short	100	0.0	NA
Approach	1169	4.0		0.597		33.3	LOS C	13.3	96.0				
North: Glenthorne Road													
Lane 1	387	4.0	986	0.393	100	12.5	LOS B	7.8	56.8	Short	180	0.0	NA
Lane 2	164	4.0	261	0.630	100	46.7	LOS D	7.1	51.7	Full	500	0.0	0.0
Lane 3	164	4.0	261	0.630	100	46.7	LOS D	7.1	51.7	Short	60	0.0	NA
Approach	716	4.0		0.630		28.2	LOS C	7.8	56.8				
West: Manning River Drive (w)													
Lane 1	194	4.0	1066	0.182	100	12.9	LOS B	3.6	25.7	Short	40	0.0	NA
Lane 2	377	4.0	450 [1]	0.837	100	37.5	LOS D	16.8	121.5	Full	500	0.0	0.0
Lane 3	477	4.0	570	0.837	100	38.1	LOS D	22.1	160.2	Full	500	0.0	0.0
Lane 4	477	4.0	570	0.837	100	38.1	LOS D	22.1	160.2	Full	500	0.0	0.0
Lane 5	142	4.0	181	0.787	100	54.0	LOS D	6.8	49.2	Short	80	0.0	NA
Approach	1667	4.0		0.837		36.4	LOS D	22.1	160.2				
Intersection	3846	4.0		0.837		34.2	LOS C	22.1	160.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 101v [2040 DEV - AM Peak - Ultimate]

Manning River Drive / Glenthorne Road / Service Centre Access
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1	100	6.0	751	0.133	100	23.9	LOS C	3.6	26.8	Short	60	0.0	NA
Lane 2	149	6.0	166	0.899	100	92.6	LOS F	12.4	91.2	Full	250	0.0	0.0
Approach	249	6.0		0.899		65.1	LOS E	12.4	91.2				
East: Manning River Drive (e)													
Lane 1	776	6.0	866	0.896	100	57.5	LOS E	56.9	418.4	Full	300	0.0	35.4
Lane 2	773	6.0	863	0.896	100	48.8	LOS D	57.2	420.7	Full	300	0.0	35.9
Lane 3	686	6.0	766 [1]	0.896	100	48.3	LOS D	48.6	357.4	Full	300	0.0	20.9
Lane 4	205	6.0	237	0.862	100	84.2	LOS F	16.3	119.7	Short	140	0.0	NA
Lane 5	205	6.0	237	0.862	100	84.2	LOS F	16.3	119.7	Short	100	0.0	NA
Approach	2645	6.0		0.896		56.7	LOS E	57.2	420.7				
North: Glenthorne Road													
Lane 1	212	6.0	1022	0.207	100	7.2	LOS A	2.2	16.0	Short	180	0.0	NA
Lane 2	54	6.0	166	0.323	100	76.1	LOS E	3.8	27.8	Full	500	0.0	0.0
Lane 3	54	6.0	166	0.323	100	76.1	LOS E	3.8	27.8	Short	60	0.0	NA
Approach	319	6.0		0.323		30.4	LOS C	3.8	27.8				
West: Manning River Drive (w)													
Lane 1	294	6.0	1408	0.209	100	6.1	LOS A	1.4	10.2	Short	40	0.0	NA
Lane 2	204	6.0	778 [1]	0.262	100	25.8	LOS C	8.9	65.2	Full	500	0.0	0.0
Lane 3	226	6.0	863	0.262	100	26.2	LOS C	10.0	73.3	Full	500	0.0	0.0
Lane 4	226	6.0	863	0.262	100	26.2	LOS C	10.0	73.3	Full	500	0.0	0.0
Lane 5	69	6.0	237	0.293	100	69.6	LOS E	4.7	34.2	Short	80	0.0	NA
Approach	1020	6.0		0.293		23.3	LOS C	10.0	73.3				
Intersection	4234	6.0		0.899		47.2	LOS D	57.2	420.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 101v [2040 DEV - PM Peak - Ultimate]

Manning River Drive / Glenthorne Road / Service Centre Access
Signals - Fixed Time Isolated Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Service Centre Access													
Lane 1	82	6.0	908	0.090	100	10.7	LOS B	1.2	8.6	Short	60	0.0	NA
Lane 2	212	6.0	248	0.854	100	66.8	LOS E	13.1	96.4	Full	250	0.0	0.0
Approach	294	6.0		0.854		51.1	LOS D	13.1	96.4				
East: Manning River Drive (e)													
Lane 1	411	6.0	737	0.558	100	37.0	LOS D	17.4	128.1	Full	300	0.0	0.0
Lane 2	400	6.0	718	0.558	100	29.9	LOS C	17.6	129.2	Full	300	0.0	0.0
Lane 3	400	6.0	718	0.558	100	29.9	LOS C	17.6	129.2	Full	300	0.0	0.0
Lane 4	75	6.0	170	0.442	100	60.9	LOS E	4.2	30.7	Short	140	0.0	NA
Lane 5	75	6.0	170	0.442	100	60.9	LOS E	4.2	30.7	Short	100	0.0	NA
Approach	1362	6.0		0.558		35.4	LOS D	17.6	129.2				
North: Glenthorne Road													
Lane 1	484	6.0	871	0.556	100	20.4	LOS C	17.9	132.0	Short	180	0.0	NA
Lane 2	122	6.0	248	0.493	100	56.4	LOS E	6.5	48.0	Full	500	0.0	0.0
Lane 3	122	6.0	248	0.493	100	56.4	LOS E	6.5	48.0	Short	60	0.0	NA
Approach	728	6.0		0.556		32.5	LOS C	17.9	132.0				
West: Manning River Drive (w)													
Lane 1	173	6.0	1137	0.152	100	13.1	LOS B	3.6	26.6	Short	40	0.0	NA
Lane 2	496	6.0	577 [1]	0.860	100	41.5	LOS D	27.0	198.9	Full	500	0.0	0.0
Lane 3	617	6.0	718	0.860	100	42.3	LOS D	35.4	260.9	Full	500	0.0	0.0
Lane 4	548	6.0	637 [1]	0.860	100	41.7	LOS D	30.4	224.1	Full	500	0.0	0.0
Lane 5	142	6.0	170	0.834	100	68.8	LOS E	8.8	64.5	Short	80	0.0	NA
Approach	1976	6.0		0.860		41.3	LOS D	35.4	260.9				
Intersection	4360	6.0		0.860		38.6	LOS D	35.4	260.9				

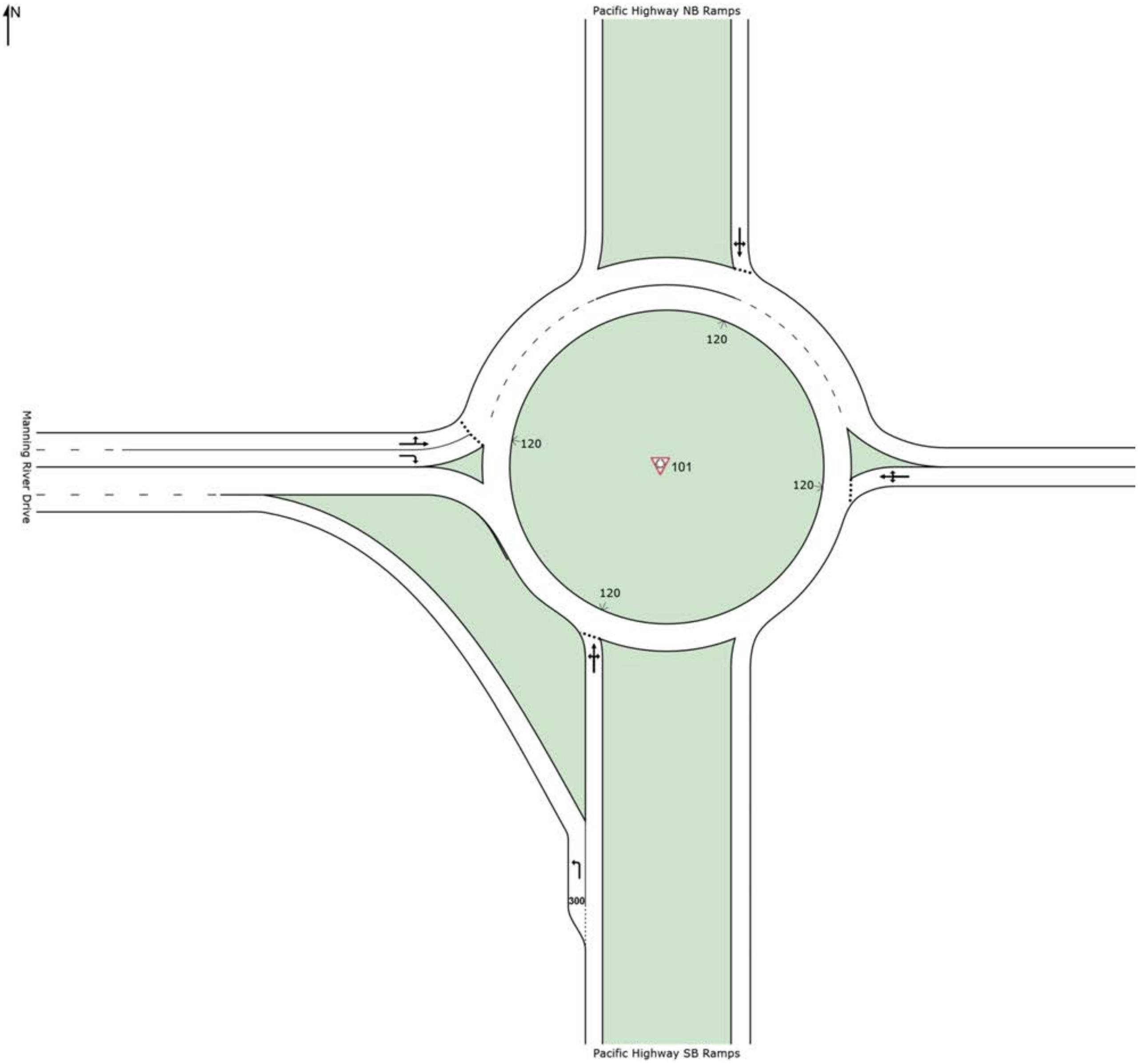
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

SITE LAYOUT

Site: 101 [2018 BG - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout



Organisation: SLR CONSULTING AUSTRALIA | Created: 08 November 2018 10:06:56
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LANE SUMMARY

Site: 101 [2018 BG - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	430	7.0	1833	0.234	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	285	7.0	1217	0.234	100	6.3	LOS A	2.2	16.4	Full	500	0.0	0.0
Approach	715	7.0		0.234		3.7	LOS A	2.2	16.4				
East: Old Bar Road													
Lane 1[d]	779	7.0	1342	0.580	100	5.7	LOS A	5.0	37.0	Full	500	0.0	0.0
Approach	779	7.0		0.580		5.7	LOS A	5.0	37.0				
North: Pacific Highway NB Ramps													
Lane 1[d]	141	7.0	1100	0.128	100	8.2	LOS A	0.5	3.9	Full	500	0.0	0.0
Approach	141	7.0		0.128		8.2	LOS A	0.5	3.9				
West: Manning River Drive													
Lane 1	297	7.0	1447	0.205	100	2.6	LOS A	1.3	9.4	Full	500	0.0	0.0
Lane 2[d]	343	7.0	1948	0.176	100	9.4	LOS A	1.1	8.3	Full	500	0.0	0.0
Approach	640	7.0		0.205		6.2	LOS A	1.3	9.4				
Intersection	2275	7.0		0.580		5.4	LOS A	5.0	37.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2018 BG - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Pacific Highway SB Ramps													
Lane 1	289	5.0	1859	0.155	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2 d	269	5.0	1731	0.155	100	5.1	LOS A	1.1	7.9	Full	500	0.0	0.0
Approach	558	5.0		0.155		3.5	LOS A	1.1	7.9				
East: Old Bar Road													
Lane 1 d	340	5.0	1155	0.294	100	5.7	LOS A	2.1	15.0	Full	500	0.0	0.0
Approach	340	5.0		0.294		5.7	LOS A	2.1	15.0				
North: Pacific Highway NB Ramps													
Lane 1 d	157	5.0	902	0.174	100	8.4	LOS A	0.8	5.5	Full	500	0.0	0.0
Approach	157	5.0		0.174		8.4	LOS A	0.8	5.5				
West: Manning River Drive													
Lane 1 d	640	5.0	2002	0.320	100	2.4	LOS A	2.2	16.3	Full	500	0.0	0.0
Lane 2	580	5.0	1496	0.388	100	9.6	LOS A	2.8	20.4	Full	500	0.0	0.0
Approach	1220	5.0		0.388		5.9	LOS A	2.8	20.4				
Intersection	2275	5.0		0.388		5.4	LOS A	2.8	20.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 BG - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	482	7.0	1833	0.263	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	286	7.0	1086	0.263	100	7.2	LOS A	2.7	19.7	Full	500	0.0	0.0
Approach	767	7.0		0.263		3.9	LOS A	2.7	19.7				
East: Old Bar Road													
Lane 1[d]	842	7.0	1304	0.646	100	6.9	LOS A	6.7	49.6	Full	500	0.0	0.0
Approach	842	7.0		0.646		6.9	LOS A	6.7	49.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	171	7.0	1081	0.158	100	8.6	LOS A	0.7	5.0	Full	500	0.0	0.0
Approach	171	7.0		0.158		8.6	LOS A	0.7	5.0				
West: Manning River Drive													
Lane 1	322	7.0	1435	0.225	100	2.7	LOS A	1.4	10.5	Full	500	0.0	0.0
Lane 2[d]	363	7.0	1938	0.187	100	9.4	LOS A	1.2	9.1	Full	500	0.0	0.0
Approach	685	7.0		0.225		6.2	LOS A	1.4	10.5				
Intersection	2465	7.0		0.646		5.9	LOS A	6.7	49.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 BG - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Pacific Highway SB Ramps													
Lane 1	307	5.0	1859	0.165	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	280	5.0	1696	0.165	100	5.2	LOS A	1.2	8.7	Full	500	0.0	0.0
Approach	586	5.0		0.165		3.5	LOS A	1.2	8.7				
East: Old Bar Road													
Lane 1[d]	361	5.0	1099	0.328	100	6.2	LOS A	2.4	17.6	Full	500	0.0	0.0
Approach	361	5.0		0.328		6.2	LOS A	2.4	17.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	169	5.0	865	0.196	100	8.8	LOS A	0.9	6.4	Full	500	0.0	0.0
Approach	169	5.0		0.196		8.8	LOS A	0.9	6.4				
West: Manning River Drive													
Lane 1[d]	722	5.0	1996	0.362	100	2.5	LOS A	2.7	19.4	Full	500	0.0	0.0
Lane 2	627	5.0	1491	0.421	100	9.7	LOS A	3.2	23.2	Full	500	0.0	0.0
Approach	1349	5.0		0.421		5.8	LOS A	3.2	23.2				
Intersection	2466	5.0		0.421		5.5	LOS A	3.2	23.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 DEV - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	482	7.0	1833	0.263	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	286	7.0	1086	0.263	100	7.2	LOS A	2.7	19.7	Full	500	0.0	0.0
Approach	767	7.0		0.263		3.9	LOS A	2.7	19.7				
East: Old Bar Road													
Lane 1[d]	842	7.0	1304	0.646	100	6.9	LOS A	6.7	49.6	Full	500	0.0	0.0
Approach	842	7.0		0.646		6.9	LOS A	6.7	49.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	171	7.0	1081	0.158	100	8.6	LOS A	0.7	5.0	Full	500	0.0	0.0
Approach	171	7.0		0.158		8.6	LOS A	0.7	5.0				
West: Manning River Drive													
Lane 1	322	7.0	1435	0.225	100	2.7	LOS A	1.4	10.5	Full	500	0.0	0.0
Lane 2[d]	363	7.0	1938	0.187	100	9.4	LOS A	1.2	9.1	Full	500	0.0	0.0
Approach	685	7.0		0.225		6.2	LOS A	1.4	10.5				
Intersection	2465	7.0		0.646		5.9	LOS A	6.7	49.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2020 DEV - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	307	5.0	1859	0.165	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	280	5.0	1696	0.165	100	5.2	LOS A	1.2	8.7	Full	500	0.0	0.0
Approach	586	5.0		0.165		3.5	LOS A	1.2	8.7				
East: Old Bar Road													
Lane 1[d]	361	5.0	1099	0.328	100	6.2	LOS A	2.4	17.6	Full	500	0.0	0.0
Approach	361	5.0		0.328		6.2	LOS A	2.4	17.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	169	5.0	865	0.196	100	8.8	LOS A	0.9	6.4	Full	500	0.0	0.0
Approach	169	5.0		0.196		8.8	LOS A	0.9	6.4				
West: Manning River Drive													
Lane 1[d]	722	5.0	1996	0.362	100	2.5	LOS A	2.7	19.4	Full	500	0.0	0.0
Lane 2	627	5.0	1491	0.421	100	9.7	LOS A	3.2	23.2	Full	500	0.0	0.0
Approach	1349	5.0		0.421		5.8	LOS A	3.2	23.2				
Intersection	2466	5.0		0.421		5.5	LOS A	3.2	23.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 BG - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	578	7.0	1833	0.315	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	280	7.0	889	0.315	100	8.9	LOS A	3.5	26.0	Full	500	0.0	0.0
Approach	858	7.0		0.315		4.2	LOS A	3.5	26.0				
East: Old Bar Road													
Lane 1[d]	945	7.0	1247	0.758	100	10.0	LOS A	10.8	80.3	Full	500	0.0	0.0
Approach	945	7.0		0.758		10.0	LOS A	10.8	80.3				
North: Pacific Highway NB Ramps													
Lane 1[d]	203	7.0	1048	0.194	100	9.0	LOS A	0.9	6.3	Full	500	0.0	0.0
Approach	203	7.0		0.194		9.0	LOS A	0.9	6.3				
West: Manning River Drive													
Lane 1	363	7.0	1412	0.257	100	2.7	LOS A	1.7	12.7	Full	500	0.0	0.0
Lane 2[d]	402	7.0	1916	0.210	100	9.5	LOS A	1.4	10.7	Full	500	0.0	0.0
Approach	765	7.0		0.257		6.3	LOS A	1.7	12.7				
Intersection	2772	7.0		0.758		7.1	LOS A	10.8	80.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2025 BG - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	344	5.0	1859	0.185	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2 [d]	302	5.0	1630	0.185	100	5.5	LOS A	1.4	10.3	Full	500	0.0	0.0
Approach	646	5.0		0.185		3.6	LOS A	1.4	10.3				
East: Old Bar Road													
Lane 1 [d]	402	5.0	1003	0.401	100	7.1	LOS A	3.2	23.3	Full	500	0.0	0.0
Approach	402	5.0		0.401		7.1	LOS A	3.2	23.3				
North: Pacific Highway NB Ramps													
Lane 1 [d]	189	5.0	803	0.236	100	9.4	LOS A	1.1	8.1	Full	500	0.0	0.0
Approach	189	5.0		0.236		9.4	LOS A	1.1	8.1				
West: Manning River Drive													
Lane 1 [d]	831	5.0	1981	0.419	100	2.5	LOS A	3.3	24.1	Full	500	0.0	0.0
Lane 2	704	5.0	1476	0.477	100	9.8	LOS A	3.9	28.3	Full	500	0.0	0.0
Approach	1535	5.0		0.477		5.9	LOS A	3.9	28.3				
Intersection	2773	5.0		0.477		5.8	LOS A	3.9	28.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 DEV - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	613	7.0	1833	0.334	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	269	7.0	806	0.334	100	9.9	LOS A	3.8	28.5	Full	500	0.0	0.0
Approach	882	7.0		0.334		4.4	LOS A	3.8	28.5				
East: Old Bar Road													
Lane 1[d]	979	7.0	1223	0.801	100	11.9	LOS B	13.2	97.8	Full	500	0.0	0.0
Approach	979	7.0		0.801		11.9	LOS B	13.2	97.8				
North: Pacific Highway NB Ramps													
Lane 1[d]	228	7.0	1041	0.219	100	9.3	LOS A	1.0	7.3	Full	500	0.0	0.0
Approach	228	7.0		0.219		9.3	LOS A	1.0	7.3				
West: Manning River Drive													
Lane 1	378	7.0	1408	0.268	100	2.8	LOS A	1.8	13.5	Full	500	0.0	0.0
Lane 2[d]	408	7.0	1913	0.213	100	9.5	LOS A	1.5	11.0	Full	500	0.0	0.0
Approach	786	7.0		0.268		6.2	LOS A	1.8	13.5				
Intersection	2876	7.0		0.801		7.8	LOS A	13.2	97.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 DEV - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	350	5.0	1859	0.188	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	303	5.0	1610	0.188	100	5.5	LOS A	1.5	10.6	Full	500	0.0	0.0
Approach	653	5.0		0.188		3.6	LOS A	1.5	10.6				
East: Old Bar Road													
Lane 1[d]	411	5.0	971	0.423	100	7.5	LOS A	3.4	25.2	Full	500	0.0	0.0
Approach	411	5.0		0.423		7.5	LOS A	3.4	25.2				
North: Pacific Highway NB Ramps													
Lane 1[d]	196	5.0	782	0.250	100	9.7	LOS A	1.2	8.8	Full	500	0.0	0.0
Approach	196	5.0		0.250		9.7	LOS A	1.2	8.8				
West: Manning River Drive													
Lane 1[d]	889	5.0	1980	0.449	100	2.5	LOS A	3.7	26.8	Full	500	0.0	0.0
Lane 2	729	5.0	1477	0.494	100	9.8	LOS A	4.1	30.0	Full	500	0.0	0.0
Approach	1619	5.0		0.494		5.8	LOS A	4.1	30.0				
Intersection	2878	5.0		0.494		5.8	LOS A	4.1	30.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	688	7.0	1833	0.375	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	261	7.0	695	0.375	100	11.4	LOS B	4.5	33.1	Full	500	0.0	0.0
Approach	948	7.0		0.375		4.6	LOS A	4.5	33.1				
East: Old Bar Road													
Lane 1[d]	1047	7.0	1186	0.883	100	17.7	LOS B	20.3	150.9	Full	500	0.0	0.0
Approach	1047	7.0		0.883		17.7	LOS B	20.3	150.9				
North: Pacific Highway NB Ramps													
Lane 1[d]	237	7.0	1014	0.234	100	9.3	LOS A	1.1	7.9	Full	500	0.0	0.0
Approach	237	7.0		0.234		9.3	LOS A	1.1	7.9				
West: Manning River Drive													
Lane 1	404	7.0	1388	0.291	100	2.8	LOS A	2.0	15.0	Full	500	0.0	0.0
Lane 2[d]	441	7.0	1893	0.233	100	9.5	LOS A	1.7	12.4	Full	500	0.0	0.0
Approach	845	7.0		0.291		6.3	LOS A	2.0	15.0				
Intersection	3078	7.0		0.883		9.9	LOS A	20.3	150.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Pacific Highway SB Ramps													
Lane 1	385	5.0	1859	0.207	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2 d	322	5.0	1557	0.207	100	5.7	LOS A	1.7	12.2	Full	500	0.0	0.0
Approach	707	5.0		0.207		3.7	LOS A	1.7	12.2				
East: Old Bar Road													
Lane 1 d	443	5.0	900	0.493	100	9.5	LOS A	4.7	34.4	Full	500	0.0	0.0
Approach	443	5.0		0.493		9.5	LOS A	4.7	34.4				
North: Pacific Highway NB Ramps													
Lane 1 d	211	5.0	739	0.285	100	10.0	LOS A	1.4	10.3	Full	500	0.0	0.0
Approach	211	5.0		0.285		10.0	LOS A	1.4	10.3				
West: Manning River Drive													
Lane 1 d	940	5.0	1965	0.478	100	2.6	LOS A	4.1	29.7	Full	500	0.0	0.0
Lane 2	782	5.0	1460	0.536	100	10.0	LOS A	4.7	34.4	Full	500	0.0	0.0
Approach	1722	5.0		0.536		5.9	LOS A	4.7	34.4				
Intersection	3083	5.0		0.536		6.2	LOS A	4.7	34.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	788	7.0	1833	0.430	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	237	7.0	552	0.430	100	15.8	LOS B	5.4	39.8	Full	500	0.0	0.0
Approach	1025	7.0		0.430		5.2	LOS A	5.4	39.8				
East: Old Bar Road													
Lane 1[d]	1151	7.0	1111	1.035	100	69.9	LOS E	64.9	481.6	Full	500	0.0	3.9
Approach	1151	7.0		1.035		69.9	LOS E	64.9	481.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	314	7.0	995	0.315	100	10.0	LOS A	1.5	11.2	Full	500	0.0	0.0
Approach	314	7.0		0.315		10.0	LOS A	1.5	11.2				
West: Manning River Drive													
Lane 1	449	7.0	1391	0.323	100	2.9	LOS A	2.3	17.2	Full	500	0.0	0.0
Lane 2[d]	460	7.0	1899	0.242	100	9.5	LOS A	1.7	12.9	Full	500	0.0	0.0
Approach	909	7.0		0.323		6.2	LOS A	2.3	17.2				
Intersection	3399	7.0		1.035		27.8	LOS C	64.9	481.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	403	5.0	1859	0.217	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2 [d]	324	5.0	1495	0.217	100	5.9	LOS A	1.8	13.3	Full	500	0.0	0.0
Approach	727	5.0		0.217		3.7	LOS A	1.8	13.3				
East: Old Bar Road													
Lane 1 [d]	469	5.0	793	0.592	100	14.4	LOS B	7.1	51.7	Full	500	0.0	0.0
Approach	469	5.0		0.592		14.4	LOS B	7.1	51.7				
North: Pacific Highway NB Ramps													
Lane 1 [d]	231	5.0	667	0.345	100	11.4	LOS B	1.9	13.7	Full	500	0.0	0.0
Approach	231	5.0		0.345		11.4	LOS B	1.9	13.7				
West: Manning River Drive													
Lane 1 [d]	1126	5.0	1962	0.574	100	2.7	LOS A	5.5	40.0	Full	500	0.0	0.0
Lane 2	862	5.0	1462	0.590	100	10.0	LOS B	5.6	41.1	Full	500	0.0	0.0
Approach	1988	5.0		0.590		5.9	LOS A	5.6	41.1				
Intersection	3416	5.0		0.592		7.0	LOS A	7.1	51.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2040 BG - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	840	7.0	1833	0.458	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	288	7.0	628	0.458	100	13.5	LOS B	5.6	41.9	Full	500	0.0	0.0
Approach	1128	7.0		0.458		4.9	LOS A	5.6	41.9				
East: Old Bar Road													
Lane 1[d]	1254	7.0	1068	1.174	100	178.1	LOS F	142.8	1059.7	Full	500	0.0	36.0
Approach	1254	7.0		1.174		178.1	LOS F	142.8	1059.7				
North: Pacific Highway NB Ramps													
Lane 1[d]	302	7.0	955	0.316	100	10.0	LOS A	1.5	11.4	Full	500	0.0	0.0
Approach	302	7.0		0.316		10.0	LOS A	1.5	11.4				
West: Manning River Drive													
Lane 1	486	7.0	1381	0.352	100	2.9	LOS A	2.6	19.1	Full	500	0.0	0.0
Lane 2[d]	519	7.0	1889	0.275	100	9.5	LOS A	2.0	15.0	Full	500	0.0	0.0
Approach	1005	7.0		0.352		6.4	LOS A	2.6	19.1				
Intersection	3689	7.0		1.174		64.6	LOS E	142.8	1059.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 BG - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	468	5.0	1859	0.252	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	360	5.0	1428	0.252	100	6.4	LOS A	2.2	16.3	Full	500	0.0	0.0
Approach	828	5.0		0.252		3.9	LOS A	2.2	16.3				
East: Old Bar Road													
Lane 1[d]	524	5.0	684	0.767	100	28.5	LOS C	13.4	98.0	Full	500	0.0	0.0
Approach	524	5.0		0.767		28.5	LOS C	13.4	98.0				
North: Pacific Highway NB Ramps													
Lane 1[d]	252	5.0	605	0.416	100	12.7	LOS B	2.5	18.1	Full	500	0.0	0.0
Approach	252	5.0		0.416		12.7	LOS B	2.5	18.1				
West: Manning River Drive													
Lane 1[d]	1160	5.0	1934	0.600	100	2.8	LOS A	6.0	43.8	Full	500	0.0	0.0
Lane 2	937	5.0	1429	0.656	100	10.3	LOS B	6.8	50.0	Full	500	0.0	0.0
Approach	2097	5.0		0.656		6.2	LOS A	6.8	50.0				
Intersection	3701	5.0		0.767		9.3	LOS A	13.4	98.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2040 DEV - AM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	905	7.0	1833	0.494	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	327	7.0	663	0.494	100	15.5	LOS B	6.4	47.3	Full	500	0.0	0.0
Approach	1233	7.0		0.494		5.6	LOS A	6.4	47.3				
East: Old Bar Road													
Lane 1[d]	1394	7.0	946	1.473	100	441.9	LOS F	302.6	2245.0	Full	500	0.0	100.0
Approach	1394	7.0		1.473		441.9	LOS F	302.6	2245.0				
North: Pacific Highway NB Ramps													
Lane 1[d]	411	7.0	933	0.440	100	11.1	LOS B	2.5	18.4	Full	500	0.0	0.0
Approach	411	7.0		0.440		11.1	LOS B	2.5	18.4				
West: Manning River Drive													
Lane 1[d]	546	7.0	1920	0.285	100	2.5	LOS A	2.1	15.4	Full	500	0.0	0.0
Lane 2	545	7.0	1411	0.386	100	9.9	LOS A	2.9	21.6	Full	500	0.0	0.0
Approach	1092	7.0		0.386		6.2	LOS A	2.9	21.6				
Intersection	4128	7.0		1.473		153.6	LOS F	302.6	2245.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2040 DEV - PM Peak]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	490	5.0	1859	0.264	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	365	5.0	1385	0.264	100	6.6	LOS A	2.4	17.5	Full	500	0.0	0.0
Approach	856	5.0		0.264		3.9	LOS A	2.4	17.5				
East: Old Bar Road													
Lane 1[d]	560	5.0	535	1.047	100	135.2	LOS F	50.6	369.6	Full	500	0.0	0.0
Approach	560	5.0		1.047		135.2	LOS F	50.6	369.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	279	5.0	500	0.558	100	18.2	LOS B	3.9	28.8	Full	500	0.0	0.0
Approach	279	5.0		0.558		18.2	LOS B	3.9	28.8				
West: Manning River Drive													
Lane 1[d]	1414	5.0	1933	0.731	100	3.1	LOS A	9.7	70.8	Full	500	0.0	0.0
Lane 2	1045	5.0	1435	0.729	100	10.5	LOS B	8.7	63.2	Full	500	0.0	0.0
Approach	2459	5.0		0.731		6.2	LOS A	9.7	70.8				
Intersection	4154	5.0		1.047		23.9	LOS C	50.6	369.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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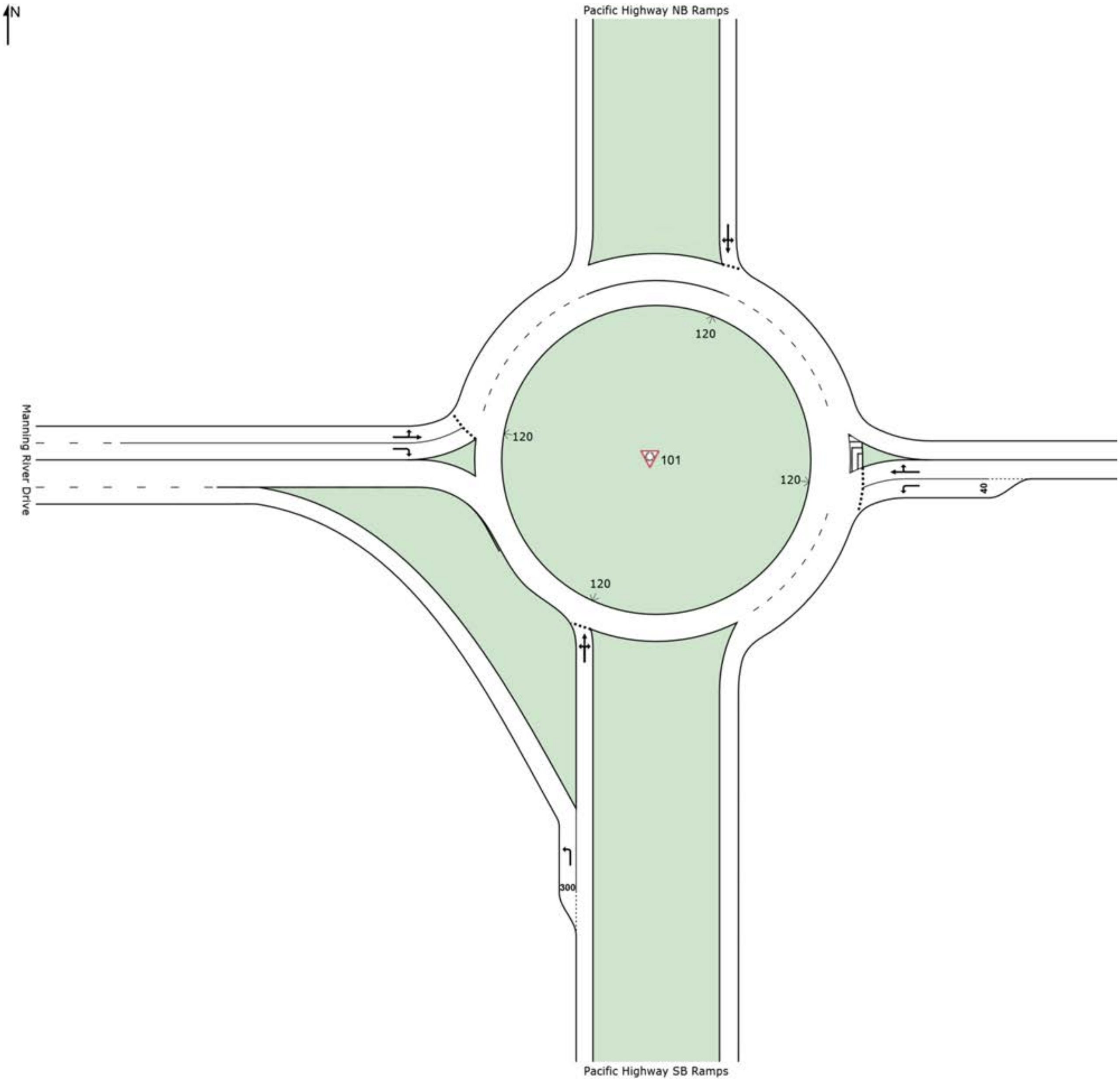
SITE LAYOUT

Site: 101 [2030 DEV - AM Peak - Upgraded]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout



Organisation: SLR CONSULTING AUSTRALIA | Created: 08 November 2018 10:07:11
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Old Bar Road-Pacific Highway Ramps v2.sip7

LANE SUMMARY

Site: 101 [2030 DEV - AM Peak - Upgraded]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	791	7.0	1833	0.431	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	235	7.0	544	0.431	100	17.4	LOS B	5.4	39.9	Full	500	0.0	0.0
Approach	1025	7.0		0.431		5.5	LOS A	5.4	39.9				
East: Old Bar Road													
Lane 1	99	7.0	1382	0.072	100	4.3	LOS A	0.5	3.6	Short	40	0.0	NA
Lane 2[d]	1052	7.0	1499	0.701	100	9.5	LOS A	10.2	75.6	Full	500	0.0	0.0
Approach	1151	7.0		0.701		9.0	LOS A	10.2	75.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	314	7.0	997	0.315	100	10.0	LOS A	1.5	11.2	Full	500	0.0	0.0
Approach	314	7.0		0.315		10.0	LOS A	1.5	11.2				
West: Manning River Drive													
Lane 1	449	7.0	1390	0.323	100	2.9	LOS A	2.3	16.9	Full	500	0.0	0.0
Lane 2[d]	460	7.0	1900	0.242	100	9.5	LOS A	1.7	12.7	Full	500	0.0	0.0
Approach	909	7.0		0.323		6.2	LOS A	2.3	16.9				
Intersection	3399	7.0		0.701		7.3	LOS A	10.2	75.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2030 DEV - PM Peak - Upgraded]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	403	5.0	1859	0.217	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	324	5.0	1495	0.217	100	5.9	LOS A	1.8	13.3	Full	500	0.0	0.0
Approach	727	5.0		0.217		3.7	LOS A	1.8	13.3				
East: Old Bar Road													
Lane 1	61	5.0	1088	0.056	100	6.5	LOS A	0.5	3.9	Short	40	0.0	NA
Lane 2[d]	408	5.0	1088	0.376	100	8.4	LOS A	3.9	28.5	Full	500	0.0	0.0
Approach	469	5.0		0.376		8.2	LOS A	3.9	28.5				
North: Pacific Highway NB Ramps													
Lane 1[d]	231	5.0	668	0.345	100	11.4	LOS B	1.9	13.7	Full	500	0.0	0.0
Approach	231	5.0		0.345		11.4	LOS B	1.9	13.7				
West: Manning River Drive													
Lane 1[d]	1126	5.0	1962	0.574	100	2.7	LOS A	5.5	40.0	Full	500	0.0	0.0
Lane 2	862	5.0	1462	0.590	100	10.0	LOS B	5.6	41.1	Full	500	0.0	0.0
Approach	1988	5.0		0.590		5.9	LOS A	5.6	41.1				
Intersection	3416	5.0		0.590		6.1	LOS A	5.6	41.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2040 DEV - AM Peak - Upgraded]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Pacific Highway SB Ramps													
Lane 1	1123	7.0	1833	0.612	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	110	7.0	180	0.612	100	53.1	LOS E	3.7	27.7	Full	500	0.0	0.0
Approach	1233	7.0		0.612		6.6	LOS A	3.7	27.7				
East: Old Bar Road													
Lane 1	115	7.0	1250	0.092	100	5.5	LOS A	0.8	5.6	Short	40	0.0	NA
Lane 2[d]	1279	7.0	1278	1.001	100	58.4	LOS E	61.7	457.6	Full	500	0.0	2.4
Approach	1394	7.0		1.001		54.1	LOS E	61.7	457.6				
North: Pacific Highway NB Ramps													
Lane 1[d]	411	7.0	917	0.448	100	11.2	LOS B	2.6	19.1	Full	500	0.0	0.0
Approach	411	7.0		0.448		11.2	LOS B	2.6	19.1				
West: Manning River Drive													
Lane 1[d]	546	7.0	1863	0.293	100	2.6	LOS A	2.2	16.4	Full	500	0.0	0.0
Lane 2	545	7.0	1349	0.404	100	10.1	LOS B	3.1	23.1	Full	500	0.0	0.0
Approach	1092	7.0		0.404		6.4	LOS A	3.1	23.1				
Intersection	4128	7.0		1.001		23.0	LOS C	61.7	457.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 DEV - PM Peak - Upgraded]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	495	5.0	1859	0.266	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2 [d]	361	5.0	1353	0.266	100	6.7	LOS A	2.5	17.9	Full	500	0.0	0.0
Approach	856	5.0		0.266		4.0	LOS A	2.5	17.9				
East: Old Bar Road													
Lane 1	72	5.0	725	0.099	100	11.0	LOS B	1.1	8.1	Short	40	0.0	NA
Lane 2 [d]	488	5.0	725	0.674	100	28.5	LOS C	12.5	91.2	Full	500	0.0	0.0
Approach	560	5.0		0.674		26.3	LOS C	12.5	91.2				
North: Pacific Highway NB Ramps													
Lane 1 [d]	279	5.0	499	0.559	100	18.2	LOS B	4.0	28.9	Full	500	0.0	0.0
Approach	279	5.0		0.559		18.2	LOS B	4.0	28.9				
West: Manning River Drive													
Lane 1 [d]	1414	5.0	1930	0.732	100	3.1	LOS A	9.7	71.0	Full	500	0.0	0.0
Lane 2	1045	5.0	1432	0.730	100	10.5	LOS B	8.7	63.4	Full	500	0.0	0.0
Approach	2459	5.0		0.732		6.2	LOS A	9.7	71.0				
Intersection	4154	5.0		0.732		9.3	LOS A	12.5	91.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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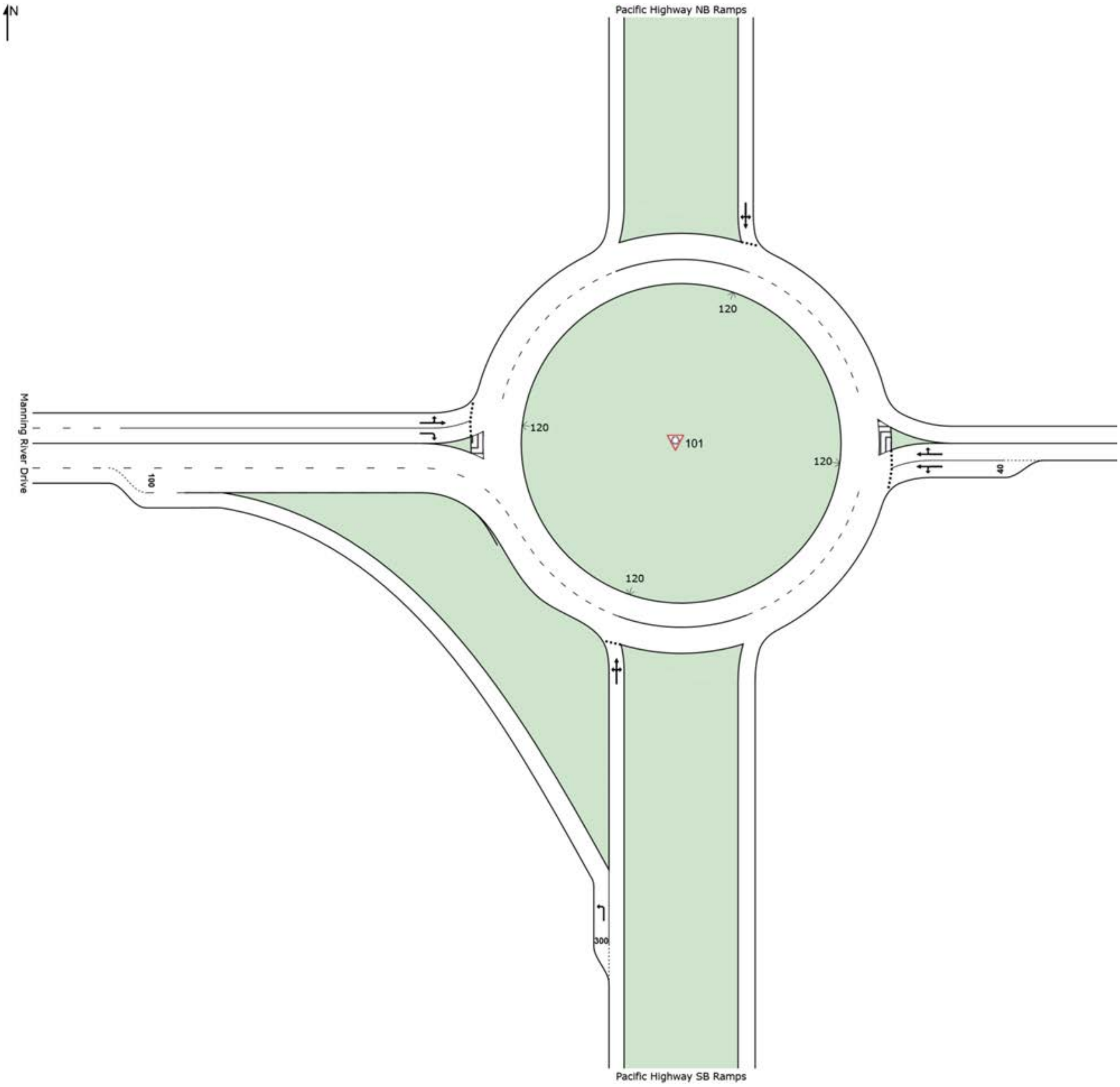
SITE LAYOUT

Site: 101 [2040 DEV - AM Peak - Ultimate]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout



Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Old Bar Road-Pacific Highway Ramps v2.sip7

LANE SUMMARY

Site: 101 [2040 DEV - AM Peak - Ultimate]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Pacific Highway SB Ramps													
Lane 1	999	7.0	1833	0.545	100	2.0	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	233	7.0	578	0.404	74[6]	11.5	LOS B	3.3	24.5	Full	500	0.0	0.0
Approach	1233	7.0		0.545		3.8	LOS A	3.3	24.5				
East: Old Bar Road													
Lane 1	497	7.0	860	0.578	82[6]	11.4	LOS B	6.2	45.9	Short	40	0.0	NA
Lane 2[d]	896	7.0	1278	0.701	100	13.5	LOS B	11.7	86.9	Full	500	0.0	0.0
Approach	1394	7.0		0.701		12.7	LOS B	11.7	86.9				
North: Pacific Highway NB Ramps													
Lane 1[d]	411	7.0	917	0.448	100	11.2	LOS B	2.6	19.1	Full	500	0.0	0.0
Approach	411	7.0		0.448		11.2	LOS B	2.6	19.1				
West: Manning River Drive													
Lane 1[d]	546	7.0	1863	0.293	100	2.6	LOS A	2.2	16.5	Full	500	0.0	0.0
Lane 2	545	7.0	1349	0.404	100	10.1	LOS B	3.1	23.1	Full	500	0.0	0.0
Approach	1092	7.0		0.404		6.4	LOS A	3.1	23.1				
Intersection	4128	7.0		0.701		8.2	LOS A	11.7	86.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 DEV - PM Peak - Ultimate]

Manning River Drive / Old Bar Road / Pacific Highway Ramps
Roundabout

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Pacific Highway SB Ramps													
Lane 1	576	5.0	1859	0.310	100	1.9	LOS A	0.0	0.0	Short	300	0.0	NA
Lane 2[d]	280	5.0	1221	0.229	74[6]	6.5	LOS A	1.4	9.9	Full	500	0.0	0.0
Approach	856	5.0		0.310		3.4	LOS A	1.4	9.9				
East: Old Bar Road													
Lane 1	199	5.0	491	0.405	82[6]	14.5	LOS B	3.7	26.9	Short	40	0.0	NA
Lane 2[d]	361	5.0	735	0.491	100	15.0	LOS B	6.2	45.5	Full	500	0.0	0.0
Approach	560	5.0		0.491		14.9	LOS B	6.2	45.5				
North: Pacific Highway NB Ramps													
Lane 1[d]	279	5.0	508	0.549	100	18.0	LOS B	3.9	28.2	Full	500	0.0	0.0
Approach	279	5.0		0.549		18.0	LOS B	3.9	28.2				
West: Manning River Drive													
Lane 1[d]	1414	5.0	1943	0.727	100	3.1	LOS A	9.2	67.4	Full	500	0.0	0.0
Lane 2	1045	5.0	1441	0.725	100	10.5	LOS B	8.3	60.8	Full	500	0.0	0.0
Approach	2459	5.0		0.727		6.2	LOS A	9.2	67.4				
Intersection	4154	5.0		0.727		7.6	LOS A	9.2	67.4				

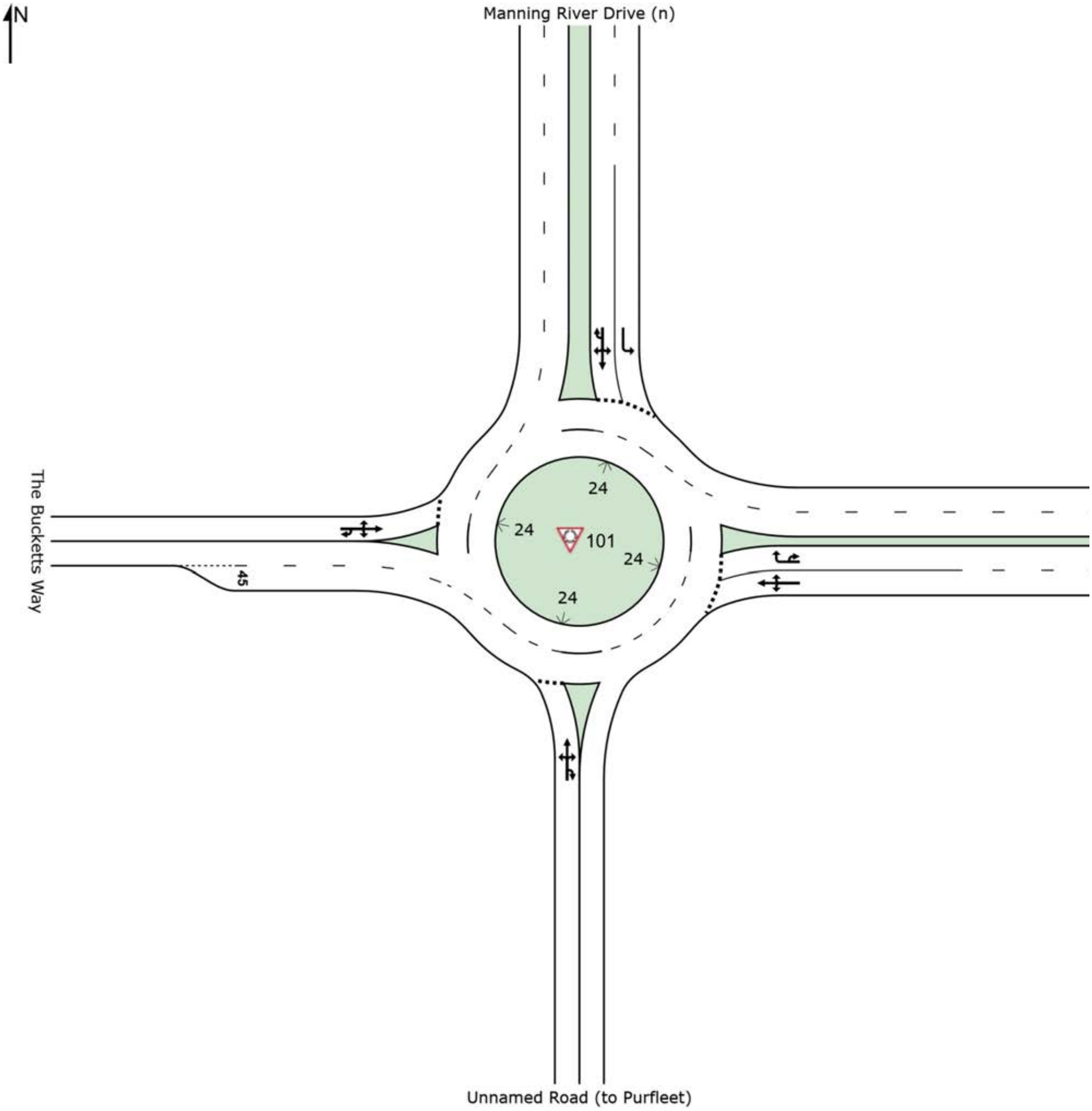
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

SITE LAYOUT

Site: 101 [2018 BG - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout



LANE SUMMARY

Site: 101 [2018 BG - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	17	6.0	589	0.029	100	10.2	LOS B	0.1	0.8	Full	500	0.0	0.0
Approach	17	6.0		0.029		10.2	LOS B	0.1	0.8				
East: Manning River Drive (e)													
Lane 1[d]	688	6.0	1332	0.517	100	8.9	LOS A	3.3	24.5	Full	500	0.0	0.0
Lane 2	622	6.0	1203	0.517	100	9.8	LOS A	3.3	24.2	Full	500	0.0	0.0
Approach	1311	6.0		0.517		9.3	LOS A	3.3	24.5				
North: Manning River Drive (n)													
Lane 1[d]	283	6.0	1239	0.229	100	4.5	LOS A	1.2	8.8	Full	500	0.0	0.0
Lane 2	262	6.0	1146	0.229	100	6.2	LOS A	1.2	8.7	Full	500	0.0	0.0
Approach	545	6.0		0.229		5.3	LOS A	1.2	8.8				
West: The Bucketts Way													
Lane 1[d]	313	6.0	620	0.505	100	10.2	LOS B	2.7	20.2	Full	500	0.0	0.0
Approach	313	6.0		0.505		10.2	LOS B	2.7	20.2				
Intersection	2185	6.0		0.517		8.4	LOS A	3.3	24.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2018 BG - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Unnamed Road (to Purfleet)													
Lane 1[d]	35	4.0	731	0.048	100	8.0	LOS A	0.2	1.3	Full	500	0.0	0.0
Approach	35	4.0		0.048		8.0	LOS A	0.2	1.3				
East: Manning River Drive (e)													
Lane 1[d]	403	4.0	1240	0.325	100	8.3	LOS A	1.7	12.0	Full	500	0.0	0.0
Lane 2	370	4.0	1139	0.325	100	9.9	LOS A	1.6	11.9	Full	500	0.0	0.0
Approach	773	4.0		0.325		9.1	LOS A	1.7	12.0				
North: Manning River Drive (n)													
Lane 1[d]	667	4.0	1405	0.475	100	4.3	LOS A	3.1	22.5	Full	500	0.0	0.0
Lane 2	600	4.0	1264	0.475	100	5.8	LOS A	3.1	22.2	Full	500	0.0	0.0
Approach	1266	4.0		0.475		5.0	LOS A	3.1	22.5				
West: The Bucketts Way													
Lane 1[d]	157	4.0	796	0.197	100	6.5	LOS A	0.8	5.9	Full	500	0.0	0.0
Approach	157	4.0		0.197		6.5	LOS A	0.8	5.9				
Intersection	2231	4.0		0.475		6.6	LOS A	3.1	22.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 BG - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance														
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Unnamed Road (to Purfleet)													
Lane 1[d]	17	6.0	545	0.031	100	10.7	LOS B	0.1	0.9	Full	500	0.0	0.0
Approach	17	6.0		0.031		10.7	LOS B	0.1	0.9				
East: Manning River Drive (e)													
Lane 1[d]	758	6.0	1325	0.572	100	9.0	LOS A	4.0	29.3	Full	500	0.0	0.0
Lane 2	684	6.0	1195	0.572	100	9.9	LOS A	3.9	28.9	Full	500	0.0	0.0
Approach	1442	6.0		0.572		9.4	LOS A	4.0	29.3				
North: Manning River Drive (n)													
Lane 1[d]	307	6.0	1234	0.249	100	4.5	LOS A	1.3	9.9	Full	500	0.0	0.0
Lane 2	284	6.0	1140	0.249	100	6.3	LOS A	1.3	9.7	Full	500	0.0	0.0
Approach	591	6.0		0.249		5.4	LOS A	1.3	9.9				
West: The Bucketts Way													
Lane 1[d]	340	6.0	575	0.591	100	11.9	LOS B	3.5	26.0	Full	500	0.0	0.0
Approach	340	6.0		0.591		11.9	LOS B	3.5	26.0				
Intersection	2389	6.0		0.591		8.8	LOS A	4.0	29.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 BG - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	36	4.0	701	0.051	100	8.2	LOS A	0.2	1.4	Full	500	0.0	0.0
Approach	36	4.0		0.051		8.2	LOS A	0.2	1.4				
East: Manning River Drive (e)													
Lane 1[d]	430	4.0	1219	0.353	100	8.5	LOS A	1.9	13.5	Full	500	0.0	0.0
Lane 2	394	4.0	1118	0.353	100	10.0	LOS B	1.8	13.3	Full	500	0.0	0.0
Approach	824	4.0		0.353		9.2	LOS A	1.9	13.5				
North: Manning River Drive (n)													
Lane 1[d]	744	4.0	1407	0.529	100	4.4	LOS A	3.8	27.2	Full	500	0.0	0.0
Lane 2	668	4.0	1263	0.529	100	5.8	LOS A	3.7	26.8	Full	500	0.0	0.0
Approach	1412	4.0		0.529		5.1	LOS A	3.8	27.2				
West: The Bucketts Way													
Lane 1[d]	166	4.0	773	0.215	100	6.6	LOS A	0.9	6.5	Full	500	0.0	0.0
Approach	166	4.0		0.215		6.6	LOS A	0.9	6.5				
Intersection	2438	4.0		0.529		6.6	LOS A	3.8	27.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 DEV - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Unnamed Road (to Purfleet)													
Lane 1[d]	17	6.0	545	0.031	100	10.7	LOS B	0.1	0.9	Full	500	0.0	0.0
Approach	17	6.0		0.031		10.7	LOS B	0.1	0.9				
East: Manning River Drive (e)													
Lane 1[d]	758	6.0	1325	0.572	100	9.0	LOS A	4.0	29.3	Full	500	0.0	0.0
Lane 2	684	6.0	1195	0.572	100	9.9	LOS A	3.9	28.9	Full	500	0.0	0.0
Approach	1442	6.0		0.572		9.4	LOS A	4.0	29.3				
North: Manning River Drive (n)													
Lane 1[d]	307	6.0	1234	0.249	100	4.5	LOS A	1.3	9.9	Full	500	0.0	0.0
Lane 2	284	6.0	1140	0.249	100	6.3	LOS A	1.3	9.7	Full	500	0.0	0.0
Approach	591	6.0		0.249		5.4	LOS A	1.3	9.9				
West: The Bucketts Way													
Lane 1[d]	340	6.0	575	0.591	100	11.9	LOS B	3.5	26.0	Full	500	0.0	0.0
Approach	340	6.0		0.591		11.9	LOS B	3.5	26.0				
Intersection	2389	6.0		0.591		8.8	LOS A	4.0	29.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2020 DEV - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	36	4.0	701	0.051	100	8.2	LOS A	0.2	1.4	Full	500	0.0	0.0
Approach	36	4.0		0.051		8.2	LOS A	0.2	1.4				
East: Manning River Drive (e)													
Lane 1[d]	430	4.0	1219	0.353	100	8.5	LOS A	1.9	13.5	Full	500	0.0	0.0
Lane 2	394	4.0	1118	0.353	100	10.0	LOS B	1.8	13.3	Full	500	0.0	0.0
Approach	824	4.0		0.353		9.2	LOS A	1.9	13.5				
North: Manning River Drive (n)													
Lane 1[d]	744	4.0	1407	0.529	100	4.4	LOS A	3.8	27.2	Full	500	0.0	0.0
Lane 2	668	4.0	1263	0.529	100	5.8	LOS A	3.7	26.8	Full	500	0.0	0.0
Approach	1412	4.0		0.529		5.1	LOS A	3.8	27.2				
West: The Bucketts Way													
Lane 1[d]	166	4.0	773	0.215	100	6.6	LOS A	0.9	6.5	Full	500	0.0	0.0
Approach	166	4.0		0.215		6.6	LOS A	0.9	6.5				
Intersection	2438	4.0		0.529		6.6	LOS A	3.8	27.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 BG - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1 [d]	18	6.0	476	0.038	100	11.7	LOS B	0.2	1.2	Full	500	0.0	0.0
Approach	18	6.0		0.038		11.7	LOS B	0.2	1.2				
East: Manning River Drive (e)													
Lane 1 [d]	862	6.0	1312	0.657	100	9.3	LOS A	5.2	38.2	Full	500	0.0	0.0
Lane 2	775	6.0	1180	0.657	100	10.1	LOS B	5.1	37.7	Full	500	0.0	0.0
Approach	1637	6.0		0.657		9.7	LOS A	5.2	38.2				
North: Manning River Drive (n)													
Lane 1 [d]	346	6.0	1219	0.284	100	4.6	LOS A	1.6	11.9	Full	500	0.0	0.0
Lane 2	318	6.0	1123	0.284	100	6.4	LOS A	1.6	11.6	Full	500	0.0	0.0
Approach	664	6.0		0.284		5.4	LOS A	1.6	11.9				
West: The Bucketts Way													
Lane 1 [d]	382	6.0	506	0.755	100	17.1	LOS B	5.5	40.8	Full	500	0.0	0.0
Approach	382	6.0		0.755		17.1	LOS B	5.5	40.8				
Intersection	2701	6.0		0.755		9.7	LOS A	5.5	40.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2025 BG - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	39	4.0	651	0.060	100	8.6	LOS A	0.2	1.7	Full	500	0.0	0.0
Approach	39	4.0		0.060		8.6	LOS A	0.2	1.7				
East: Manning River Drive (e)													
Lane 1[d]	479	4.0	1192	0.402	100	8.7	LOS A	2.3	16.5	Full	500	0.0	0.0
Lane 2	438	4.0	1088	0.402	100	10.3	LOS B	2.2	16.2	Full	500	0.0	0.0
Approach	917	4.0		0.402		9.4	LOS A	2.3	16.5				
North: Manning River Drive (n)													
Lane 1[d]	852	4.0	1401	0.608	100	4.5	LOS A	4.9	35.3	Full	500	0.0	0.0
Lane 2	763	4.0	1255	0.608	100	6.0	LOS A	4.8	34.9	Full	500	0.0	0.0
Approach	1615	4.0		0.608		5.2	LOS A	4.9	35.3				
West: The Bucketts Way													
Lane 1[d]	184	4.0	732	0.252	100	6.9	LOS A	1.1	7.9	Full	500	0.0	0.0
Approach	184	4.0		0.252		6.9	LOS A	1.1	7.9				
Intersection	2755	4.0		0.608		6.8	LOS A	4.9	35.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2025 DEV - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	20	6.0	469	0.043	100	11.8	LOS B	0.2	1.3	Full	500	0.0	0.0
Approach	20	6.0		0.043		11.8	LOS B	0.2	1.3				
East: Manning River Drive (e)													
Lane 1[d]	872	6.0	1311	0.665	100	9.3	LOS A	5.4	39.6	Full	500	0.0	0.0
Lane 2	785	6.0	1179	0.665	100	10.1	LOS B	5.3	39.0	Full	500	0.0	0.0
Approach	1657	6.0		0.665		9.7	LOS A	5.4	39.6				
North: Manning River Drive (n)													
Lane 1[d]	380	6.0	1203	0.316	100	4.7	LOS A	1.9	13.7	Full	500	0.0	0.0
Lane 2	349	6.0	1106	0.316	100	6.3	LOS A	1.8	13.4	Full	500	0.0	0.0
Approach	729	6.0		0.316		5.5	LOS A	1.9	13.7				
West: The Bucketts Way													
Lane 1[d]	397	6.0	499	0.796	100	19.2	LOS B	6.3	46.5	Full	500	0.0	0.0
Approach	397	6.0		0.796		19.2	LOS B	6.3	46.5				
Intersection	2803	6.0		0.796		10.0	LOS A	6.3	46.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 DEV - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	39	4.0	623	0.063	100	8.9	LOS A	0.3	1.8	Full	500	0.0	0.0
Approach	39	4.0		0.063		8.9	LOS A	0.3	1.8				
East: Manning River Drive (e)													
Lane 1[d]	523	4.0	1195	0.438	100	8.7	LOS A	2.6	18.7	Full	500	0.0	0.0
Lane 2	477	4.0	1089	0.438	100	10.3	LOS B	2.5	18.3	Full	500	0.0	0.0
Approach	1000	4.0		0.438		9.5	LOS A	2.6	18.7				
North: Manning River Drive (n)													
Lane 1[d]	861	4.0	1393	0.618	100	4.5	LOS A	5.1	36.6	Full	500	0.0	0.0
Lane 2	771	4.0	1248	0.618	100	6.0	LOS A	5.0	36.1	Full	500	0.0	0.0
Approach	1632	4.0		0.618		5.2	LOS A	5.1	36.6				
West: The Bucketts Way													
Lane 1[d]	188	4.0	709	0.266	100	7.2	LOS A	1.2	8.5	Full	500	0.0	0.0
Approach	188	4.0		0.266		7.2	LOS A	1.2	8.5				
Intersection	2859	4.0		0.618		6.9	LOS A	5.1	36.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2030 BG - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	20	6.0	360	0.055	100	13.2	LOS B	0.3	1.9	Full	500	0.0	0.0
Approach	20	6.0		0.055		13.2	LOS B	0.3	1.9				
East: Manning River Drive (e)													
Lane 1[d]	964	6.0	1237	0.780	100	10.6	LOS B	8.7	63.8	Full	500	0.0	0.0
Lane 2	866	6.0	1110	0.780	100	12.3	LOS B	8.8	65.0	Full	500	0.0	0.0
Approach	1831	6.0		0.780		11.4	LOS B	8.8	65.0				
North: Manning River Drive (n)													
Lane 1[d]	403	6.0	1199	0.336	100	4.7	LOS A	2.1	15.1	Full	500	0.0	0.0
Lane 2	370	6.0	1100	0.336	100	7.1	LOS A	2.0	14.8	Full	500	0.0	0.0
Approach	773	6.0		0.336		5.9	LOS A	2.1	15.1				
West: The Bucketts Way													
Lane 1[d]	444	6.0	412	1.079	100	109.7	LOS F	32.7	240.8	Full	500	0.0	0.0
Approach	444	6.0		1.079		109.7	LOS F	32.7	240.8				
Intersection	3067	6.0		1.079		24.3	LOS C	32.7	240.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Unnamed Road (to Purfleet)													
Lane 1[d]	43	4.0	598	0.072	100	9.1	LOS A	0.3	2.2	Full	500	0.0	0.0
Approach	43	4.0		0.072		9.1	LOS A	0.3	2.2				
East: Manning River Drive (e)													
Lane 1[d]	529	4.0	1149	0.460	100	8.7	LOS A	2.9	21.2	Full	500	0.0	0.0
Lane 2	481	4.0	1045	0.460	100	10.5	LOS B	2.8	20.6	Full	500	0.0	0.0
Approach	1009	4.0		0.460		9.6	LOS A	2.9	21.2				
North: Manning River Drive (n)													
Lane 1[d]	919	4.0	1280	0.718	100	5.1	LOS A	6.7	48.4	Full	500	0.0	0.0
Lane 2	826	4.0	1152	0.718	100	6.9	LOS A	6.6	47.6	Full	500	0.0	0.0
Approach	1745	4.0		0.718		5.9	LOS A	6.7	48.4				
West: The Bucketts Way													
Lane 1[d]	333	4.0	696	0.478	100	8.6	LOS A	2.7	19.4	Full	500	0.0	0.0
Approach	333	4.0		0.478		8.6	LOS A	2.7	19.4				
Intersection	3131	4.0		0.718		7.4	LOS A	6.7	48.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	25	6.0	337	0.075	100	14.3	LOS B	0.3	2.6	Full	500	0.0	0.0
Approach	25	6.0		0.075		14.3	LOS B	0.3	2.6				
East: Manning River Drive (e)													
Lane 1[d]	999	6.0	1235	0.808	100	11.0	LOS B	10.0	73.4	Full	500	0.0	0.0
Lane 2	896	6.0	1109	0.808	100	12.8	LOS B	10.2	74.7	Full	500	0.0	0.0
Approach	1895	6.0		0.808		11.9	LOS B	10.2	74.7				
North: Manning River Drive (n)													
Lane 1[d]	511	6.0	1193	0.429	100	4.9	LOS A	2.9	21.0	Full	500	0.0	0.0
Lane 2	466	6.0	1088	0.429	100	6.8	LOS A	2.8	20.5	Full	500	0.0	0.0
Approach	978	6.0		0.429		5.8	LOS A	2.9	21.0				
West: The Bucketts Way													
Lane 1[d]	491	6.0	385	1.273	100	268.8	LOS F	75.5	555.4	Full	500	0.0	8.2
Approach	491	6.0		1.273		268.8	LOS F	75.5	555.4				
Intersection	3388	6.0		1.273		47.3	LOS D	75.5	555.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:29:49
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-The Bucketts Way v2.sip7

LANE SUMMARY

Site: 101 [2030 DEV - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	44	4.0	506	0.087	100	10.1	LOS B	0.4	2.8	Full	500	0.0	0.0
Approach	44	4.0		0.087		10.1	LOS B	0.4	2.8				
East: Manning River Drive (e)													
Lane 1[d]	669	4.0	1156	0.579	100	8.9	LOS A	4.2	30.7	Full	500	0.0	0.0
Lane 2	605	4.0	1045	0.579	100	10.8	LOS B	4.2	30.4	Full	500	0.0	0.0
Approach	1275	4.0		0.579		9.8	LOS A	4.2	30.7				
North: Manning River Drive (n)													
Lane 1[d]	947	4.0	1260	0.752	100	5.5	LOS A	7.7	56.1	Full	500	0.0	0.0
Lane 2	852	4.0	1133	0.752	100	7.5	LOS A	7.9	57.4	Full	500	0.0	0.0
Approach	1799	4.0		0.752		6.4	LOS A	7.9	57.4				
West: The Bucketts Way													
Lane 1[d]	345	4.0	601	0.574	100	10.6	LOS B	3.6	26.0	Full	500	0.0	0.0
Approach	345	4.0		0.574		10.6	LOS B	3.6	26.0				
Intersection	3463	4.0		0.752		8.1	LOS A	7.9	57.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:29:50
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-The Bucketts Way v2.sip7

LANE SUMMARY

Site: 101 [2040 BG - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	24	6.0	203	0.119	100	19.7	LOS B	0.6	4.5	Full	500	0.0	0.0
Approach	24	6.0		0.119		19.7	LOS B	0.6	4.5				
East: Manning River Drive (e)													
Lane 1[d]	1173	6.0	1192	0.984	100	28.7	LOS C	35.1	258.4	Full	500	0.0	0.0
Lane 2	1046	6.0	1063	0.984	100	32.4	LOS C	34.1	250.7	Full	500	0.0	0.0
Approach	2219	6.0		0.984		30.5	LOS C	35.1	258.4				
North: Manning River Drive (n)													
Lane 1[d]	493	6.0	1296	0.380	100	4.5	LOS A	2.5	18.1	Full	500	0.0	0.0
Lane 2	449	6.0	1181	0.380	100	7.1	LOS A	2.4	17.7	Full	500	0.0	0.0
Approach	942	6.0		0.380		5.7	LOS A	2.5	18.1				
West: The Bucketts Way													
Lane 1[d]	541	6.0	255	2.126	100	1030.4	LOS F	191.2	1407.4	Full	500	0.0	73.6
Approach	541	6.0		2.126		1030.4	LOS F	191.2	1407.4				
Intersection	3726	6.0		2.126		169.3	LOS F	191.2	1407.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2040 BG - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	49	4.0	488	0.101	100	10.1	LOS B	0.5	3.3	Full	500	0.0	0.0
Approach	49	4.0		0.101		10.1	LOS B	0.5	3.3				
East: Manning River Drive (e)													
Lane 1[d]	630	4.0	1066	0.591	100	9.6	LOS A	4.9	35.3	Full	500	0.0	0.0
Lane 2	568	4.0	961	0.591	100	11.6	LOS B	4.8	34.8	Full	500	0.0	0.0
Approach	1198	4.0		0.591		10.5	LOS B	4.9	35.3				
North: Manning River Drive (n)													
Lane 1[d]	1112	4.0	1208	0.921	100	11.5	LOS B	19.8	143.1	Full	500	0.0	0.0
Lane 2	995	4.0	1081	0.921	100	14.5	LOS B	19.9	143.8	Full	500	0.0	0.0
Approach	2107	4.0		0.921		12.9	LOS B	19.9	143.8				
West: The Bucketts Way													
Lane 1[d]	449	4.0	600	0.749	100	13.6	LOS B	6.0	43.7	Full	500	0.0	0.0
Approach	449	4.0		0.749		13.6	LOS B	6.0	43.7				
Intersection	3804	4.0		0.921		12.2	LOS B	19.9	143.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:29:52
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-The Bucketts Way v2.sip7

LANE SUMMARY

Site: 101 [2040 DEV - AM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance														
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Unnamed Road (to Purfleet)													
Lane 1[d]	31	6.0	198	0.154	100	20.2	LOS C	0.8	5.8	Full	500	0.0	0.0
Approach	31	6.0		0.154		20.2	LOS C	0.8	5.8				
East: Manning River Drive (e)													
Lane 1[d]	1197	6.0	1183	1.012	100	42.4	LOS D	49.4	363.9	Full	500	0.0	0.0
Lane 2	1067	6.0	1054	1.012	100	46.2	LOS D	46.8	344.2	Full	500	0.0	0.0
Approach	2263	6.0		1.012		44.2	LOS D	49.4	363.9				
North: Manning River Drive (n)													
Lane 1[d]	571	6.0	1298	0.440	100	4.5	LOS A	3.0	22.2	Full	500	0.0	0.0
Lane 2	518	6.0	1179	0.440	100	6.9	LOS A	2.9	21.7	Full	500	0.0	0.0
Approach	1089	6.0		0.440		5.6	LOS A	3.0	22.2				
West: The Bucketts Way													
Lane 1[d]	604	6.0	251	2.408	100	1283.2	LOS F	234.3	1724.2	Full	500	0.0	100.0
Approach	604	6.0		2.408		1283.2	LOS F	234.3	1724.2				
Intersection	3987	6.0		2.408		221.2	LOS F	234.3	1724.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:29:53
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-The Bucketts Way v2.sip7

LANE SUMMARY

Site: 101 [2040 DEV - PM Peak]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1 [d]	52	4.0	407	0.127	100	11.3	LOS B	0.6	4.3	Full	500	0.0	0.0
Approach	52	4.0		0.127		11.3	LOS B	0.6	4.3				
East: Manning River Drive (e)													
Lane 1 [d]	726	4.0	1035	0.702	100	11.2	LOS B	7.4	53.9	Full	500	0.0	0.0
Lane 2	651	4.0	928	0.702	100	13.4	LOS B	7.3	52.5	Full	500	0.0	0.0
Approach	1378	4.0		0.702		12.2	LOS B	7.4	53.9				
North: Manning River Drive (n)													
Lane 1 [d]	1152	4.0	1195	0.964	100	17.3	LOS B	28.6	206.8	Full	500	0.0	0.0
Lane 2	1029	4.0	1068	0.964	100	21.2	LOS C	28.2	204.4	Full	500	0.0	0.0
Approach	2181	4.0		0.964		19.1	LOS B	28.6	206.8				
West: The Bucketts Way													
Lane 1 [d]	465	4.0	520	0.895	100	24.1	LOS C	10.0	72.1	Full	500	0.0	0.0
Approach	465	4.0		0.895		24.1	LOS C	10.0	72.1				
Intersection	4076	4.0		0.964		17.3	LOS B	28.6	206.8				

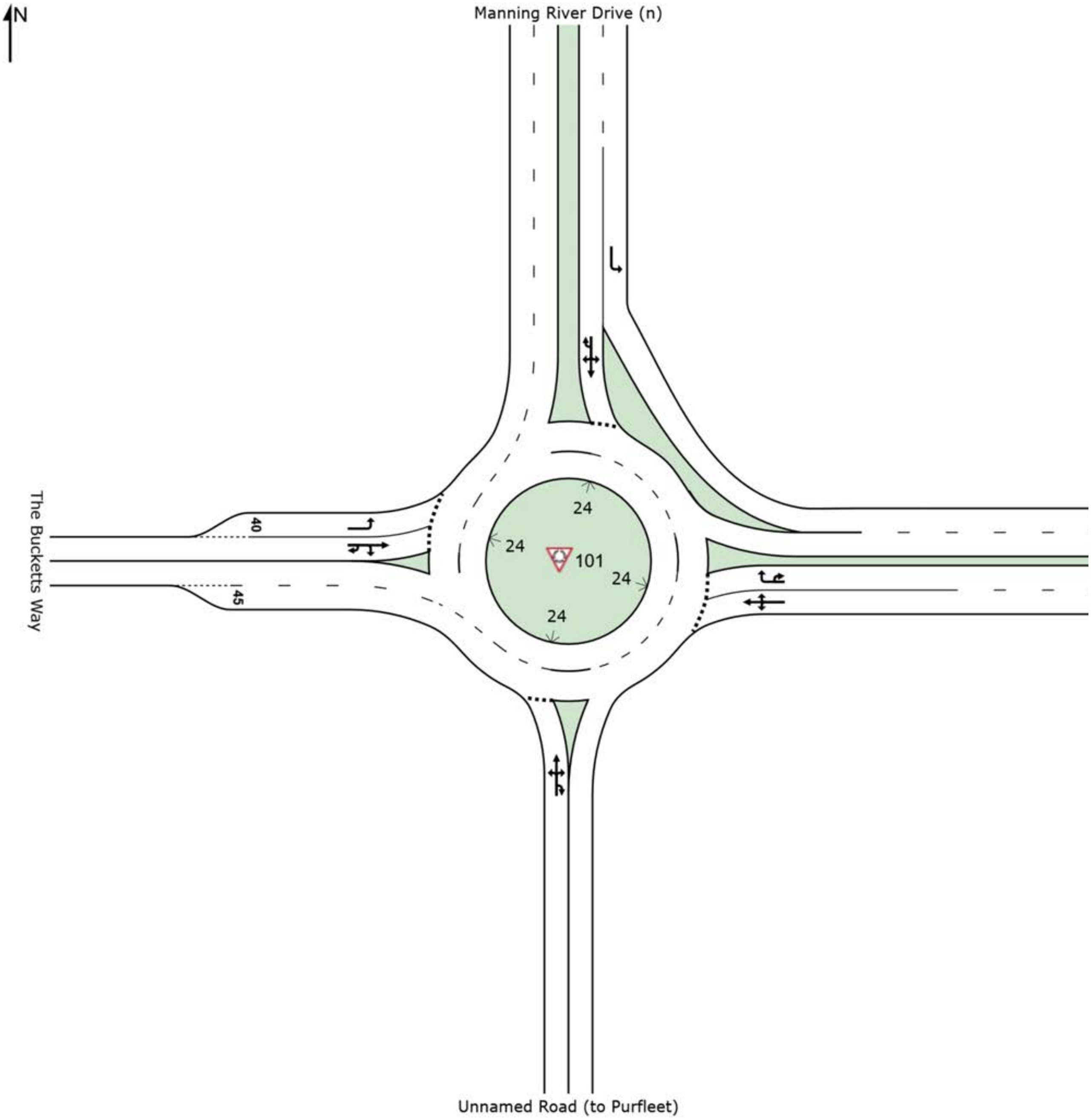
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

SITE LAYOUT

Site: 101 [2030 DEV - AM Peak - Upgraded]

Manning River Drive / The Bucketts Way
Roundabout



LANE SUMMARY

Site: 101 [2030 DEV - AM Peak - Upgraded]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	25	6.0	337	0.075	100	14.3	LOS B	0.3	2.6	Full	500	0.0	0.0
Approach	25	6.0		0.075		14.3	LOS B	0.3	2.6				
East: Manning River Drive (e)													
Lane 1[d]	999	6.0	1235	0.809	100	11.0	LOS B	10.0	73.5	Full	500	0.0	0.0
Lane 2	896	6.0	1108	0.809	100	12.9	LOS B	10.2	74.8	Full	500	0.0	0.0
Approach	1895	6.0		0.809		11.9	LOS B	10.2	74.8				
North: Manning River Drive (n)													
Lane 1	607	6.0	1846	0.329	100	3.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2[d]	371	6.0	1128	0.329	100	7.1	LOS A	1.9	14.2	Full	500	0.0	0.0
Approach	978	6.0		0.329		4.8	LOS A	1.9	14.2				
West: The Bucketts Way													
Lane 1[d]	269	6.0	520	0.518	100	11.6	LOS B	3.3	24.4	Short	40	0.0	NA
Lane 2	221	6.0	372	0.594	100	15.7	LOS B	3.5	25.9	Full	500	0.0	0.0
Approach	491	6.0		0.594		13.4	LOS B	3.5	25.9				
Intersection	3388	6.0		0.809		10.1	LOS B	10.2	74.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - PM Peak - Upgraded]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	44	4.0	512	0.086	100	10.1	LOS B	0.4	2.7	Full	500	0.0	0.0
Approach	44	4.0		0.086		10.1	LOS B	0.4	2.7				
East: Manning River Drive (e)													
Lane 1[d]	669	4.0	1170	0.572	100	8.9	LOS A	4.0	29.0	Full	500	0.0	0.0
Lane 2	605	4.0	1058	0.572	100	10.8	LOS B	3.9	28.5	Full	500	0.0	0.0
Approach	1275	4.0		0.572		9.8	LOS A	4.0	29.0				
North: Manning River Drive (n)													
Lane 1	1078	4.0	1871	0.576	100	3.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2[d]	721	4.0	1251	0.576	100	6.3	LOS A	4.3	31.2	Full	500	0.0	0.0
Approach	1799	4.0		0.576		4.6	LOS A	4.3	31.2				
West: The Bucketts Way													
Lane 1[d]	179	4.0	779	0.230	100	7.0	LOS A	1.1	8.2	Short	40	0.0	NA
Lane 2	166	4.0	632	0.263	100	7.8	LOS A	1.2	8.9	Full	500	0.0	0.0
Approach	345	4.0		0.263		7.4	LOS A	1.2	8.9				
Intersection	3463	4.0		0.576		6.9	LOS A	4.3	31.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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LANE SUMMARY

Site: 101 [2040 DEV - AM Peak - Upgraded]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1[d]	31	6.0	203	0.151	100	19.8	LOS B	0.8	5.6	Full	500	0.0	0.0
Approach	31	6.0		0.151		19.8	LOS B	0.8	5.6				
East: Manning River Drive (e)													
Lane 1[d]	1197	6.0	1169	1.024	100	49.9	LOS D	55.0	404.9	Full	500	0.0	0.0
Lane 2	1066	6.0	1041	1.024	100	53.6	LOS E	51.7	380.5	Full	500	0.0	0.0
Approach	2263	6.0		1.024		51.6	LOS E	55.0	404.9				
North: Manning River Drive (n)													
Lane 1	681	6.0	1846	0.369	100	3.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2[d]	408	6.0	1107	0.369	100	7.8	LOS A	2.3	17.0	Full	500	0.0	0.0
Approach	1089	6.0		0.369		5.1	LOS A	2.3	17.0				
West: The Bucketts Way													
Lane 1[d]	362	6.0	351	1.032	100	91.8	LOS F	21.8	160.7	Short	40	0.0	NA
Lane 2	242	6.0	239	1.015	100	91.4	LOS F	14.4	105.9	Full	500	0.0	0.0
Approach	604	6.0		1.032		91.7	LOS F	21.8	160.7				
Intersection	3987	6.0		1.032		44.7	LOS D	55.0	404.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 DEV - PM Peak - Upgraded]

Manning River Drive / The Bucketts Way
Roundabout

Lane Use and Performance														
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Unnamed Road (to Purfleet)													
Lane 1[d]	52	4.0	421	0.123	100	11.3	LOS B	0.6	4.2	Full	500	0.0	0.0
Approach	52	4.0		0.123		11.3	LOS B	0.6	4.2				
East: Manning River Drive (e)													
Lane 1[d]	726	4.0	1069	0.679	100	10.9	LOS B	6.6	47.8	Full	500	0.0	0.0
Lane 2	651	4.0	959	0.679	100	13.1	LOS B	6.5	46.9	Full	500	0.0	0.0
Approach	1378	4.0		0.679		12.0	LOS B	6.6	47.8				
North: Manning River Drive (n)													
Lane 1	1332	4.0	1871	0.712	100	3.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2[d]	849	4.0	1192	0.712	100	7.8	LOS A	7.0	50.9	Full	500	0.0	0.0
Approach	2181	4.0		0.712		5.2	LOS A	7.0	50.9				
West: The Bucketts Way													
Lane 1[d]	245	4.0	690	0.355	100	7.6	LOS A	2.0	14.3	Short	40	0.0	NA
Lane 2	220	4.0	549	0.401	100	9.2	LOS A	2.2	15.6	Full	500	0.0	0.0
Approach	465	4.0		0.401		8.4	LOS A	2.2	15.6				
Intersection	4076	4.0		0.712		7.9	LOS A	7.0	50.9				

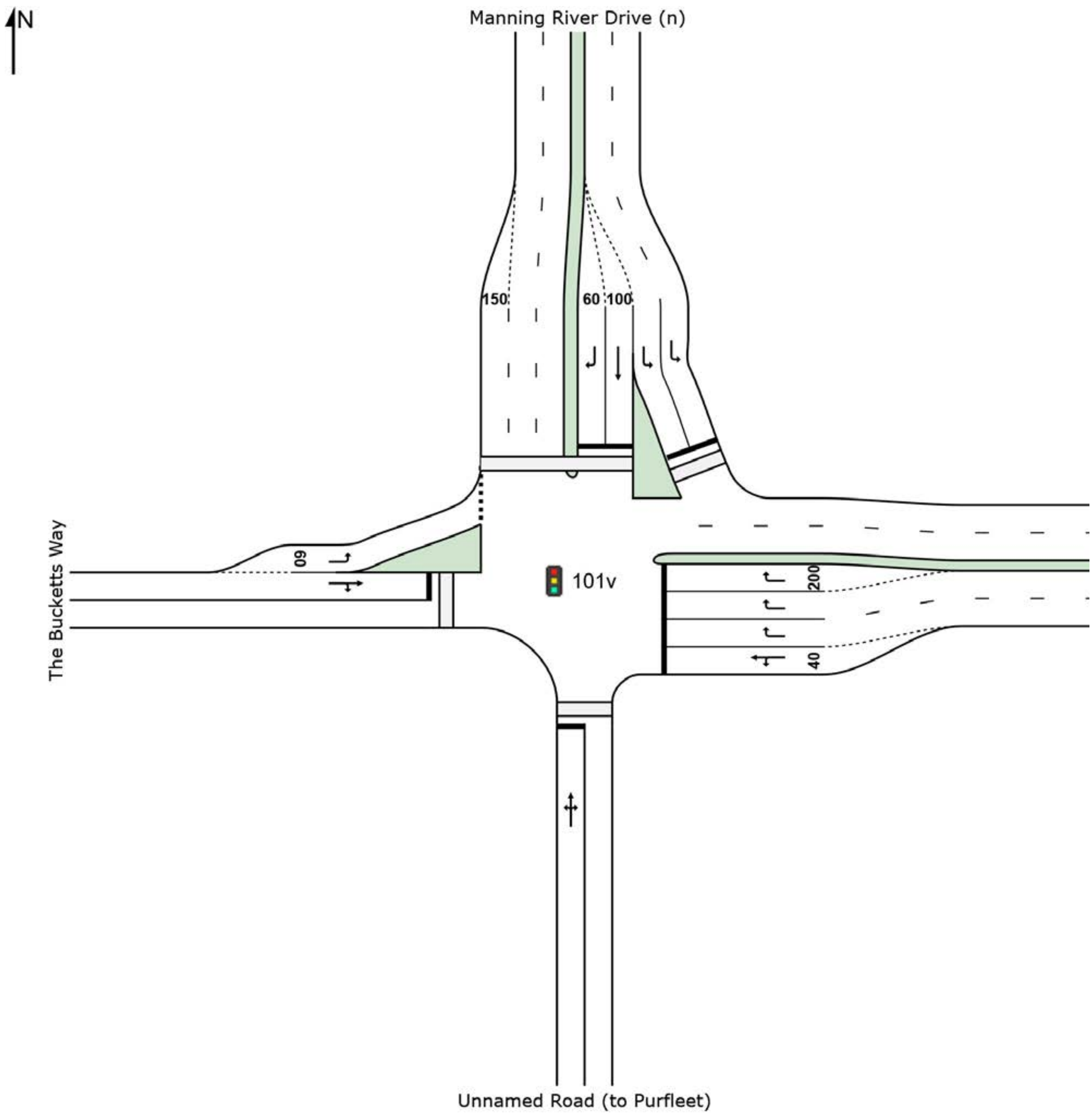
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

SITE LAYOUT

Site: 101v [2030 DEV - AM Peak - Ultimate]

Manning River Drive / The Bucketts Way
Signals - Fixed Time Isolated



LANE SUMMARY

Site: 101v [2030 DEV - AM Peak - Ultimate]

Manning River Drive / The Bucketts Way
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1	24	6.0	184	0.131	100	34.9	LOS C	0.8	5.8	Full	500	0.0	0.0
Approach	24	6.0		0.131		34.9	LOS C	0.8	5.8				
East: Manning River Drive (e)													
Lane 1	212	6.0	885	0.239	100	12.9	LOS B	4.4	32.4	Short	40	0.0	NA
Lane 2	477	6.0	770 [1]	0.619	87 [6]	20.8	LOS C	12.0	88.5	Full	500	0.0	0.0
Lane 3	603	6.0	844	0.714	100	22.7	LOS C	17.0	124.9	Full	500	0.0	0.0
Lane 4	603	6.0	844	0.714	100	22.7	LOS C	17.0	124.9	Short	200	0.0	NA
Approach	1894	6.0		0.714		21.1	LOS C	17.0	124.9				
North: Manning River Drive (n)													
Lane 1	388	6.0	844	0.460	100	19.8	LOS B	9.2	67.6	Full	500	0.0	0.0
Lane 2	388	6.0	844	0.460	100	19.8	LOS B	9.2	67.6	Full	500	0.0	0.0
Lane 3	39	6.0	222	0.175	100	31.7	LOS C	1.3	9.3	Short	100	0.0	NA
Lane 4	144	6.0	198	0.727	100	42.0	LOS D	5.3	39.1	Short	60	0.0	NA
Approach	960	6.0		0.727		23.7	LOS C	9.2	67.6				
West: The Bucketts Way													
Lane 1	269	6.0	762	0.354	100	12.1	LOS B	4.3	31.8	Short	60	0.0	NA
Lane 2	220	6.0	333	0.661	100	31.3	LOS C	7.5	55.0	Full	500	0.0	0.0
Approach	489	6.0		0.661		20.7	LOS C	7.5	55.0				
Intersection	3367	6.0		0.727		21.9	LOS C	17.0	124.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:30:02
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-The Bucketts Way v2.sip7

LANE SUMMARY

Site: 101v [2030 DEV - PM Peak - Ultimate]

Manning River Drive / The Bucketts Way
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance														
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1	43	4.0	160	0.270	100	43.4	LOS D	1.8	12.9	Full	500	0.0	0.0
Approach	43	4.0		0.270		43.4	LOS D	1.8	12.9				
East: Manning River Drive (e)													
Lane 1	216	4.0	576	0.374	100	26.4	LOS C	7.2	51.9	Short	40	0.0	NA
Lane 2	303	4.0	512[1]	0.593	87[6]	33.3	LOS C	10.8	77.9	Full	500	0.0	0.0
Lane 3	377	4.0	550	0.684	100	34.9	LOS C	14.1	102.3	Full	500	0.0	0.0
Lane 4	377	4.0	550	0.684	100	34.9	LOS C	14.1	102.3	Short	200	0.0	NA
Approach	1273	4.0		0.684		33.1	LOS C	14.1	102.3				
North: Manning River Drive (n)													
Lane 1	774	4.0	1013	0.764	100	22.4	LOS C	25.3	183.4	Full	500	0.0	0.0
Lane 2	763	4.0	999[1]	0.764	100	22.3	LOS C	24.8	179.5	Full	500	0.0	0.0
Lane 3	27	4.0	348	0.079	100	31.9	LOS C	1.0	7.0	Short	100	0.0	NA
Lane 4	214	4.0	330	0.647	100	42.3	LOS D	8.6	62.4	Short	60	0.0	NA
Approach	1778	4.0		0.764		24.9	LOS C	25.3	183.4				
West: The Bucketts Way													
Lane 1	179	4.0	1124	0.159	100	9.5	LOS A	2.3	16.5	Short	60	0.0	NA
Lane 2	165	4.0	324	0.510	100	36.1	LOS D	6.5	46.8	Full	500	0.0	0.0
Approach	344	4.0		0.510		22.3	LOS C	6.5	46.8				
Intersection	3438	4.0		0.764		27.9	LOS C	25.3	183.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

LANE SUMMARY

Site: 101v [2040 DEV - AM Peak - Ultimate]

Manning River Drive / The Bucketts Way
Signals - Fixed Time Isolated   Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1	29	6.0	270	0.109	100	41.2	LOS D	1.2	9.1	Full	500	0.0	0.0
Approach	29	6.0		0.109		41.2	LOS D	1.2	9.1				
East: Manning River Drive (e)													
Lane 1	273	6.0	949	0.287	100	16.5	LOS B	7.8	57.4	Short	40	0.0	NA
Lane 2	509	6.0	718 [1]	0.709	87 [6]	24.9	LOS C	17.4	128.0	Full	500	0.0	0.0
Lane 3	740	6.0	904	0.818	100	32.0	LOS C	32.6	240.1	Full	500	0.0	0.0
Lane 4	740	6.0	904	0.818	100	32.0	LOS C	32.6	240.1	Short	200	0.0	NA
Approach	2262	6.0		0.818		28.5	LOS C	32.6	240.1				
North: Manning River Drive (n)													
Lane 1	409	6.0	904	0.452	100	23.5	LOS C	13.0	95.5	Full	500	0.0	0.0
Lane 2	409	6.0	904	0.452	100	23.5	LOS C	13.0	95.5	Full	500	0.0	0.0
Lane 3	46	6.0	331	0.140	100	38.5	LOS D	1.9	14.3	Short	100	0.0	NA
Lane 4	204	6.0	253	0.808	100	55.6	LOS E	10.8	79.4	Short	60	0.0	NA
Approach	1068	6.0		0.808		30.3	LOS C	13.0	95.5				
West: The Bucketts Way													
Lane 1	362	6.0	725	0.499	100	18.9	LOS B	10.7	78.4	Short	60	0.0	NA
Lane 2	241	6.0	311	0.776	100	47.7	LOS D	12.2	89.6	Full	500	0.0	0.0
Approach	603	6.0		0.776		30.4	LOS C	12.2	89.6				
Intersection	3963	6.0		0.818		29.4	LOS C	32.6	240.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

LANE SUMMARY

Site: 101v [2040 DEV - PM Peak - Ultimate]

Manning River Drive / The Bucketts Way
Signals - Fixed Time Isolated   Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Unnamed Road (to Purfleet)													
Lane 1	51	4.0	159	0.318	100	55.3	LOS E	2.7	19.4	Full	500	0.0	0.0
Approach	51	4.0		0.318		55.3	LOS E	2.7	19.4				
East: Manning River Drive (e)													
Lane 1	234	4.0	623 [1]	0.375	100	31.7	LOS C	9.7	70.1	Short	40	0.0	NA
Lane 2	300	4.0	490 [1]	0.612	87 [6]	38.5	LOS D	13.1	94.8	Full	500	0.0	0.0
Lane 3	421	4.0	595	0.706	100	41.3	LOS D	19.9	144.3	Full	500	0.0	0.0
Lane 4	421	4.0	595	0.706	100	41.3	LOS D	19.9	144.3	Short	200	0.0	NA
Approach	1375	4.0		0.706		39.1	LOS D	19.9	144.3				
North: Manning River Drive (n)													
Lane 1	921	4.0	1123	0.820	100	24.7	LOS C	39.0	282.5	Full	500	0.0	0.0
Lane 2	901	4.0	1098 [1]	0.820	100	24.6	LOS C	37.6	272.1	Full	500	0.0	0.0
Lane 3	36	4.0	448	0.080	100	35.9	LOS D	1.5	10.9	Short	100	0.0	NA
Lane 4	299	4.0	425 [1]	0.704	100	49.0	LOS D	15.2	109.7	Short	60	0.0	NA
Approach	2157	4.0		0.820		28.2	LOS C	39.0	282.5				
West: The Bucketts Way													
Lane 1	245	4.0	1118	0.219	100	11.2	LOS B	4.5	32.5	Short	60	0.0	NA
Lane 2	219	4.0	304	0.719	100	50.2	LOS D	11.7	84.9	Full	500	0.0	0.0
Approach	464	4.0		0.719		29.6	LOS C	11.7	84.9				
Intersection	4046	4.0		0.820		32.4	LOS C	39.0	282.5				

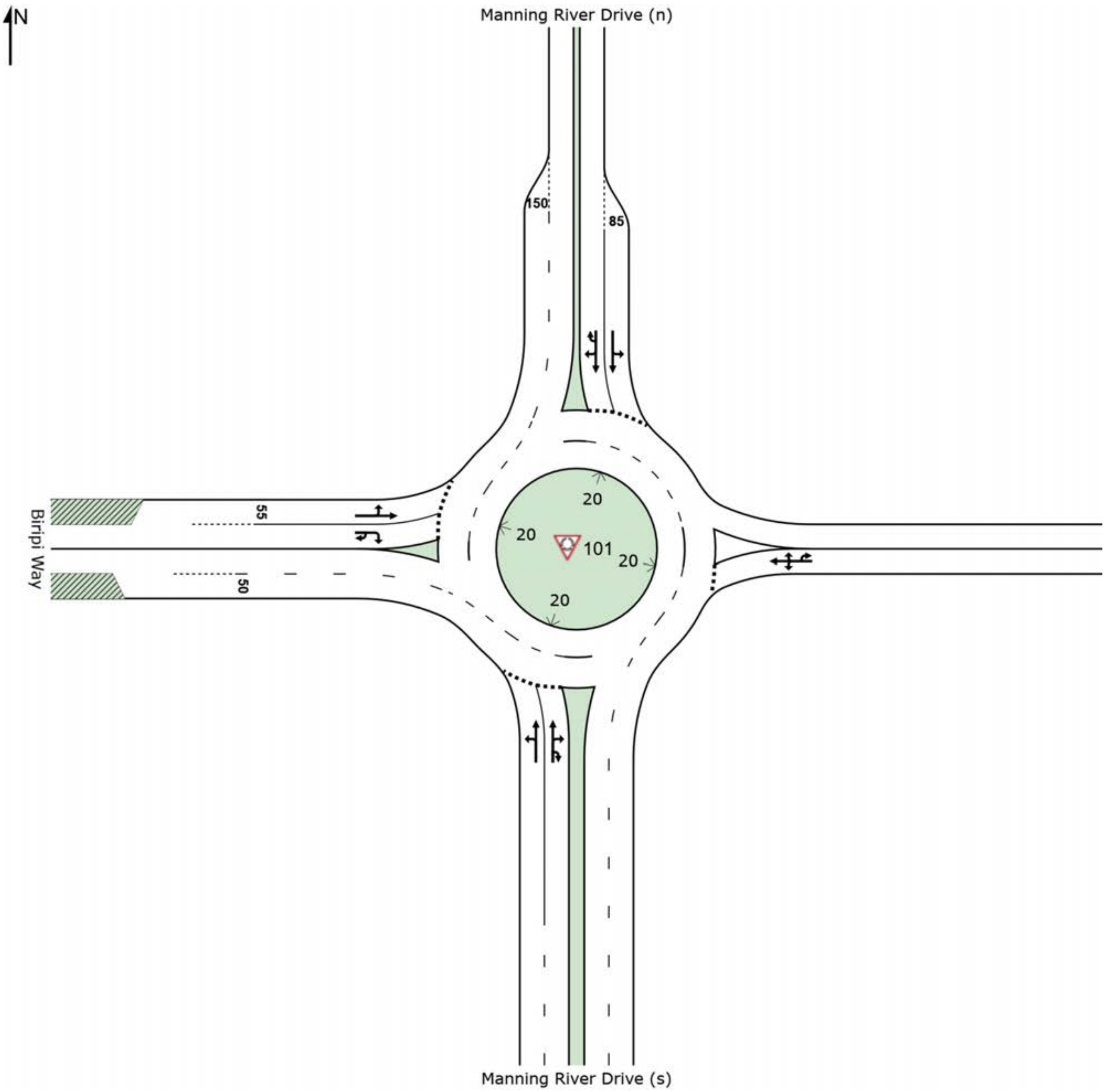
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

SITE LAYOUT

Site: 101 [2018 BG - AM Peak]

Manning River Drive / Biripi Way
Roundabout



Organisation: SLR CONSULTING AUSTRALIA | Created: 08 November 2018 09:47:51
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Biripi Way v2.sip7

LANE SUMMARY

Site: 101 [2018 BG - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	612	6.0	1323	0.463	93[6]	4.4	LOS A	2.7	19.9	Full	500	0.0	0.0
Lane 2[d]	754	6.0	1512	0.499	100	4.5	LOS A	3.1	22.5	Full	500	0.0	0.0
Approach	1366	6.0		0.499		4.4	LOS A	3.1	22.5				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	864	0.012	100	8.3	LOS A	0.0	0.3	Full	50	0.0	0.0
Approach	11	5.4		0.012		8.3	LOS A	0.0	0.3				
North: Manning River Drive (n)													
Lane 1[d]	294	6.0	1447	0.203	100	4.3	LOS A	0.9	6.3	Short	85	0.0	NA
Lane 2	267	5.7	1314	0.203	100	4.7	LOS A	0.8	6.2	Full	500	0.0	0.0
Approach	561	5.9		0.203		4.5	LOS A	0.9	6.3				
West: Biripi Way													
Lane 1[d]	3	6.0	794	0.004	100	7.4	LOS A	0.0	0.1	Short (P)	55	0.0	NA
Lane 2	2	3.0	614	0.003	100	14.1	LOS B	0.0	0.1	Full	500	0.0	0.0
Approach	5	4.8		0.004		10.1	LOS B	0.0	0.1				
Intersection	1943	6.0		0.499		4.5	LOS A	3.1	22.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2018 BG - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	355	4.0	1294	0.274	93[6]	4.4	LOS A	1.3	9.4	Full	500	0.0	0.0
Lane 2[d]	429	4.0	1451	0.296	100	4.4	LOS A	1.4	10.4	Full	500	0.0	0.0
Approach	784	4.0		0.296		4.4	LOS A	1.4	10.4				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	666	0.030	100	9.4	LOS A	0.1	0.8	Full	50	0.0	0.0
Approach	20	4.0		0.030		9.4	LOS A	0.1	0.8				
North: Manning River Drive (n)													
Lane 1[d]	681	4.0	1559	0.437	100	4.3	LOS A	2.4	17.2	Short	85	0.0	NA
Lane 2	600	4.0	1372	0.437	100	4.5	LOS A	2.4	17.3	Full	500	0.0	0.0
Approach	1281	4.0		0.437		4.4	LOS A	2.4	17.3				
West: Biripi Way													
Lane 1[d]	2	4.0	961	0.002	100	6.0	LOS A	0.0	0.1	Short (P)	55	0.0	NA
Lane 2	2	4.0	842	0.003	100	12.0	LOS B	0.0	0.1	Full	500	0.0	0.0
Approach	4	4.0		0.003		9.0	LOS A	0.0	0.1				
Intersection	2089	4.0		0.437		4.4	LOS A	2.4	17.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 BG - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	685	6.0	1224	0.560	93[6]	4.8	LOS A	3.6	26.8	Full	500	0.0	0.0
Lane 2[d]	829	6.0	1374	0.603	100	4.9	LOS A	4.2	31.0	Full	500	0.0	0.0
Approach	1514	6.0		0.603		4.8	LOS A	4.2	31.0				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	816	0.013	100	8.6	LOS A	0.0	0.3	Full	50	0.0	0.0
Approach	11	5.4		0.013		8.6	LOS A	0.0	0.3				
North: Manning River Drive (n)													
Lane 1[d]	336	6.0	1383	0.243	100	4.4	LOS A	1.2	8.5	Short	85	0.0	NA
Lane 2	309	5.8	1270	0.243	100	5.7	LOS A	1.1	8.4	Full	500	0.0	0.0
Approach	645	5.9		0.243		5.0	LOS A	1.2	8.5				
West: Biripi Way													
Lane 1	19	6.0	535	0.035	100	9.2	LOS A	0.1	1.1	Short (P)	55	0.0	NA
Lane 2[d]	25	5.8	704	0.036	100	12.7	LOS B	0.2	1.2	Full	500	0.0	0.0
Approach	44	5.9		0.036		11.2	LOS B	0.2	1.2				
Intersection	2214	6.0		0.603		5.0	LOS A	4.2	31.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 BG - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	380	4.0	1267	0.300	93[6]	4.4	LOS A	1.5	10.6	Full	500	0.0	0.0
Lane 2[d]	457	4.0	1413	0.323	100	4.5	LOS A	1.6	11.9	Full	500	0.0	0.0
Approach	837	4.0		0.323		4.5	LOS A	1.6	11.9				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	566	0.035	100	9.9	LOS A	0.1	1.0	Full	50	0.0	0.0
Approach	20	4.0		0.035		9.9	LOS A	0.1	1.0				
North: Manning River Drive (n)													
Lane 1[d]	705	4.0	1334	0.528	100	4.7	LOS A	3.5	25.7	Short	85	0.0	NA
Lane 2	642	4.0	1216	0.528	100	5.2	LOS A	3.5	25.4	Full	500	0.0	0.0
Approach	1347	4.0		0.528		4.9	LOS A	3.5	25.7				
West: Biripi Way													
Lane 1	64	4.0	768	0.084	100	6.9	LOS A	0.3	2.2	Short (P)	55	0.0	NA
Lane 2[d]	95	4.0	944	0.100	100	11.0	LOS B	0.4	2.8	Full	500	0.0	0.0
Approach	159	4.0		0.100		9.4	LOS A	0.4	2.8				
Intersection	2363	4.0		0.528		5.1	LOS A	3.5	25.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2020 DEV - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	685	6.0	1224	0.560	93[6]	4.8	LOS A	3.6	26.8	Full	500	0.0	0.0
Lane 2[d]	829	6.0	1374	0.603	100	4.9	LOS A	4.2	31.0	Full	500	0.0	0.0
Approach	1514	6.0		0.603		4.8	LOS A	4.2	31.0				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	816	0.013	100	8.6	LOS A	0.0	0.3	Full	50	0.0	0.0
Approach	11	5.4		0.013		8.6	LOS A	0.0	0.3				
North: Manning River Drive (n)													
Lane 1[d]	336	6.0	1383	0.243	100	4.4	LOS A	1.2	8.5	Short	85	0.0	NA
Lane 2	309	5.8	1270	0.243	100	5.7	LOS A	1.1	8.4	Full	500	0.0	0.0
Approach	645	5.9		0.243		5.0	LOS A	1.2	8.5				
West: Biripi Way													
Lane 1	19	6.0	535	0.035	100	9.2	LOS A	0.1	1.1	Short (P)	55	0.0	NA
Lane 2[d]	25	5.8	704	0.036	100	12.7	LOS B	0.2	1.2	Full	500	0.0	0.0
Approach	44	5.9		0.036		11.2	LOS B	0.2	1.2				
Intersection	2214	6.0		0.603		5.0	LOS A	4.2	31.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:01:30
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Biripi Way v2.sip7

LANE SUMMARY

Site: 101 [2020 DEV - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	380	4.0	1267	0.300	93[6]	4.4	LOS A	1.5	10.6	Full	500	0.0	0.0
Lane 2[d]	457	4.0	1413	0.323	100	4.5	LOS A	1.6	11.9	Full	500	0.0	0.0
Approach	837	4.0		0.323		4.5	LOS A	1.6	11.9				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	566	0.035	100	9.9	LOS A	0.1	1.0	Full	50	0.0	0.0
Approach	20	4.0		0.035		9.9	LOS A	0.1	1.0				
North: Manning River Drive (n)													
Lane 1[d]	705	4.0	1334	0.528	100	4.7	LOS A	3.5	25.7	Short	85	0.0	NA
Lane 2	642	4.0	1216	0.528	100	5.2	LOS A	3.5	25.4	Full	500	0.0	0.0
Approach	1347	4.0		0.528		4.9	LOS A	3.5	25.7				
West: Biripi Way													
Lane 1	64	4.0	768	0.084	100	6.9	LOS A	0.3	2.2	Short (P)	55	0.0	NA
Lane 2[d]	95	4.0	944	0.100	100	11.0	LOS B	0.4	2.8	Full	500	0.0	0.0
Approach	159	4.0		0.100		9.4	LOS A	0.4	2.8				
Intersection	2363	4.0		0.528		5.1	LOS A	3.5	25.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 BG - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance														
	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	780	6.0	1163	0.671	93[6]	5.4	LOS A	5.1	37.9	Full	500	0.0	0.0
Lane 2[d]	943	6.0	1303	0.723	100	5.4	LOS A	6.1	45.2	Full	500	0.0	0.0
Approach	1723	6.0		0.723		5.4	LOS A	6.1	45.2				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	766	0.014	100	8.9	LOS A	0.0	0.4	Full	50	0.0	0.0
Approach	11	5.4		0.014		8.9	LOS A	0.0	0.4				
North: Manning River Drive (n)													
Lane 1[d]	391	6.0	1348	0.290	100	4.5	LOS A	1.5	11.1	Short	85	0.0	NA
Lane 2	360	5.8	1241	0.290	100	6.3	LOS A	1.5	10.9	Full	500	0.0	0.0
Approach	752	5.9		0.290		5.3	LOS A	1.5	11.1				
West: Biripi Way													
Lane 1	32	6.0	438	0.072	100	10.4	LOS B	0.3	2.4	Short (P)	55	0.0	NA
Lane 2[d]	44	5.9	589	0.075	100	13.6	LOS B	0.4	2.7	Full	500	0.0	0.0
Approach	76	5.9		0.075		12.3	LOS B	0.4	2.7				
Intersection	2561	6.0		0.723		5.6	LOS A	6.1	45.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:01:32
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Biripi Way v2.sip7

LANE SUMMARY

Site: 101 [2025 BG - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	425	4.0	1242	0.342	93[6]	4.5	LOS A	1.8	13.4	Full	500	0.0	0.0
Lane 2[d]	510	4.0	1382	0.369	100	4.6	LOS A	2.1	15.1	Full	500	0.0	0.0
Approach	935	4.0		0.369		4.6	LOS A	2.1	15.1				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	467	0.043	100	10.9	LOS B	0.2	1.3	Full	50	0.0	0.0
Approach	20	4.0		0.043		10.9	LOS B	0.2	1.3				
North: Manning River Drive (n)													
Lane 1[d]	778	4.0	1237	0.629	100	5.3	LOS A	4.7	34.2	Short	85	0.0	NA
Lane 2	711	4.0	1130	0.629	100	5.9	LOS A	4.6	33.6	Full	500	0.0	0.0
Approach	1488	4.0		0.629		5.6	LOS A	4.7	34.2				
West: Biripi Way													
Lane 1	117	4.0	734	0.159	100	7.4	LOS A	0.6	4.6	Short (P)	55	0.0	NA
Lane 2[d]	172	4.0	910	0.189	100	11.4	LOS B	0.8	5.7	Full	500	0.0	0.0
Approach	288	4.0		0.189		9.8	LOS A	0.8	5.7				
Intersection	2732	4.0		0.629		5.7	LOS A	4.7	34.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 DEV - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	788	6.0	1163	0.678	93[6]	5.4	LOS A	5.3	38.7	Full	500	0.0	0.0
Lane 2[d]	952	6.0	1304	0.730	100	5.4	LOS A	6.3	46.3	Full	500	0.0	0.0
Approach	1740	6.0		0.730		5.4	LOS A	6.3	46.3				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	744	0.014	100	9.1	LOS A	0.1	0.4	Full	50	0.0	0.0
Approach	11	5.4		0.014		9.1	LOS A	0.1	0.4				
North: Manning River Drive (n)													
Lane 1[d]	426	6.0	1354	0.315	100	4.5	LOS A	1.7	12.4	Short	85	0.0	NA
Lane 2	391	5.8	1243	0.315	100	6.1	LOS A	1.7	12.2	Full	500	0.0	0.0
Approach	818	5.9		0.315		5.3	LOS A	1.7	12.4				
West: Biripi Way													
Lane 1	32	6.0	431	0.073	100	10.5	LOS B	0.3	2.4	Short (P)	55	0.0	NA
Lane 2[d]	44	5.9	582	0.076	100	13.7	LOS B	0.4	2.8	Full	500	0.0	0.0
Approach	76	5.9		0.076		12.4	LOS B	0.4	2.8				
Intersection	2644	6.0		0.730		5.6	LOS A	6.3	46.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2025 DEV - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	455	4.0	1244	0.366	93[6]	4.5	LOS A	2.0	14.7	Full	500	0.0	0.0
Lane 2[d]	547	4.0	1387	0.394	100	4.6	LOS A	2.3	16.6	Full	500	0.0	0.0
Approach	1002	4.0		0.394		4.6	LOS A	2.3	16.6				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	461	0.043	100	11.0	LOS B	0.2	1.3	Full	50	0.0	0.0
Approach	20	4.0		0.043		11.0	LOS B	0.2	1.3				
North: Manning River Drive (n)													
Lane 1[d]	787	4.0	1236	0.636	100	5.3	LOS A	4.9	35.1	Short	85	0.0	NA
Lane 2	718	4.0	1129	0.636	100	5.9	LOS A	4.8	34.5	Full	500	0.0	0.0
Approach	1505	4.0		0.636		5.6	LOS A	4.9	35.1				
West: Biripi Way													
Lane 1	117	4.0	710	0.165	100	7.6	LOS A	0.7	4.8	Short (P)	55	0.0	NA
Lane 2[d]	172	4.0	887	0.193	100	11.6	LOS B	0.8	6.0	Full	500	0.0	0.0
Approach	288	4.0		0.193		10.0	LOS A	0.8	6.0				
Intersection	2816	4.0		0.636		5.7	LOS A	4.9	35.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance													
	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	842	6.0	1171	0.719	93[6]	5.4	LOS A	6.0	44.4	Full	500	0.0	0.0
Lane 2[d]	1019	6.0	1315	0.775	100	5.5	LOS A	7.3	54.0	Full	500	0.0	0.0
Approach	1861	6.0		0.775		5.5	LOS A	7.3	54.0				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	733	0.014	100	9.2	LOS A	0.1	0.4	Full	50	0.0	0.0
Approach	11	5.4		0.014		9.2	LOS A	0.1	0.4				
North: Manning River Drive (n)													
Lane 1[d]	447	6.0	1361	0.329	100	4.5	LOS A	1.8	13.2	Short	85	0.0	NA
Lane 2	410	5.8	1247	0.329	100	6.0	LOS A	1.8	13.0	Full	500	0.0	0.0
Approach	857	5.9		0.329		5.2	LOS A	1.8	13.2				
West: Biripi Way													
Lane 1	29	6.0	385	0.077	100	11.5	LOS B	0.3	2.5	Short (P)	55	0.0	NA
Lane 2[d]	42	5.9	531	0.079	100	14.4	LOS B	0.4	3.0	Full	500	0.0	0.0
Approach	72	5.9		0.079		13.2	LOS B	0.4	3.0				
Intersection	2800	6.0		0.775		5.6	LOS A	7.3	54.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 BG - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	484	4.0	1245	0.389	93[6]	4.5	LOS A	2.2	16.2	Full	500	0.0	0.0
Lane 2[d]	583	4.0	1391	0.419	100	4.6	LOS A	2.5	18.4	Full	500	0.0	0.0
Approach	1067	4.0		0.419		4.6	LOS A	2.5	18.4				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	430	0.047	100	11.5	LOS B	0.2	1.5	Full	50	0.0	0.0
Approach	20	4.0		0.047		11.5	LOS B	0.2	1.5				
North: Manning River Drive (n)													
Lane 1[d]	852	4.0	1251	0.681	100	5.3	LOS A	5.6	40.6	Short	85	0.0	NA
Lane 2	776	4.0	1140	0.681	100	5.9	LOS A	5.5	39.9	Full	500	0.0	0.0
Approach	1628	4.0		0.681		5.6	LOS A	5.6	40.6				
West: Biripi Way													
Lane 1	111	4.0	684	0.162	100	7.9	LOS A	0.6	4.7	Short (P)	55	0.0	NA
Lane 2[d]	162	4.0	863	0.188	100	11.7	LOS B	0.8	5.8	Full	500	0.0	0.0
Approach	273	4.0		0.188		10.2	LOS B	0.8	5.8				
Intersection	2988	4.0		0.681		5.7	LOS A	5.6	40.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	865	6.0	1170	0.739	93[6]	5.5	LOS A	6.5	47.6	Full	500	0.0	0.0
Lane 2[d]	1048	6.0	1316	0.796	100	5.5	LOS A	7.9	58.3	Full	500	0.0	0.0
Approach	1913	6.0		0.796		5.5	LOS A	7.9	58.3				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	672	0.016	100	9.7	LOS A	0.1	0.4	Full	50	0.0	0.0
Approach	11	5.4		0.016		9.7	LOS A	0.1	0.4				
North: Manning River Drive (n)													
Lane 1[d]	556	6.0	1375	0.404	100	4.5	LOS A	2.4	17.7	Short	85	0.0	NA
Lane 2	506	5.8	1252	0.404	100	5.7	LOS A	2.4	17.5	Full	500	0.0	0.0
Approach	1062	5.9		0.404		5.1	LOS A	2.4	17.7				
West: Biripi Way													
Lane 1	29	6.0	365	0.081	100	11.9	LOS B	0.4	2.7	Short (P)	55	0.0	NA
Lane 2[d]	42	5.9	507	0.083	100	14.8	LOS B	0.4	3.1	Full	500	0.0	0.0
Approach	72	5.9		0.083		13.6	LOS B	0.4	3.1				
Intersection	3057	6.0		0.796		5.6	LOS A	7.9	58.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2030 DEV - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	579	4.0	1250	0.463	93[6]	4.6	LOS A	2.9	21.3	Full	500	0.0	0.0
Lane 2[d]	700	4.0	1402	0.499	100	4.6	LOS A	3.4	24.4	Full	500	0.0	0.0
Approach	1279	4.0		0.499		4.6	LOS A	3.4	24.4				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	412	0.049	100	11.8	LOS B	0.2	1.5	Full	50	0.0	0.0
Approach	20	4.0		0.049		11.8	LOS B	0.2	1.5				
North: Manning River Drive (n)													
Lane 1[d]	880	4.0	1250	0.704	100	5.4	LOS A	6.1	44.0	Short	85	0.0	NA
Lane 2	801	4.0	1138	0.704	100	6.0	LOS A	6.1	44.3	Full	500	0.0	0.0
Approach	1681	4.0		0.704		5.7	LOS A	6.1	44.3				
West: Biripi Way													
Lane 1	111	4.0	610	0.181	100	8.7	LOS A	0.7	5.4	Short (P)	55	0.0	NA
Lane 2[d]	162	4.0	791	0.205	100	12.3	LOS B	0.9	6.6	Full	500	0.0	0.0
Approach	273	4.0		0.205		10.9	LOS B	0.9	6.6				
Intersection	3253	4.0		0.704		5.7	LOS A	6.1	44.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 BG - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	1009	6.0	1101	0.917	93[6]	12.5	LOS B	18.7	137.4	Full	500	0.0	0.0
Lane 2[d]	1226	6.0	1241	0.988	100	23.0	LOS C	36.6	269.1	Full	500	0.0	0.0
Approach	2236	6.0		0.988		18.3	LOS B	36.6	269.1				
East: Holden Dealership Access													
Lane 1[d]	11	5.4	650	0.016	100	9.8	LOS A	0.1	0.4	Full	50	0.0	0.0
Approach	11	5.4		0.016		9.8	LOS A	0.1	0.4				
North: Manning River Drive (n)													
Lane 1[d]	557	6.0	1323	0.421	100	4.6	LOS A	2.7	19.5	Short	85	0.0	NA
Lane 2	510	5.8	1212	0.421	100	6.5	LOS A	2.6	19.2	Full	500	0.0	0.0
Approach	1066	5.9		0.421		5.5	LOS A	2.7	19.5				
West: Biripi Way													
Lane 1	46	6.0	206	0.225	100	17.4	LOS B	1.2	8.5	Short (P)	55	0.0	NA
Lane 2[d]	66	5.9	296	0.224	100	19.4	LOS B	1.3	9.9	Full	500	0.0	0.0
Approach	113	5.9		0.225		18.6	LOS B	1.3	9.9				
Intersection	3425	6.0		0.988		14.3	LOS B	36.6	269.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:01:40
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Biripi Way v2.sip7

LANE SUMMARY

Site: 101 [2040 BG - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	582	4.0	1211	0.480	93[6]	4.7	LOS A	3.3	24.2	Full	500	0.0	0.0
Lane 2[d]	701	4.0	1354	0.518	100	4.7	LOS A	3.9	28.0	Full	500	0.0	0.0
Approach	1283	4.0		0.518		4.7	LOS A	3.9	28.0				
East: Holden Dealership Access													
Lane 1[d]	20	4.0	268	0.075	100	14.9	LOS B	0.4	2.6	Full	50	0.0	0.0
Approach	20	4.0		0.075		14.9	LOS B	0.4	2.6				
North: Manning River Drive (n)													
Lane 1[d]	1001	4.0	1146	0.873	100	10.2	LOS B	14.1	102.3	Short	85	0.0	NA
Lane 2	907	4.0	1038	0.873	100	11.6	LOS B	14.1	101.9	Full	500	0.0	0.0
Approach	1907	4.0		0.873		10.9	LOS B	14.1	102.3				
West: Biripi Way													
Lane 1	178	4.0	595	0.299	100	9.1	LOS A	1.3	9.6	Short (P)	55	0.0	NA
Lane 2[d]	262	4.0	770	0.340	100	12.8	LOS B	1.7	12.2	Full	500	0.0	0.0
Approach	440	4.0		0.340		11.3	LOS B	1.7	12.2				
Intersection	3651	4.0		0.873		8.8	LOS A	14.1	102.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:01:41
Project: C:\Users\agreen\Desktop\OneDrive - SLR Consulting Limited\620.12373 Taree Glenthorne SS & Industrial\Analysis\SIDRA\Manning River Drive-Biripi Way v2.sip7

LANE SUMMARY

Site: 101 [2040 DEV - AM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	1040	6.0	1067	0.975	93[6]	23.4	LOS C	31.0	227.8	Full	500	0.0	0.0
Lane 2[d]	1265	6.0	1204	1.051	100	63.8	LOS E	72.3	532.4	Full	500	0.0	6.9
Approach	2305	6.0		1.051		45.6	LOS D	72.3	532.4				
East: Holden Dealership Access													
Lane 1[d]	54	5.9	580	0.093	100	10.5	LOS B	0.4	2.8	Full	50	0.0	0.0
Approach	54	5.9		0.093		10.5	LOS B	0.4	2.8				
North: Manning River Drive (n)													
Lane 1[d]	702	6.0	1296	0.542	100	4.8	LOS A	3.6	26.7	Short	85	0.0	NA
Lane 2	642	5.8	1184	0.542	100	6.4	LOS A	3.6	26.4	Full	500	0.0	0.0
Approach	1344	5.9		0.542		5.6	LOS A	3.6	26.7				
West: Biripi Way													
Lane 1	46	6.0	195	0.238	100	18.2	LOS B	1.2	9.0	Short (P)	55	0.0	NA
Lane 2[d]	66	5.9	283	0.234	100	20.0	LOS B	1.4	10.3	Full	500	0.0	0.0
Approach	113	5.9		0.238		19.3	LOS B	1.4	10.3				
Intersection	3816	6.0		1.051		30.2	LOS C	72.3	532.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2040 DEV - PM Peak]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	653	4.0	1052	0.621	93[6]	6.0	LOS A	4.8	34.8	Full	500	0.0	0.0
Lane 2[d]	785	4.0	1173	0.669	100	6.1	LOS A	5.8	42.0	Full	500	0.0	0.0
Approach	1438	4.0		0.669		6.1	LOS A	5.8	42.0				
East: Holden Dealership Access													
Lane 1[d]	200	4.0	239	0.837	100	45.9	LOS D	6.4	46.6	Full	50	0.0	3.0
Approach	200	4.0		0.837		45.9	LOS D	6.4	46.6				
North: Manning River Drive (n)													
Lane 1[d]	1040	4.0	1132	0.919	100	12.9	LOS B	18.6	134.4	Short	85	0.0	NA
Lane 2	940	4.0	1024	0.919	100	14.6	LOS B	18.4	133.4	Full	500	0.0	0.0
Approach	1980	4.0		0.919		13.7	LOS B	18.6	134.4				
West: Biripi Way													
Lane 1	178	4.0	431	0.412	100	12.6	LOS B	2.2	15.9	Short (P)	55	0.0	NA
Lane 2[d]	262	4.0	579	0.453	100	15.8	LOS B	2.8	20.2	Full	500	0.0	0.0
Approach	440	4.0		0.453		14.5	LOS B	2.8	20.2				
Intersection	4058	4.0		0.919		12.7	LOS B	18.6	134.4				

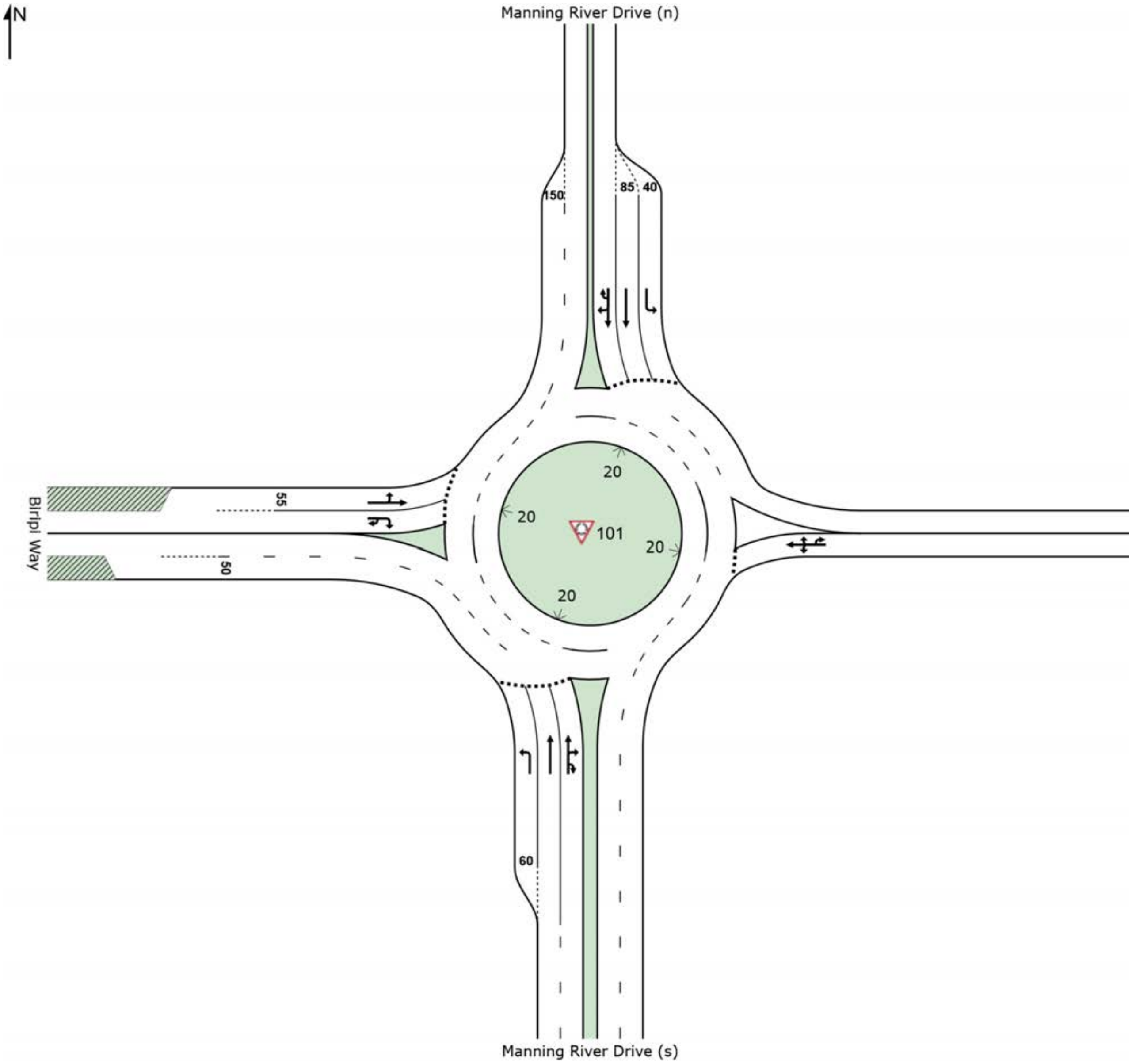
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

SITE LAYOUT

Site: 101 [2040 DEV - AM Peak - Upgraded]

Manning River Drive / Biripi Way
Roundabout



LANE SUMMARY

Site: 101 [2040 DEV - AM Peak - Upgraded]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	256	6.0	929	0.275	100	5.9	LOS A	1.3	9.5	Short	60	0.0	NA
Lane 2	890	6.0	1158	0.769	93[6]	7.5	LOS A	8.4	61.7	Full	500	0.0	0.0
Lane 3[d]	1160	6.0	1400	0.828	100	7.7	LOS A	10.8	79.3	Full	500	0.0	0.0
Approach	2305	6.0		0.828		7.4	LOS A	10.8	79.3				
East: Holden Dealership Access													
Lane 1[d]	54	5.9	607	0.088	100	10.3	LOS B	0.3	2.5	Full	50	0.0	0.0
Approach	54	5.9		0.088		10.3	LOS B	0.3	2.5				
North: Manning River Drive (n)													
Lane 1	155	6.0	989	0.156	100	5.2	LOS A	0.7	4.9	Short	40	0.0	NA
Lane 2[d]	643	6.0	1484	0.433	100	4.6	LOS A	2.5	18.7	Short	85	0.0	NA
Lane 3	546	5.8	1261	0.433	100	6.5	LOS A	2.5	18.3	Full	500	0.0	0.0
Approach	1344	5.9		0.433		5.4	LOS A	2.5	18.7				
West: Biripi Way													
Lane 1	46	6.0	259	0.179	100	15.6	LOS B	0.9	6.3	Short (P)	55	0.0	NA
Lane 2[d]	66	5.9	381	0.174	100	17.3	LOS B	1.0	7.2	Full	500	0.0	0.0
Approach	113	5.9		0.179		16.6	LOS B	1.0	7.2				
Intersection	3816	6.0		0.828		7.0	LOS A	10.8	79.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Organisation: SLR CONSULTING AUSTRALIA | Processed: 30 October 2018 10:01:47
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LANE SUMMARY

Site: 101 [2040 DEV - PM Peak - Upgraded]

Manning River Drive / Biripi Way
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Manning River Drive (s)													
Lane 1	65	4.0	922	0.071	100	5.6	LOS A	0.3	2.2	Short	60	0.0	NA
Lane 2	597	4.0	1146	0.521	93[6]	5.5	LOS A	3.5	25.6	Full	500	0.0	0.0
Lane 3[d]	775	4.0	1380	0.562	100	5.4	LOS A	4.2	30.3	Full	500	0.0	0.0
Approach	1438	4.0		0.562		5.4	LOS A	4.2	30.3				
East: Holden Dealership Access													
Lane 1[d]	200	4.0	298	0.671	100	26.7	LOS C	4.2	30.7	Full	50	0.0	0.0
Approach	200	4.0		0.671		26.7	LOS C	4.2	30.7				
North: Manning River Drive (n)													
Lane 1	43	4.0	889	0.049	100	5.7	LOS A	0.2	1.5	Short	40	0.0	NA
Lane 2[d]	1058	4.0	1335	0.793	100	7.1	LOS A	9.6	69.3	Short	85	0.0	NA
Lane 3	878	4.0	1108	0.793	100	8.6	LOS A	9.6	69.4	Full	500	0.0	0.0
Approach	1980	4.0		0.793		7.8	LOS A	9.6	69.4				
West: Biripi Way													
Lane 1	178	4.0	454	0.392	100	12.2	LOS B	2.0	14.7	Short (P)	55	0.0	NA
Lane 2[d]	262	4.0	610	0.429	100	15.4	LOS B	2.6	18.5	Full	500	0.0	0.0
Approach	440	4.0		0.429		14.1	LOS B	2.6	18.5				
Intersection	4058	4.0		0.793		8.5	LOS A	9.6	69.4				

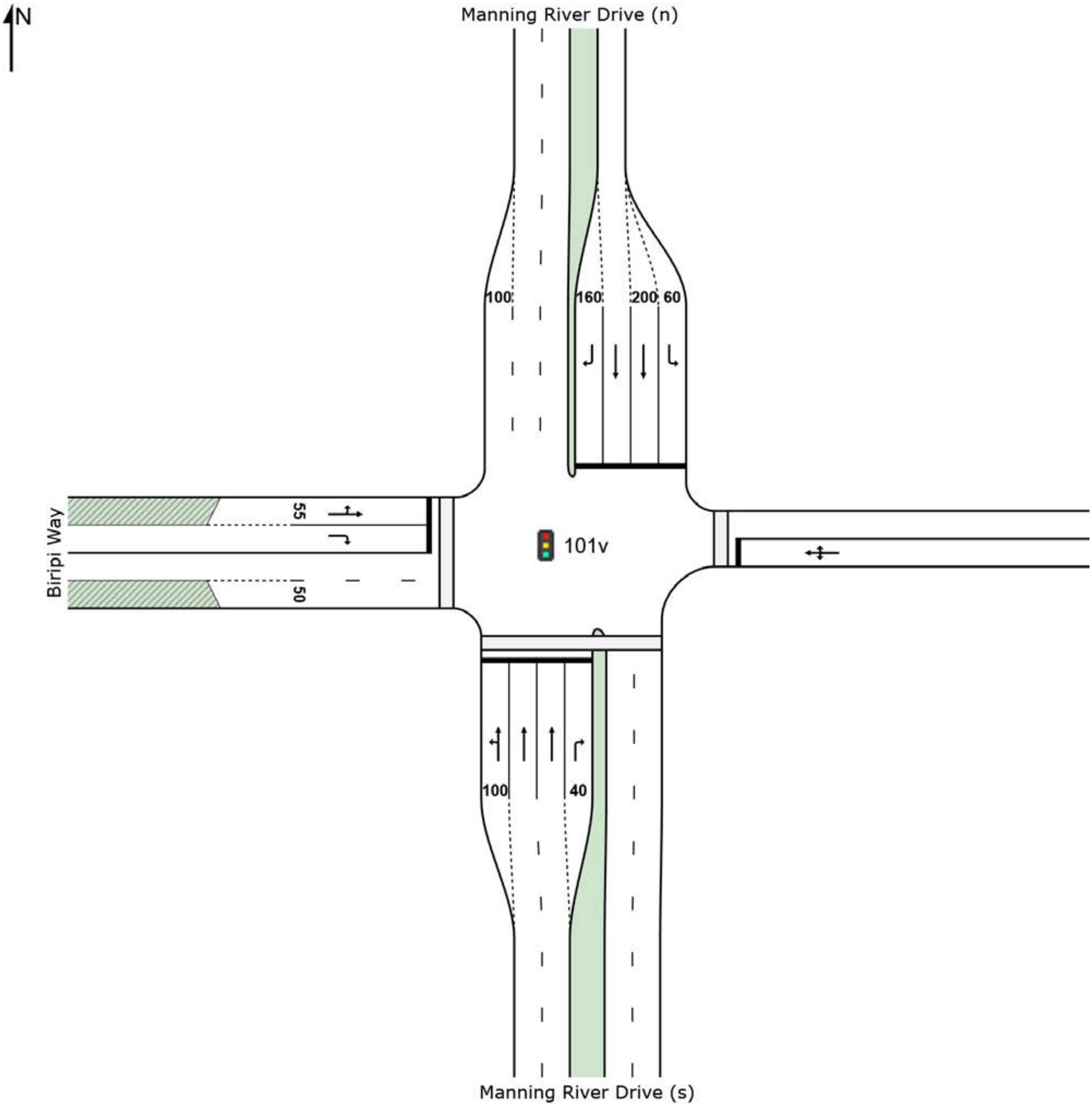
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

SITE LAYOUT

Site: 101v [2040 DEV - AM Peak - Ultimate]

Manning River Drive / Biripi Way
Signals - Fixed Time Isolated



LANE SUMMARY

Site: 101v [2040 DEV - AM Peak - Ultimate]

Manning River Drive / Biripi Way
Signals - Fixed Time Isolated   Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	557	6.0	1152	0.484	57[6]	19.8	LOS B	22.2	163.2	Short	100	0.0	NA
Lane 2	741	6.0	872[1]	0.850	100	23.0	LOS C	35.8	263.7	Full	500	0.0	0.0
Lane 3	952	6.0	1120[1]	0.850	100	23.9	LOS C	52.5	386.2	Full	500	0.0	0.0
Lane 4	55	6.0	209	0.262	100	72.2	LOS E	3.7	27.4	Short	40	0.0	NA
Approach	2304	6.0		0.850		23.8	LOS C	52.5	386.2				
East: Holden Dealership Access													
Lane 1	53	6.0	214	0.246	100	66.1	LOS E	3.5	25.6	Full	50	0.0	0.0
Approach	53	6.0		0.246		66.1	LOS E	3.5	25.6				
North: Manning River Drive (n)													
Lane 1	155	6.0	1120	0.138	100	18.9	LOS B	4.7	34.8	Short	60	0.0	NA
Lane 2	479	6.0	1091[1]	0.439	100	16.2	LOS B	17.9	131.5	Short	200	0.0	NA
Lane 3	518	6.0	1180	0.439	100	16.6	LOS B	19.9	146.1	Full	500	0.0	0.0
Lane 4	174	6.0	209	0.830	100	83.2	LOS F	13.5	99.4	Short	160	0.0	NA
Approach	1326	6.0		0.830		25.4	LOS C	19.9	146.1				
West: Biripi Way													
Lane 1	46	6.0	296	0.157	100	64.0	LOS E	2.9	21.5	Short (P)	55	0.0	NA
Lane 2	65	6.0	238	0.275	100	66.2	LOS E	4.3	31.4	Full	500	0.0	0.0
Approach	112	6.0		0.275		65.3	LOS E	4.3	31.4				
Intersection	3795	6.0		0.850		26.2	LOS C	52.5	386.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

LANE SUMMARY

Site: 101v [2040 DEV - PM Peak - Ultimate]

Manning River Drive / Biripi Way
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Manning River Drive (s)													
Lane 1	315	4.0	1088	0.290	57[6]	15.9	LOS B	9.5	69.1	Short	100	0.0	NA
Lane 2	560	4.0	1100	0.509	100	17.3	LOS B	19.9	143.9	Full	500	0.0	0.0
Lane 3	543	4.0	1067[1]	0.509	100	17.1	LOS B	19.1	137.9	Full	500	0.0	0.0
Lane 4	19	4.0	94	0.202	100	68.1	LOS E	1.1	8.2	Short	40	0.0	NA
Approach	1437	4.0		0.509		17.6	LOS B	19.9	143.9				
East: Holden Dealership Access													
Lane 1	199	4.0	237	0.838	100	65.4	LOS E	12.8	92.9	Full	50	0.0	62.3
Approach	199	4.0		0.838		65.4	LOS E	12.8	92.9				
North: Manning River Drive (n)													
Lane 1	43	4.0	1045	0.041	100	18.1	LOS B	1.1	8.0	Short	60	0.0	NA
Lane 2	925	4.0	1064[1]	0.870	100	28.6	LOS C	48.6	352.1	Short	200	0.0	NA
Lane 3	939	4.0	1079[1]	0.870	100	28.7	LOS C	49.7	360.1	Full	500	0.0	0.0
Lane 4	44	4.0	94	0.472	100	69.7	LOS E	2.7	19.6	Short	160	0.0	NA
Approach	1952	4.0		0.870		29.3	LOS C	49.7	360.1				
West: Biripi Way													
Lane 1	178	4.0	452	0.393	100	46.8	LOS D	8.8	63.5	Short (P)	55	0.0	NA
Lane 2	261	4.0	339[1]	0.770	100	56.3	LOS E	15.2	110.0	Full	500	0.0	0.0
Approach	439	4.0		0.770		52.5	LOS D	15.2	110.0				
Intersection	4026	4.0		0.870		29.4	LOS C	49.7	360.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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6 Lane under-utilisation due to downstream effects

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Appendix H – Council Letter of Support for Strategic Merit

From: Roger Busby

Sent: Tuesday, 12 December 2017 1:45 PM

To: pw@walshconsulting.com.au

Cc: Richard Pamplin

Subject: Potential Planning Proposal Glenthorne Rd

Dear Peter,

Thank you for your letter dated 1 December 2017 enquiring into Council's categorisation of a planning proposal for this site at Glenthorne and the associated fee. I advise as follows regarding proceeding with this proposed application:

Planning proposal categorisation:

Due to the size of land, need to justify the rezoning on economic grounds and potential agency consultation for this rezoning I have classified it as a Category 2 Application.

Application fee:

The lodgement fee (Stage 1 Council Fee) for a Category 2 application is $40,000 (GST is not applicable - rezoning fees are GST exempt). This fee includes any processing by Council staff up to and including 200 hours. If this is exceeded an additional Stage 2 Council Fee of $150/hr applies. Richard (see below) can organise an invoice for the $40,000 payment if you would prefer prior to payment.

Application Form and Fee Agreement:

I have attached the Application Form – you will need to complete as the Applicant and have the landowner/s sign it and whoever the invoices need to be made out to needs to sign the Fee Agreement attached to the application (Appendix 2).

I confirm (and you can use this email as confirmation) that I consider this rezoning to have Strategic Merit for the purposes of lodgement – see page 2 of the application form.

Processing:

Due to our current resources I advise that staff are not available to process this application. As per Council's policy on planning proposals you have the following options:

a. Wait until there is staff capacity to process this application (likely to be 5+ years);

b. Withdraw (or do not lodge the application in the first instance); or

c. Have the application processed by a consultant engaged by Council at the applicant's cost (this option is only available if there are staff resources available to manage a consultant).

At present I advise that there are staff resources available to commence management of a consultant to review and process this application. I wish to point out however that if all applications are active at the same time that resources will be allocated on the basis of their strategic priority to

Council. Additionally, as staff are close to capacity the opportunity to commence this application may close if any other applications are formally lodged prior to this one.

Our recently appointed Special Projects Coordinator, Richard Pamplin, will be undertaking the management of the consultant for this application. In this regard all further formal correspondence on this application should be forwarded to Richard Pamplin at our Taree Office (PO Box 482 Taree NSW 2430) quoting file number S1714. Richard can be contacted directly on 6592 5266 or richard.pamplin@midcoast.nsw.gov.au

Following lodgement of the Application (including the signed Fee Agreement) and payment of the Stage 1 Council Fee Richard will issue a Request for Quotation (RFQ) for a consultant to process this application on a 2 stage basis, involving separate engagement for each stage. Stage 1 will involve an initial assessment as to whether the application includes an Acceptable Planning Proposal in accordance with Council's Policy – Planning proposals and development control plan applications and if so then undertaking a comprehensive assessment of the planning proposal before it is finalised for reporting to Council for a decision on whether to seek a Gateway Determination from the Department of Planning and Environment. If a positive decision from Council and a subsequent positive Gateway Determine is obtained the application will then move onto Stage 2. You will need to pay the Stage 2 Consultant Fee (which will be re-evaluated based on the Gateway decision) prior to Council engaging the consultant and work on this component being undertaken. Applicants do not have any role in the selection of this consultant and must only deal directly with Council staff on this application.

Please note that to be considered as an Acceptable Planning Proposal the consultant engaged by Council will be ensuring that the planning proposal has been prepared by a Qualified Town Planner as per Council's policy, that it is consistent with section 55 of the Environmental Planning and Assessment Act 1979, that it has been prepared in accordance with the NSW Department of Planning and Environment's Planning Proposals: A guide to preparing planning proposals, that the main issue relevant to this application (economic justification) has been adequately assessed, that the planning proposal has been prepared using Council's template for planning proposals and that the consultant's/applicant's logos are not included in the planning proposal (they are however permitted to be on attachments to the planning proposal). Please also note that if deemed acceptable this does not mean that the planning proposal does not require further studies or that Council is in agreement with it, merely that it is acceptable to proceed to a comprehensive assessment by Council's consultant.

If not deemed to be acceptable all work will cease on this application until the applicant has addressed the deficiencies advised by Council.

I note that your planning proposal includes details on a proposed Highway Service Centre (HSC). As rezoning is sought for IN1 – General Industrial and a number of uses would be permitted on the site, information on the proposed HSC should be removed although reference can be made to desired uses in the text of the PP. I also suggest that you await the release of the Regional Economic Development Strategy that should provide some higher level strategic context for the planning proposal. I will let you know shortly when this document is timed for release.

Once the preferred consultant's cost to undertake the Stage 1 assessment is known Richard will invoice you for this amount prior to the consultant being engaged. Please note that while Council is seeking a fixed cost from the consultant, such a cost will be based on an assumption on the amount of work involved in assessing and processing an Acceptable Planning Proposal and that the comprehensive assessment of the planning proposal only finds minor aspects that need to be addressed. Should this not be the case the consultant's fee will be varied based on their hourly rates, with a nominated upfront amount from the applicant required to be paid to Council before further work is undertaken.

Richard can provide further information on Council's processes if required.

Please let me or Richard know if you'd like the invoice issued as mentioned above for the Stage 1 Council Fee.

Regards

Roger Busby

MCC Website

Direct 02 6591 7254

Roger.Busby@MidCoast.nsw.gov.au

www.midcoast.nsw.gov.au or follow us

MCC Facebook

Appendix I – MidCoast Water Preliminary Servicing Advice

MIDCOAST water services

PO Box 671
Taree NSW 2430

23rd March 2018

Att: Lisa Proctor
Blue Sky Planning & Environment

Land Ref: 84326 & 14804
Enquiries: Craig Wilkinson

By Email only: Lisa@blueskyplanning.com.au

Dear Lisa,

Preliminary Servicing Advice: Industrial Rezoning - Eriksson Lane, Taree South (Glenthorne) (Lot 50 DP 836972 & Lot 2 DP 827097)

As requested within your email correspondence dated 20th February 2018, MidCoast Water Services ("Council") has undertaken a preliminary review of the development proposal based on the information supplied. The information contained within this advice is preliminary only and does not constitute an approval for water and sewer services by Council. In order to undertake a complete assessment and issue a Notice of Determination, Council requires additional information to be supplied; this information is outlined at the end of the advice. With these factors noted, Council provides the following preliminary advice:

Development Proposal:

Based on the supplied details and discussions held, Council understands that it is proposed to undertake a rezoning of land to create an industrial precinct. The approximate size of the developable land has been identified as 16.0 hectares. Council anticipates that under our current equivalent tenement (ET) policy that this development would place an additional demand of approximately 64 ETs on the water supply and 64 ETs on the sewer system. Council's ET policy does not consider rezoning of land within the ET calculation, and as such additional reference has been made to the 'Taree Sewerage Scheme Servicing Strategy – 2016' which identifies a rate of 7.5ETs per hectare for industrial land, which correlates with an ET demand of 120ET for both water & sewer.

For the purposes of this review the ET demand rate of 120ET has been utilised for the review of water & sewer capacities.

Servicing Advice:

This servicing advice provides general information on water and sewer issues relevant to the proposed development. The enclosed information is based on Council's knowledge of its own systems and their performance and does not represent a commitment by Council to supply services. Actual requirements may be subject to significant change prior to the development proceeding.

It should be noted that this advice is subject to significant change due to a range of factors. In particular, it should be noted that water and sewer systems are dynamic by nature and capacity availability and system performance also vary over time. A detailed analysis of available capacity will be undertaken upon lodgment of a development application with Council:

- ***Water Servicing:***

  The site at Eriksson Lane, Taree South (Glenthorne), being Lot 50 DP 836972 & Lot 2 DP 827097, currently adjoins an existing Council water service area. There is currently sufficient capacity in the Council water treatment plant to serve the proposed development, however it should be noted that capacity availability and system performance vary over time.

  Strategy & Design: A water strategy will be required to be completed by the developer to demonstrate serviceability of the development. The design and construction of all infrastructure required to service the development is to be undertaken in accordance with standards published by the Water Services Association of Australia and Council. The developer is responsible for the costs for design and construction of water infrastructure required to service the development.

- ***Sewer Servicing:***

  The site at Eriksson Lane, Taree South (Glenthorne), being Lot 50 DP 836972 & Lot 2 DP 827097, currently adjoins an existing Council sewer service area. There is currently sufficient capacity in the Council sewer treatment plant to serve the proposed development, however it should be noted that capacity availability and system performance vary over time.

  Pumpstation TS-SPS-01: There is currently sufficient capacity within pumpstation TS-SPS-01 to cater for the proposed development, however it should be noted that capacity availability and system performance vary over time.

  Strategy & Design: A sewer strategy will be required to be completed by the developer to demonstrate serviceability of the development. The design and construction of all infrastructure required to service the development is to be undertaken in accordance with standards published by the Water Services Association of Australia and Council. The developer is responsible for the costs for design and construction of sewerage infrastructure required to service the development.

In order to undertake a formal assessment and confirm service availability, the developer will be required to submit a formal Development Application.

Developer Charges:

In accordance with Section 64 of the *Local Government Act 1993*, payment of Council Development Charges will be required as part of this development. Developer charges are to be paid at the rate applicable at time of payment. Council publishes developer charges in its annual Operational Plan.

Developer charges are based on the total Equivalent Tenement's (ET) for the proposed development in accordance with Council's *Equivalent Tenement Policy – DV02*. The ET rates utilised for this development is the '*6.4: Industrial Subdivision'* category. The total estimated ET charge to be levied for this development cannot currently be identified under this policy, however for the purposes of this preliminary servicing advice has been assumed as being 120ETs. It should be noted that this is subject to significant change pending the final arrangements of the proposed industrial development, including, but not limited to, lot numbers and lot size. A full calculation of the ET demand will be undertaken at time of lodgment of plans.

Additional ET demand may be applicable for other components of the development and this would be assessed at time of lodgment of additional development details. It should be noted that the final ET demand to be levied shall be re-calculated at time of lodgment of application and final assessment. ET rates are subject to change and the rate utilised will be that which is applicable at time of payment of Section 64 Contributions.

Environmental Assessment:

Please note that a Review of Environmental Factors (REF) may be required for works within Council's area of operations.

Prior to commencement of any environmental assessment please contact Council's Development Group in order to ascertain the scope and need for such an assessment. Details in relation to the requirements for an REF will be made available once further information is supplied in relation to the proposed development.

Further Information Required:

In order to undertake a formal assessment and confirm service availability, at a minimum, Council will require the following to be submitted:

1. *A completed Development Application Form along with payment of Assessment fee;*
2. *Three copies of building plans, including site plan and dimensioned floor plan;*
3. *Any additional supporting information*.*

** Additional information may be required; however this would be determined upon lodgement of application and plans.*

It should be noted that the information provided within this advice is preliminary only. This advice is subject to change at Council's discretion upon full lodgement of a Development Assessment application along with the final plans and ancillary documents, as well as any changes to Council policies and standards that may occur, or if further information becomes available between the date of this letter and completion of a final assessment.

If you have any questions on the above preliminary servicing advice please feel free to contact me on (02) 6591 7513.

Yours sincerely

Craig Wilkinson
Development Coordinator
(02) 6591 7513