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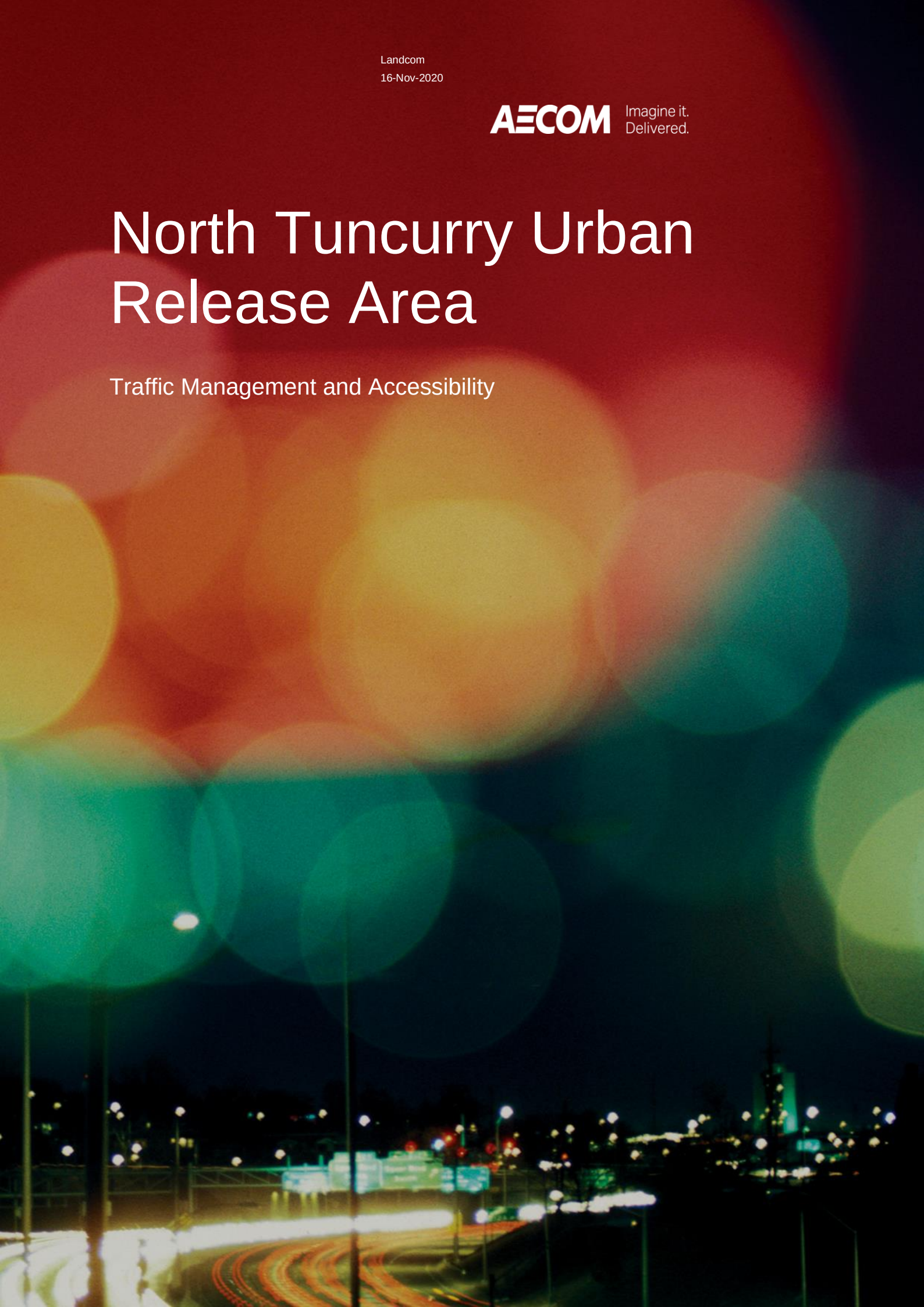
North Tuncurry Urban Release Area

Traffic Management and Accessibility



North Tuncurry Urban Release Area

Traffic Management and Accessibility

Client: Landcom

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Prepared by

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16-Nov-2020

Job No.: 60594018

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Quality Information

Document	North Tuncurry Urban Release Area
Ref	60594018
Date	16-Nov-2020
Prepared by	Ghizlane Chergaoui
Reviewed by	Martin Mallia

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	19-Feb-2019	Draft	Martin Mallia Principal Traffic Engineer	
B	21-Feb-2019	Final	Martin Mallia Principal Traffic Engineer	
C	25-Feb-2019	Final	Martin Mallia Principal Traffic Engineer	
D	08-Mar-2019	Final	Martin Mallia Principal Traffic Engineer	
E	16-Nov-2020	Comments from Council and TfNSW	Martin Mallia Principal Traffic Engineer	

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Executive Summary

The NSW Government's Hunter Regional Plan 2036 (HRP 2036) identifies North Tuncurry as a potential new release area to address the housing needs of the MidCoast area. Landcom (the proponent) is therefore seeking to rezone approximately 615ha of land for conservation and urban purposes. The rezoning, referred to as the North Tuncurry Urban Release Area or NTURA, seeks to formalise the Project Delivery Agreement (PDA) entered into between the NSW Department of Industry - Crown Lands and Water and Landcom. A Native Title Agreement signed in late 2010 between the NSW Government and the traditional owners of the land, the Worimi and Birpai People of Forster Tuncurry recognises that development of the NTURA Site can proceed subject to certain conditions.

The Minister for Planning and Public Spaces endorsed the preparation of a self-repealing SEPP Amendment to Great Lakes Local Environmental Plan (LEP) 2014 on the 18 March 2020. A Rezoning Study is proposed to be submitted to the Minister for Planning and Public Spaces to set the vision for the NTURA, and outline the extent and scope of the new land use and development control framework proposed to apply to land known as the NTURA Site.

In August 2019, Landcom submitted the draft Rezoning Study, including this TMAP, to the Department of Planning, Industry and Environment (DPIE) for review and to determine whether the draft documentation is fit for public exhibition purposes. The DPIE referred the Rezoning Study (and supporting studies) to MidCoast Council and relevant state agencies inviting feedback from those stakeholders. Landcom consequently requested AECOM to update the TMAP to address Transport for NSW's and Midcoast Council's feedback. Individual responses to each issue raised by Transport for NSW and Council are provided in a consultation schedule presented in **Appendix A**.

This Traffic Management and Accessibility Plan (TMAP) evaluates traffic and transport related issues associated with the NTURA, including:

- Traffic generated by the development and consideration of the traffic impacts on the existing road network
- Intersection and mid-block analysis to identify any road network upgrades to ameliorate the impacts of the proposed development
- Access strategy both external and internal ensuring connectivity of the study area to the surrounding road network
- Integration of walking, cycling, public transport and road network linkages to balance the needs of all users.

The NTURA Site

Tuncurry is located in the Midcoast LGA on the entrance to Wallis Lake, approximately 320 kilometres north of Sydney. The land the subject of this Study is a 615ha parcel of land located on the eastern side of The Lakes Way, directly to the north of, and adjoining, the Tuncurry town centre (herein referred to as the NTURA Site). It is an irregular shaped waterfront parcel of land situated on a peninsula that has been created by the Wallamba River.

The NTURA Site enjoys an ocean beach frontage of more than 4.5 kilometres and has a frontage to The Lakes Way and Northern Parkway. It is located within the coastal zone and is low lying and undulating as a result of the presence of a dunal system.

The NTURA Site was formerly used as a commercial pine plantation established to productively use prison labour, prior to being destroyed by bushfire in 1939. It was subsequently bulldozed in the 1950's and has generally been left unutilised. An 18-hole golf course is currently operational on part of the NTURA Site.

NTURA Vision and Master Plan

The overall vision for the NTURA is a low-medium density coastal community with approximately 2,123 dwellings centred around a new centre, reconfigured golf course and new open space areas.

Providing new housing and neighbourhood supermarket and specialty stores to support local residents, future development will integrate with the existing Tuncurry-Forster urban area.

Environmentally sensitive urban design is a prominent feature of the Master Plan that underpins the NTURA with the creation of new conservation lands and incorporation of best practice coastal design.

The objectives for the NTURA is that it will:

- Be the destination of choice for the NSW 'sea change' market and the aspirational goal for the regional housing market.
- Enhance Forster-Tuncurry as a coastal tourism destination.
- Be an innovative and authentic coastal community with a genuine sense of place that can enhance and expand the existing Tuncurry community.
- Be a new coastal community that reflects local lifestyle, offers housing diversity that is not available elsewhere in the Mid North Coast.
- Provide a unique offering where the beach, golf course and proximity to amenity and services are delivered as an integrated lifestyle package.
- Facilitate the conservation of 327 ha of land for ecological conservation within the NTURA site and provide the opportunity to register this land as BioBank Sites ensuring long term conservation outcomes.
- Strengthen connections to Nine Mile Beach and the foreshore.
- Celebrate and interpret local culture and heritage.
- Attract employment, tourists, sea- changers and a younger generation.
- Accelerate the growth and activation of a 'heart' at the B2 Local Centre Zone by co- locating daily convenience services and needs with the beach, a new golf clubhouse, community centre, cultural centre, mobile surf club and public gathering places.
- Accommodate a diverse range of residents with shared values as to how they choose to live, move around and recreate.
- Facilitate healthy living through a connected loop of destinations that encourage walking and cycling as a convenient and desirable mode of transport.
- Promote social equity and interaction by rethinking streets, open space and retail as places to meet and gather.

More specifically, the Master Plan comprises:

- the type and location of land uses within the NTURA Site;
- dwelling yield / density (approximately 2,123 dwellings);
- proposed location of retail / commercial / community floor space within the NTURA Site;
- a landscape strategy including identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- transport network layout;
- servicing and infrastructure strategy;
- location and dimensions of Bushfire Asset Protection Zones; and
- appropriate conservation of European and Aboriginal heritage located on the NTURA Site.

Future Development Control Regime

To facilitate realisation of the Master Plan, Landcom is seeking the Minister for Planning introduce a new planning framework for the NTURA Site by amending the Great Lakes Local Environmental Plan 2014 to:

- introduce new land use zones and objectives, including:
    - R2 Low Density Residential
    - R3 Medium Density Residential
    - B2 Local Centre
    - B5 Business Development
    - IN1 General Industrial
    - SP3 Tourist
    - RE2 Public Recreation
    - E2 Environmental Conservation
    - E3 Environmental Management
- identify principal development standards to broadly guide yield, density and built form outcomes, such as:
    - minimum lot size controls to facilitate dwelling typologies on a range of lots from 200-1,000m^2
    - maximum floor space ratio for development within the future B2 Local Centre Zone
    - maximum building height controls between 8.5m (2 storeys) and 20m (5 storeys)
- identify matters for consideration that future development must address;
- identify those portions of the NTURA Site to be set aside for conservation purposes; and
- implement a number of other minor changes to local clauses within the LEP to facilitate the proposed development.

In addition, the rezoning proposal is supported by:

- an Amending Development Control Plan (DCP) to guide future built form on the NTURA Site; and
- an outline offer to enter into a Voluntary Planning Agreement with Midcoast Council to establish a developer contributions framework and governance arrangement for the delivery of infrastructure and community facilities is currently being negotiated between Landcom and Council.

The Amending DCP has been prepared on behalf of Landcom and is appended to the Rezoning Study. The Amending DCP includes further design controls for the NTURA Site including:

- detailed design controls for residential dwellings, commercial/retail development and the public domain;
- concept layout of retail / commercial / community floor space within the B2 Local Centre Zone and proposed location for additional employment lands within a separate northern precinct of the NTURA Site;
- road network layout;
- identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- servicing and infrastructure strategy;
- location and dimensions of Bushfire Asset Protection Zones; and
- appropriate conservation of Aboriginal heritage located on the NTURA Site.

Following gazettal of the rezoning, and adoption of the Amending DCP, detailed development applications for subdivision and infrastructure works, buildings and other development will be submitted to the relevant planning authority for approval consistent with the overall rezoning and development control framework established for the NTURA Site.

A Voluntary Planning Agreement (VPA) would be entered into by Landcom (or a future developer) with relevant State agencies and Midcoast Council in order to ensure that the local and regional infrastructure needs of the future North Tuncurry population are adequately met. It is anticipated that this VPA would include monetary contributions for roads and transport, recreation, and social infrastructure, and will also provide for registration of land as Biobank Sites for conservation purposes. The proposed Biobank Agreement is intended to be fully funded for in-perpetuity conservation management. For the purposes of the Rezoning Study, Landcom has prepared a Statement of Intent to outline the aims, purposes and proposed outcomes of the future VPA. This will be subject to further discussion and negotiation with the relevant authorities as planning for the precinct progresses.

Traffic Impact Assessment

Two methods of evaluation have been used to understand the potential impacts of the NTURA on the local road network. It is assumed that the NTURA is developed at a rate of 50 lots per year from 2023. A network traffic model has been developed for both assessments and key intersections have been assessed in SIDRA.

- Method 1 is a traffic assessment that assumes the development of external road network upgrades identified for development (up to the year 2050) by Great Lakes Council (the previous council authority in Tuncurry, and now part of MidCoast Council) Schedule of Works included within *Forster District Section 94 Development Contributions Plan 2014* (S94 Plan). This method also assumes full development of the NTURA in 2050 (for modelling purposes). The purpose of this assessment is to determine whether the proposed upgrades will cater for full development of the NTURA.
- Method 2 is an alternate traffic assessment that seeks to estimate the year in which these upgrades are likely to be required (both with and without development of the NTURA).

The Extension of Beach Street from North Street to Northern Parkway is not scheduled until the year 2027 (as per the S94 Plan), however for the purposes of both assessments this connection has been assumed to be developed by 2023, as the NTURA would bring this forward to facilitate development.

Method 1 assumes the following road infrastructure upgrades have been implemented by 2050 (in addition to the Beach Street connection), as identified in the S94 Plan for the Forster District:

- Construction of two additional lanes along The Lakes Way between Grey Gum Road and approximately 250m north of Chapmans Road
- An upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout
- An upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout
- Duplication of the Wallis Lake Bridge.

The summary results emanating from Method 1 are based on the modelling of key intersections and are presented in **Table 1**.

Table 1 Method 1 summary results for 2050 with Development

Approach	Peak hour	Level of Service (LoS)	Requires additional upgrades
Tuncurry Road | New Access Road	AM	C	N/A
	PM	C	
The Lakes Way | Chapmans Road*	AM	A	No
	PM	A	
The Lakes Way | Northern Parkway | Grandis Drive*	AM	C	No
	PM	B	
The Lakes Way | Grey Gum Road*	AM	A	No
	PM	B	

* Intersection assumed to be upgraded as part of road network and infrastructure upgrade identified in the S94 Plan.

The results suggest that the intersection upgrades identified in the S94 Plan can accommodate the additional traffic generated by the full development with the exception of providing the proposed roundabout for the new access road that facilitates access to the northern part of the NTURA. Note that this upgrade would be subject to staging and is unlikely to be required until development of the northern area of the NTURA is commenced.

Method 2 assesses the required timing of infrastructure upgrades based on background traffic growth and the NTURA. Traffic modelling has been undertaken for the following scenarios:

- Traffic forecasts without the NTURA
- Traffic forecasts with the NTURA

The results emanating from Method 2 show the estimated timing of road network infrastructure upgrades and are presented in Table 2.

Table 2 Method 2 summary results with development of NTURA

Schedule of works	S94 Plan estimated start date	Estimated requirement (Method 2)
Construction of two additional lanes along The Lakes Way from Grey Gum Road to approximately 250m north of Chapmans Road.	2021	2033-2038
Upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout	2017[1] *	2038-2040
Upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout	2017[1] *	2063-2065
Extension of Beach Street from North Street to Northern Parkway	2027 **	2023
Duplication of the Wallis Lake Bridge	2025	2034

*Discussions with Council in 2015 suggested that these upgrades will be associated with surrounding development at Leo Street and Chapmans Road.
**Proposed to be brought forward should the NTURA proceed.
[1]The intersection improvements have not yet commenced. The estimated start date is to be confirmed.

Based on the assumptions of this modelling assessment the infrastructure upgrades proposed in the S94 Plan are currently scheduled to occur before capacity is estimated to be reached, suggesting the timing of the infrastructure upgrades in the S94 Plan may be delayed under both scenarios.

Several sustainable travel strategy measures have been proposed to influence travel behaviours which encourage the uptake of sustainable forms of transport such as the use of public transport and walking and cycling facilities wherever possible for all journey purposes.

1.0 Objectives of assessment

1.1 Introduction

The NSW Government's Hunter Regional Plan 2036 (HRP 2036) identifies North Tuncurry as a potential new release area to address the housing needs of the MidCoast area. Landcom (the proponent) is therefore seeking to rezone approximately 615ha of land for conservation and urban purposes. The rezoning, referred to as the North Tuncurry Urban Release Area or NTURA, seeks to formalise the Project Delivery Agreement (PDA) entered into between the NSW Department of Industry - Crown Lands and Water and Landcom. A Native Title Agreement signed in late 2010 between the NSW Government and the traditional owners of the land, the Worimi and Birpai People of Forster Tuncurry recognises that development of the NTURA Site can proceed subject to certain conditions.

The Minister for Planning and Public Spaces endorsed the preparation of a self-repealing SEPP Amendment to Great Lakes Local Environmental Plan (LEP) 2014 on the 18 March 2020. A Rezoning Study is proposed to be submitted to the Minister for Planning and Public Spaces to set the vision for the NTURA, and outline the extent and scope of the new land use and development control framework proposed to apply to land known as the NTURA Site.

In August 2019, Landcom submitted the draft Rezoning Study, including this TMAP, to the Department of Planning, Industry and Environment (DPIE) for review and to determine whether the draft documentation is fit for public exhibition purposes. The DPIE referred the Rezoning Study (and supporting studies) to MidCoast Council and relevant state agencies inviting feedback from those stakeholders. Landcom consequently requested AECOM to update the TMAP to address Transport for NSW's and Midcoast Council's feedback. Individual responses to each issue raised by Transport for NSW and Council are provided in a consultation schedule presented in **Appendix A**.

The overall vision for the NTURA is a low-medium density coastal community with approximately 2,123 dwellings centred around a new centre, reconfigured golf course and new open space areas. Providing new housing and neighbourhood supermarket and specialty stores to support residents, future development will integrate with the existing Tuncurry-Forster urban area.

Environmentally sensitive urban design is a prominent feature of the Master Plan that underpins the NTURA with the creation of new conservation lands and incorporation of best practice coastal design. AECOM had been commissioned by UrbanGrowth NSW (now Landcom) in 2015 to prepare a Transport Management and Accessibility Plan (TMAP) supporting the proposed NTURA. AECOM was subsequently engaged by Landcom to update the TMAP in 2018 to reflect current baseline traffic conditions and policy context.

1.2 TMAP objectives

The objectives of this TMAP are to address the following items:

- A comprehensive assessment of the transport impact of the NTURA taking all traffic constraints of the site and surrounding locality into consideration.
- Anticipated traffic generation from the NTURA and the distribution of traffic along the surrounding road network system, its impact on existing intersections and surrounding road network including Wallis Lake Bridge with regard to road capacity, level of service, traffic conditions, expected impacts and upgrade requirements.
- Intersection modelling using SIDRA for key intersections likely to be impacted by the NTURA during the AM and PM peak under 2050 traffic conditions with assumed road network upgrades identified in the *Forster District Section 94 Development Contributions Plan, adopted 28 October 2014* (S94 Plan).
- An assessment of the requirements for the timing of road network upgrades as a result of the NTURA.

- Proposed vehicular access from the wider road network and possible future road connections, road upgrades / widening, additional road requirements and any intersection upgrade requirements.
- Proposed pedestrian and cycle access within and to the site that connects to all relevant transport services and key off site locations and measures to promote the use of these modes.
- Identification of appropriate measures to manage the demand for travel to and from the development, in particular to reduce the demand for travel by private car and increase the proportion of travel by public transport, walking and cycling.
- Transport infrastructure required to ameliorate the impacts of the NTURA.
- Changes to bus routes and services in the area to increase the use of public transport.

The approach and requirements of the TMAP have previously been agreed by Roads and Maritime Services, now Transport for NSW (TfNSW) and Great Lakes Council, the previous council authority in Tuncurry and the Great Lakes region, which is now part of MidCoast Council.

2.0 Site and project descriptions

This chapter provides background information on the site and the NTURA.

2.1 Background

The NTURA site is approximately 615ha of coastal heathland located between the Lakes Way and Nine Mile Beach in the Great Lakes Region, under MidCoast Council Local Government Area (LGA). The site is Crown land under the control of NSW Department of Primary Industry – Crown Lands and Water.

A Project Delivery Agreement (PDA) was signed by NSW Department of Primary Industry – Crown Lands and Water and Landcom, which will facilitate development of the site for a range of land uses including residential, open space, retail and employment. Commencement of the project (including the commencement of planning) was subject to a Native Title Application and any Land Claims under the NSW Aboriginal Land Rights Act 1983.

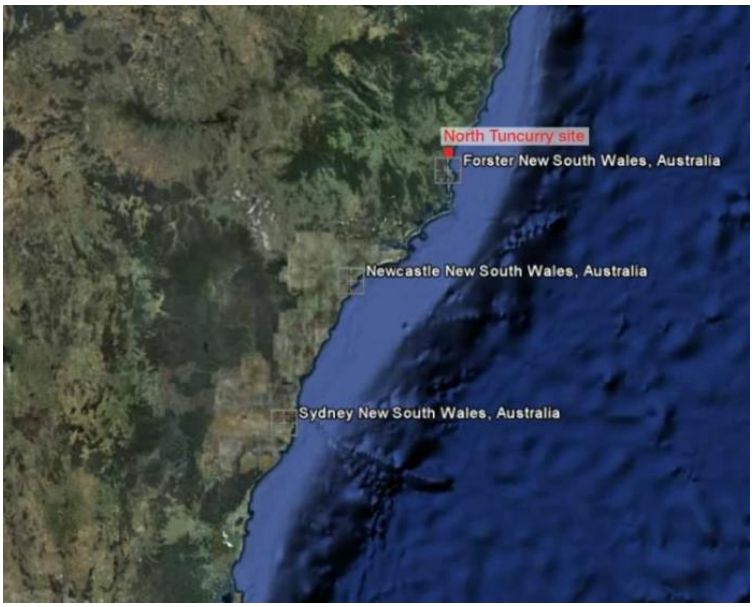
2.2 The site

Tuncurry is located in the Midcoast LGA on the entrance to Wallis Lake, approximately 320 kilometres north of Sydney. The land the subject of this Study is a 615ha parcel of land located on the eastern side of The Lakes Way, directly to the north of, and adjoining, the Tuncurry town centre (herein referred to as the NTURA Site). It is an irregular shaped waterfront parcel of land situated on a peninsula that has been created by the Wallamba River.

The NTURA Site enjoys an ocean beach frontage of more than 4.5 kilometres and has a frontage to The Lakes Way and Northern Parkway. It is located within the coastal zone and is low lying and undulating as a result of the presence of a dunal system.

The NTURA Site was formerly used as a commercial pine plantation established to productively use prison labour, prior to being destroyed by bushfire in 1939. It was subsequently bulldozed in the 1950's and has generally been left unutilised. An 18-hole golf course is currently operational on part of the NTURA Site. **Figure 1** indicates the location of North Tuncurry within the regional context, and **Figure 2** indicates the location of the subject site and its surrounding environs.

Figure 1 North Tuncurry regional context



Source: Allen Jack + Cottier, 2013

Figure 2 The NTURA site

Source: JBA Planning, 2013

2.3 Site ownership

The site comprises three allotments. Table 3 summarises the site's legal description and ownership details.

Table 3 Lot details

Lot	DP	Landowner
294	43110	Crown (lease to Forster Tuncurry Golf Club)
295	43110	Crown (lease to Forster Tuncurry Golf Club)
331	1104340	Crown Land

2.4 Site description

The site is low lying (RL 3 - 6 metres AHD) and undulating, due to its coastal location and presence of a dunal system. Existing development includes an 18-hole golf course on the southern portion of the Site, and a 66kV power line running along the western edge of the site (parallel to The Lakes Way). Current road and pedestrian access are via The Lakes Way at the Northern Parkway; however, a number of access roads and tracks traverse the site and provide informal access to and from the beach and golf course located on the site.

The condition of current vegetation on the site varies from exotic pasture with negligible ecological value to areas of good condition vegetation with high recovery potential. The cleared portions of the site generally coincide with the golf course and contain non-native species. Otherwise, the site is predominantly characterised by re-growth coastal and heath vegetation.

2.5 Site context

The site is located at the northern end of Tuncurry. Existing development and land uses surrounding the site include the Darawank Nature Reserve comprising undeveloped heath and coastal scrub to the north, Nine Mile Beach and the Pacific Ocean to the east, The Lakes Way and low scale residential to the west, and education facilities, low scale residential, playing fields, sports clubs and a cemetery to the south. The site is located approximately 2.0km north of the Tuncurry town centre, 3.7km north of Forster town centre, 160km north of Newcastle CBD and 30km south-east of Taree. The distance to the Pacific Highway is approximately 11km via The Lakes Way and Failford Road.

The site has been earmarked as the priority new land release area to address the regional housing needs of the Mid North Coast Region. Accordingly, the site presents a significant opportunity to provide residential dwellings and retail and employment activities within close proximity to existing infrastructure and established services. The introduction of retail and employment uses can be supported by the proposed residential uses envisaged for the site, which will be a key way of ensuring housing targets can be met by MidCoast Council in the mid to long term. Given the undersupply of readily available residential land, large sites or land suitable for conversion in the area, the NTURA provides an excellent opportunity to meet a variety of housing typologies in demand.

2.6 The Project

The overall vision for the NTURA is a low-medium density coastal community with approximately 2,123 dwellings centred around a new centre, reconfigured golf course and new open space areas. Providing new housing and neighbourhood supermarket and specialty stores to support local residents, future development will integrate with the existing Tuncurry-Forster urban area.

Environmentally sensitive urban design is a prominent feature of the Master Plan that underpins the NTURA with the creation of new conservation lands and incorporation of best practice coastal design.

The objectives for the NTURA is that it will:

- Be the destination of choice for the NSW ‘sea change’ market and the aspirational goal for the regional housing market.
- Enhance Forster-Tuncurry as a coastal tourism destination.
- Be an innovative and authentic coastal community with a genuine sense of place that can enhance and expand the existing Tuncurry community.
- Be a new coastal community that reflects local lifestyle, offers housing diversity that is not available elsewhere in the Mid North Coast.
- Provide a unique offering where the beach, golf course and proximity to amenity and services are delivered as an integrated lifestyle package.
- Facilitate the conservation of 327 ha of land for ecological conservation within the NTURA site and provide the opportunity to register this land as BioBank Sites ensuring long term conservation outcomes.
- Strengthen connections to Nine Mile Beach and the foreshore.
- Celebrate and interpret local culture and heritage.
- Attract employment, tourists, sea- changers and a younger generation.
- Accelerate the growth and activation of a ‘heart’ at the B2 Local Centre Zone by co- locating daily convenience services and needs with the beach, a new golf clubhouse, community centre, cultural centre, mobile surf club and public gathering places.
- Accommodate a diverse range of residents with shared values as to how they choose to live, move around and recreate.
- Facilitate healthy living through a connected loop of destinations that encourage walking and cycling as a convenient and desirable mode of transport.

- Promote social equity and interaction by rethinking streets, open space and retail as places to meet and gather.

More specifically, the Master Plan comprises:

- the type and location of land uses within the NTURA Site;
- dwelling yield / density (approximately 2,123 dwellings);
- proposed location of retail / commercial / community floor space within the NTURA Site;
- a landscape strategy including identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- transport network layout;
- servicing and infrastructure strategy;
- location and dimensions of Bushfire Asset Protection Zones; and
- appropriate conservation of European and Aboriginal heritage located on the NTURA Site.

To facilitate realisation of the Master Plan, Landcom is seeking the Minister for Planning introduce a new planning framework for the NTURA Site by amending the Great Lakes Local Environmental Plan 2014 to:

- introduce new land use zones and objectives, including:
    - R2 Low Density Residential
    - R3 Medium Density Residential
    - B2 Local Centre
    - B5 Business Development
    - IN1 General Industrial
    - SP3 Tourist
    - RE2 Public Recreation
    - E2 Environmental Conservation
    - E3 Environmental Management
- identify principal development standards to broadly guide yield, density and built form outcomes, such as:
    - minimum lot size controls to facilitate dwelling typologies on a range of lots from 200-1,000m^2
    - maximum floor space ratio for development within the future B2 Local Centre Zone
    - maximum building height controls between 8.5m (2 storeys) and 20m (5 storeys)
- identify matters for consideration that future development must address;
- identify those portions of the NTURA Site to be set aside for conservation purposes; and
- implement a number of other minor changes to local clauses within the LEP to facilitate the proposed development.

In addition, the rezoning proposal is supported by:

- an Amending Development Control Plan (DCP) to guide future built form on the NTURA Site; and
- an outline offer to enter into a Voluntary Planning Agreement with Midcoast Council to establish a developer contributions framework and governance arrangement for the delivery of

infrastructure and community facilities is currently being negotiated between Landcom and Council.

The Amending DCP has been prepared on behalf of Landcom and is appended to the Rezoning Study. The Amending DCP includes further design controls for the NTURA Site including:

- detailed design controls for residential dwellings, commercial/retail development and the public domain;
- concept layout of retail / commercial / community floor space within the B2 Local Centre Zone and proposed location for additional employment lands within a separate northern precinct of the NTURA Site;
- road network layout;
- identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- servicing and infrastructure strategy;
- location and dimensions of Bushfire Asset Protection Zones; and
- appropriate conservation of Aboriginal heritage located on the NTURA Site.

Following gazettal of the rezoning, and adoption of the Amending DCP, detailed development applications for subdivision and infrastructure works, buildings and other development will be submitted to the relevant planning authority for approval consistent with the overall rezoning and development control framework established for the NTURA Site.

A Voluntary Planning Agreement (VPA) would be entered into by Landcom (or a future developer) with relevant State agencies and Midcoast Council in order to ensure that the local and regional infrastructure needs of the future North Tuncurry population are adequately met. It is anticipated that this VPA would include monetary contributions for roads and transport, recreation, and social infrastructure, and will also provide for registration of land as Biobank Sites for conservation purposes. The proposed Biobank Agreement is intended to be fully funded for in-perpetuity conservation management. For the purposes of the Rezoning Study, Landcom has prepared a Statement of Intent to outline the aims, purposes and proposed outcomes of the future VPA. This will be subject to further discussion and negotiation with the relevant authorities as planning for the precinct progresses.

2.7 Study area

The TMAP considers the impact of the development on the surrounding road network as shown in **Figure 3**. The intersections to be assessed as part of the TMAP, which has previously been agreed with MidCoast Council (previously Great Lakes Council) and TfNSW include:

- The Lakes Way | Chapmans Road
- The Lakes Way | Northern Parkway | Grandis Drive
- The Lakes Way | Grey Gum Road.

The study also considers the impacts of the development on Wallis Lake Bridge and Beach Street as a result of a proposed extension of Beach Street to connect to the NTURA.

Figure 3 NTURA study area

Source: AECOM, 2014

3.0 Strategic context

3.1 State and regional strategic planning policies

3.1.1 State Infrastructure Strategy

Document	State Infrastructure Strategy 2018 – 2038: Building Momentum
Organisation	NSW Government – Infrastructure NSW
Date	March 2018
Purpose	The State Infrastructure Strategy 2018 – 2038 builds upon the previous State Infrastructure Strategy established by Infrastructure NSW in 2012. The Strategy aims to assess the current state of infrastructure and identify strategic priorities for the next 20 years. The Strategy provides independent advice to the Government on recommended specific infrastructure investments and reforms. It also makes recommendations to the NSW Government on how to fund these recommendations.
Content	The strategy identifies infrastructure challenges and presents solutions to address these needs. The strategy aims to meet the needs of a growing population and economy. Strategic directions are given for Greater Sydney, Regional NSW and NSW as a whole.
Relevance to North Tuncurry	Several strategic needs and planned projects are identified in the strategy which pertain to the Mid North or the North Coast and may be relevant for North Tuncurry. These include: • Safety: despite being home to just over 20 per cent of the state, regional NSW areas represent two thirds of all road fatalities in NSW. The strategy outlines potential infrastructure improvements and policies which will improve safety. • Healthcare and access: 38.5 per cent of the Mid-Coast region is over the age of 60, compared to 27.2 per cent for regional NSW. The population of those over 60 is growing at a faster rate than those under 60. As such, travel needs may change over time, and transport infrastructure and access may need to adapt.

3.1.2 Future Transport 2056

Document	Future Transport 2056 – Regional NSW Services and Infrastructure Plan
Organisation	NSW Government
Date	March 2018
Purpose	Future Transport 2056 is an update of the NSW Long Term Transport Master Plan released in December 2012. The plan has been developed in concert with the Greater Sydney Commission's Sydney Region Plan, Infrastructure NSW's State Infrastructure Strategy, and the Department of Planning and Environment's Regional Plans. The plan aims to provide an integrated vision for the state to support growth in the population and the economy. Future Transport 2056 provides a framework to guide investment, policies and network planning to address the current and future transport needs of NSW.
Content	Future Transport 2056 outlines a vision and strategic direction for the transport infrastructure across New South Wales. The strategy includes both general direction for large-scale infrastructure projects, as well as area specific improvements. A dedicated Regional NSW Services and Infrastructure Plan is provided as part of the strategy.
Relevance to North Tuncurry	Regional transport actions identified which are relevant for North Tuncurry include: • Bypasses of regional centres on New England Highway • Faster rail connections between Newcastle and Sydney:

Document	Future Transport 2056 – Regional NSW Services and Infrastructure Plan
	• Lower Hunter Freight Corridor Other general regional transport outcomes in the strategy include delivering effective and efficient networks, creating regional investment and jobs and connecting regional cities and centres to ensure regional communities play their role in the larger NSW, Australian and global context.

3.1.3 Hunter Regional Plan 2036

Document	Hunter Regional Plan 2036
Organisation	NSW Government – Department of Planning and Environment
Date	October 2016
Purpose	The Hunter Regional Plan 2036 will guide the NSW Government's land use planning priorities and decisions over the next 20 years. It provides an overarching framework which will guide detailed land use plans, development proposals and infrastructure funding. The plan aims to deliver a vibrant metropolitan city through creating a leading regional economy with a biodiversity rich natural environment and thriving communities and providing greater housing choice and jobs.
Content	The Hunter Regional Plan 2036 outlines 27 directions which provide a framework for future projects aimed at achieving the goals set out by the plan. It addresses the unique challenges in the area and provides several actions and priorities aimed at developing the local economies.
Relevance to North Tuncurry	The following actions have been identified for the Forster-Tuncurry area: • Support the visitor economy by leveraging the natural beauty of the area and enhancing nature-based tourism infrastructure • Provide capacity for long-term employment through education and training, and by capitalising on intra and inter-regional connections. • Provide housing, services and facilities, as well as accessible public spaces for an ageing population.

3.1.4 Hunter Regional Transport Plan

Document	Hunter Regional Transport Plan
Organisation	NSW Government
Date	March 2014
Purpose	The Hunter Regional Transport Plan supports the Long-Term Transport Master Plan and provides specific local transport needs and priorities for the Hunter region. The plan aims to improve the customer experience for travel to and from other regions, within the region, within towns and centres, and for visitors.
Content	The Hunter Regional Transport Plan outlines specific actions to address the unique challenges of the area to ensure the transport system in the Hunter region meets the needs of the community. The plan provides several actions and projects that will deliver better transport services, ensure effective regulation, and improve transport infrastructure.
Relevance to North Tuncurry	The following actions have been identified for the Forster-Tuncurry area: • Improve opportunities for walking and cycling – opportunities for MidCoast Council to seek support for new links through the NSW Government's funding mechanism • Improve public transport services – examine opportunities to better meet the needs of customers • Manage tourism-related travel – opportunity to develop initiatives during the holiday periods

3.1.5 Mid North Coast Regional Strategy

Document	Mid North Coast Regional Strategy
Organisation	NSW Department of Planning and Environment
Date	March 2009
Purpose	The Mid North Coast Regional Strategy outlines a planning approach to sustainably balance the region's expected population growth and the housing and employment development which will be required to support this increasing population.
Content	The strategy identifies the region's challenges and sets out a vision for the future. It presents a high-level assessment of the existing situation, identifies needs, develops a plan, and proposes actions to address housing, economic development and employment, protection of the natural environment and resources, and regional transport.
Relevance to North Tuncurry	The Mid North Coast will need to cater for a minimum housing demand of 59,600 new dwellings by 2031 to accommodate a forecast population increase of 94,000 as well as any anticipated growth beyond this figure arising from increased development pressures in the Region. The following strategic outcomes targeted for the mid north coast should be considered in development planning for North Tuncurry: • Ensure that new housing meets the needs of smaller households and an ageing population by encouraging a shift in dwelling mix and type so that 60 per cent of new housing is the traditional detached style and 40 per cent is of multiunit style. • Support the creation of additional service jobs by supplying adequate and well located commercial and industrial floor space within centres. • Build on the employment sectors that are currently successful and maintain the qualities that make the Region desirable to visitors.

3.1.6 MidCoast 2030: Shared Vision, Shared Responsibility – Community Strategic Plan 2018-2030

Document	MidCoast 2030: Shared Vision, Shared Responsibility
Organisation	MidCoast Council
Date	2018
Purpose	MidCoast 2030 expresses the community's ideas, priorities and values and is based on the aspirations, knowledge and feedback of the community aimed to guide decision making and planning. The vision was developed over an extensive community consultation process that spanned 18 months. In addition to community consultation, other key government plans and frameworks were considered in the plan, aiming to set the tone and direction for council planning in the future.
Content	The document details five key value areas which guide the structure of the plan. Within these value areas are key objectives and strategies as follows: • Unique, diverse and culturally rich communities: providing for all the members of the community • A connected community: using technology and transport to provide safe and easy access to the community • The environment: protecting the natural environment and managing resources wisely • Thriving and growing economy: developing and promoting the region • Strong leadership and shared vision: working in partnership with the community and government to deliver results
Relevance to North Tuncurry	The five key value areas and key objectives should guide and be considered for any development in North Tuncurry.

3.1.7 NSW Bike plan

Document	NSW Bike plan
Organisation	NSW Government
Date	May 2010
Purpose	The NSW Bike Plan sets out a plan to encourage cycling to increase the share of short trips by bike for all travel purposes and double the use of cycling to get to work. The Bike Plan outlines how the NSW Government will work with local council, communities and businesses to improve cycling and deliver: • Improved signage for cyclists; • More bike parking and facilities for cyclists at local centres, workplaces and transport interchanges; and • Resources to shape sustainable, active communities.
Content	The NSW Government has identified cycling as an important mode of transport for regional and country NSW. The following strategies have been identified: • Promote cycle tourism in country and regional NSW destinations • Encourage recreational bike-riding • Complete sections of the NSW Coastline Cycleway
Relevance to North Tuncurry	Complete the missing link of the Coastline cycleway in the Forster – Tuncurry area.

3.2 Local planning context

3.2.1 Great Lakes Local Environmental Plan (LEP)

Document	Great Lakes Local Environmental Plan
Organisation	Midcoast Council
Date	2014
Purpose	The Great Lakes LEP provides a land use framework to guide the future use of the land within the area of Great Lakes and provide a basis for the preparation of detailed development control plans. It also serves to protect environmentally sensitive areas and the heritage of the area, improve opportunities for ecologically sustainable development, provide for the cultural needs, and the equitable provision, of services and facilities for the community, to promote public transport patronage and encourage walking and cycling and to facilitate the orderly and sustainable economic development of land. The MidCoast Council aims to have a new LEP for the recently formed council by 2021.
Content	The LEP provides guidance on zoning controls, special provisions governing different development aspects and governance for the approval of urban release areas.
Relevance to North Tuncurry	Development in North Tuncurry is subject to the Great Lakes LEP. As such the LEP will provide guidance regarding land zoning, subdivision and other special provisions, and requirements regarding urban release areas.

3.2.2 Forster District Section 94 Development Contributions Plan (S94 Plan)

Document	Forster District Section 94 Development Contributions Plan
Organisation	MidCoast Council
Date	Adopted 28 October 2014
Purpose	The Forster S94 Plan enables contributions to be levied as a condition of consent for development that increases the demand for infrastructure in the Forster District.

Document	Forster District Section 94 Development Contributions Plan
	It applies to development in the area for which the Forster-Tuncurry urban area is the main service centre.
Content	The S94 Plan includes a Major Roads Program which addresses the timing and funding for improvements to Forster-Tuncurry Major Roads. The Program includes a Schedule of Works on the Lakes Way, and details Major Roads Contribution Rates and the scheduled development year for each upgrade are based on required funding for the major roads program distributed among the estimated number of trips for which Forster-Tuncurry urban area is the main service centre. Rates are provided for Inner, Middle, and Outer Zones, which are classified as being up to 15km, between 15 and 30km, and over 30km from the Bridge, respectively. Note the schedule and rates have been updated as part of the 2014 (draft) amendment.
Relevance to North Tuncurry	The schedule of works provides road network development upgrade assumptions applicable for the modelling assessment used in this TMAP. In addition, North Tuncurry is considered as being in the 'Inner Zone' for trip generation. The contribution rate per additional one-way trip for the Inner Zone is $634.53 in the S94 Plan amended in 2014. The S94 Plan states that this rate will be indexed on each 1 July in accordance with the change in the All Groups Consumer Price Index, weighted average of 8 capital cities for the year, to the previous December quarter.

3.2.3 Car Parking Policy

Document	Car Parking Policy
Organisation	MidCoast Council
Date	March 2011 (Date of last revision)
Purpose	The Car Parking Policy aims to facilitate the following within MidCoast Council: • To promote alternative and active transport for both commuter and recreational transport. • To provide an adequate level of on-site parking based upon anticipated occupancy rates and proximity to alternate and active transport, such as walking and cycling. To ensure that parking requirements are met without imposing an undue burden on developers or an additional liability on the present and future ratepayers.
Content	The policy requirements which must be carried out by developers to facilitate alternate and active transport. It also details bicycle and car parking requirements by development type.
Relevance to North Tuncurry	Development is subject to cycle facility requirements for residential flat buildings as well as, if applicable, requirements for any office, retail, commercial or restaurant developments.

3.2.4 Great Lakes Bike Plan

Document	Great Lakes Bike Plan
Organisation	MidCoast Council
Date	2010
Purpose	The Great Lake Bike Plan outlines the direction Council will take to encourage additional cycling trips in the Great Lakes region.
Content	Summarises the review of the 1989 Great Lakes Council Bike Plan and the issues identified and strategy recommended as a result of the review. Presents tasks and actions proposed to carry out the implementation of recommendations.

Document	Great Lakes Bike Plan
Relevance to North Tuncurry	Actions include the proposed extension of existing bike links in Forster and Tuncurry. It is planned that the existing cycle route running along the western border of the site on Tuncurry Road be extended to connect to other existing cycle links in Tuncurry, and to connect to cycle links in Forster.

3.2.5 MidCoast Council Delivery Program (2018-2021) and Operational Plan (2018-2019)

Document	MidCoast Council Delivery Program (2018-2021) and Operational Plan (2018-2019)
Organisation	MidCoast Council
Date	2018
Purpose	The plan aims to deliver results for the community in alignment with the Community Strategic Plan MidCoast 2030. The plan aims to consider the views of the community and to make well informed decisions which will help achieve the community's vision and values identified in the MidCosat 2030 plan.
Content	The Delivery Program outlines the focus areas for the Council, while the Operational Plan outlines the one-year actions for 2018-19. They are integrated in one document so the relationship between the Delivery Program and Operational Plan is clear. The overarching plan that forms the framework for the Delivery Program and Operational Plan is the MidCoast Community Strategic Plan MidCoast 2030 - Shared Vision, Shared Responsibility.
Relevance to North Tuncurry	Actions affecting the Forster-Tuncurry region include: • Develop a strategy for the development of Chapmans Road, Tuncurry • Review existing bike plans to develop a single MidCoast Council Bike Plan • Upgrade amenities at Little Street, Forster • Ensure all major upgrades to existing amenities and all new amenities are accessible for people of all abilities • Develop a Pedestrian Access and Mobility Plan

4.0 Site analysis

4.1 Existing travel patterns

4.1.1 Background

Travel characteristics for NSW residents travelling to work are gathered from the journey-to-work (JTW) data extracted from the Australian Bureau of Statistics (ABS) 2016 census. The journey-to-work dataset provides details of the origin and destination zones of trips, as well as characteristics of the journey such as mode of travel.

In addition, MidCoast Council (previously Great Lakes Council) undertook a Household Travel Survey (HTS) on Thursday 16 August 2012 to assess travel patterns of residents specifically in the Forster–Tuncurry area.

Both sets of data will be used to determine travel patterns in the study area and applied to the proposed development.

4.1.2 Mode split

The NTURA site is largely vacant, therefore surrounding suburbs were analysed to establish mode split, travel patterns and trip destinations in the area. The mode splits for Forster-Tuncurry area are illustrated in **Table 4**.

Table 4 Mode split data in Forster - Tuncurry

Mode of travel	Car driver	Car passenger	Walk	Bicycle	Motorbike	Bus	Taxi
HTS (Work Trips)	84.1%	5.6%	5.6%	4.0%	0.8%	0.0%	0.0%
HTS (All trips)	62.5%	17.9%	13.2%	2.2%	0.2%	3.7%	0.3%
2016 Census (Travel to Work) *	64.4%	4.6%	6.8%	n/a	n/a	0.6%	n/a

*Based on the 2016 Census Quick Stats, method of travel to work
Source: Great Lakes Council, Household Travel Survey Data 2011

Based on the 2012 HTS data, there is a high reliance (approximately 84%) on private vehicles for work trips, while active travel accounts for approximately 10% of work trips. Public transport use is very low in Forster-Tuncurry, particularly for work trips. Non-car modes increase when all trip purposes are considered.

The 2016 Census data also shows a similar high reliance for work trips. Approximately 69 per cent of trips to work use private vehicles. The mode share observed for public transport and active transport are very low (0.6 per cent and 6.8 per cent respectively).

4.1.3 Origin and destination survey

MidCoast Council (previously Great Lakes Council) undertook an origin and destination (OD) travel survey in 2011 to understand travel patterns in the Forster-Tuncurry area. The results of the OD surveys during the AM and PM Peak hour are presented in Table 5 and **Table 6**. Note that numbers shaded in grey represent eastbound movements on Wallis Lake Bridge originating in Tuncurry, while numbers shaded in blue represent trips over Wallis Lake Bridge with a Tuncurry destination.

Table 5 AM peak OD survey

Origin/ Destination	North of Tuncurry	Tuncurry	Forster	South of Forster
North of Tuncurry		214	432	19
Tuncurry	113		504	37
Forster	272	583		
South of Forster	19	89	180	

Source: Great Lakes Council, Household Travel Survey Data 2011

Table 6 PM peak OD survey

Origin/ Destination	North of Tuncurry	Tuncurry	Forster	South of Forster
North of Tuncurry		194	365	27
Tuncurry	181		649	80
Forster	370	558		129
South of Forster	23	47	112	

Source: Great Lakes Council, Household Travel Survey Data 2011

In 2016 ABS Census, Tuncurry had a population of 6,186. Using the population of Tuncurry to interpret the peak hour OD surveys, the following patterns were identified:

- Approximately 9% of the total population from Tuncurry crossed the Wallis Lake Bridge eastbound during the AM Peak
- Approximately 10% of the total population from Tuncurry crossed the Wallis Lake Bridge westbound during the PM Peak
- In the AM Peak hour, westbound traffic is the peak direction of travel between Forster and Tuncurry across the Wallis Lake Bridge
- In the PM Peak hour, eastbound traffic is the peak direction of travel between Forster and Tuncurry across the Wallis Lake Bridge.

4.1.4 Vehicle travel

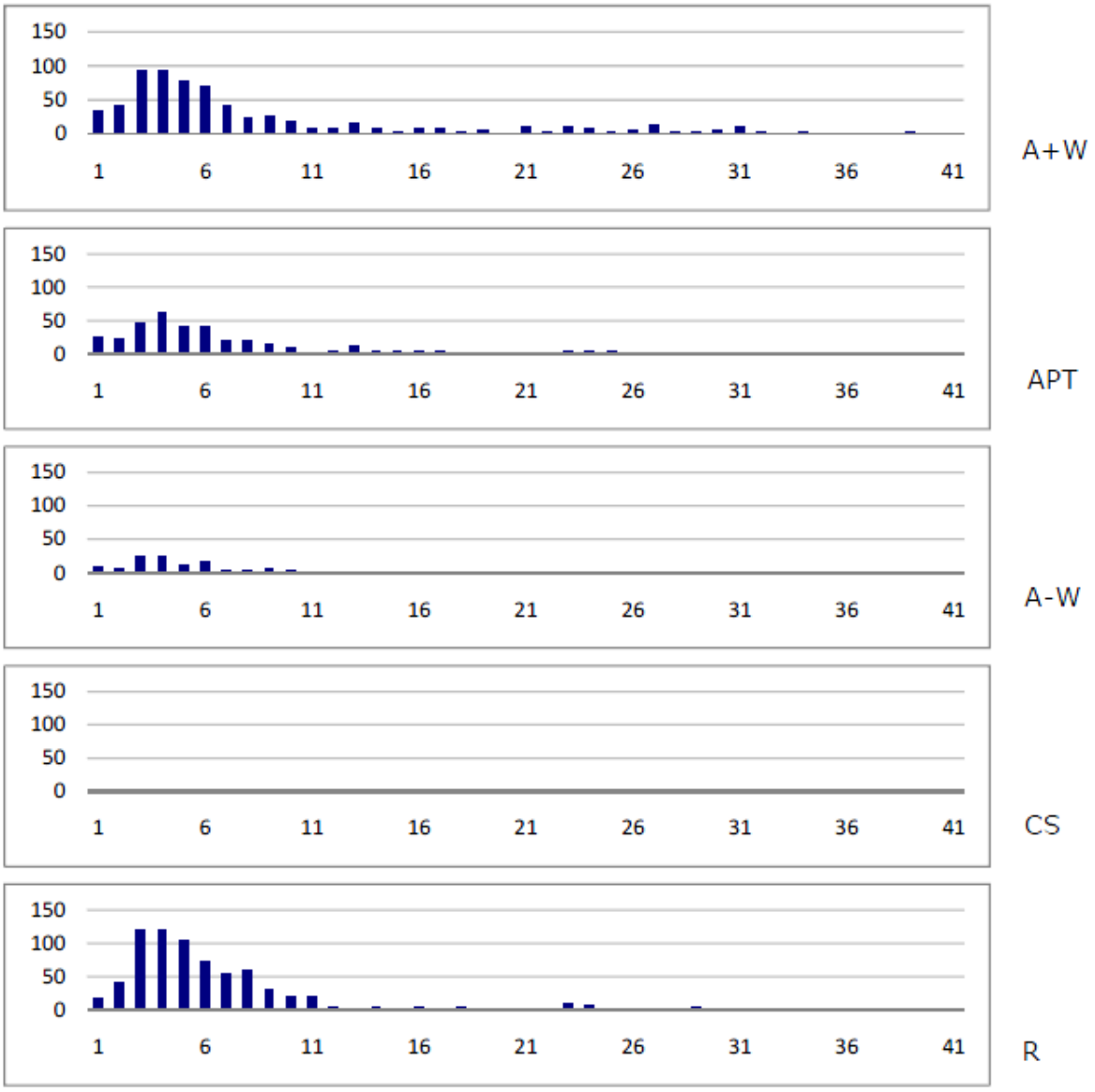
The morning peak hour in Forster-Tuncurry occurs between 8:00-9:00am, while the afternoon peak hour occurs between 3:00-4:00pm. These times are consistent with school travel peaks rather than typical commuter travel peaks (usually 8:00-9:00am and 5:00-6:00pm). This indicates that travel for education purposes plays a particularly strong role in the local area.

The Great Lakes College / TAFE education campus and the golf course are the only land uses accessible from the Northern Parkway. As minimal vehicle trips were observed accessing the golf course during weekday peak hours it can be assumed that data collected at the signalised intersection linking the Northern Parkway to The Lakes Way provides a reasonable estimate of vehicle trip generation for the education campus.

Traffic survey results indicate that the Northern Parkway generates approximately 414 vehicle movements (approximately 268 inbound) during the AM peak hour and 215 vehicle movements (approximately 159 outbound vehicle trips) during the PM peak hour. An estimated 122 vehicles park on site each day, while the remaining peak hour trips can be accounted for by buses and pick up / drop off.

The Household Travel Survey estimated the kilometres travelled for car driver trips based on an uncongested traffic network, with results grouped into person classifications as shown in **Figure 4**. Analysis of the results shows that the majority of car driver trips were less than 5 minutes.

Figure 4 HTS trip length



Source: Great Lakes Council, 2012

Horizontal axis represents trip length in minutes
Vertical axis represents the number of trips

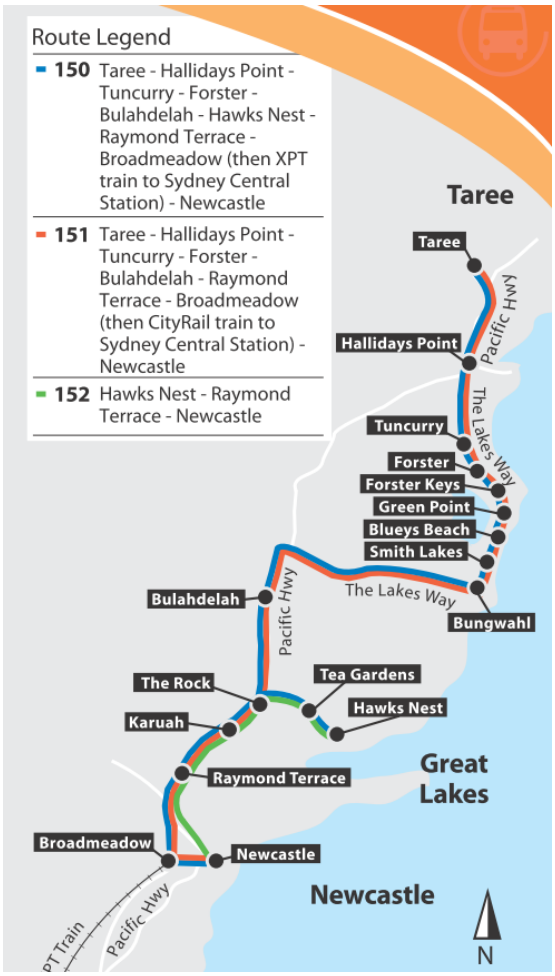
A+W – Adults who work full time;
APT – Adults working part time or casual;
A-W – Adults who don't work;
CS – Child who attends secondary school;
R – Retired

4.2 Existing public transport provision

4.2.1 Coach services linking to Taree railway station

The nearest train station to the NTURA is Taree Railway Station, which is approximately 30 kilometres north of the site. Busways operates coach services between Taree Railway Station and Newcastle via Broadmeadow Railway Station and Tuncurry. At present, the coach stop in Tuncurry is located at Beach Street, between Manning Street and Parkes Street. The existing coach network is shown in **Figure 5** and the frequencies of the coach services are shown in **Table 7**.

Figure 5 Existing coach network



Source: Busways, 2018

Table 7 Frequency of coach services in Tuncurry

Route description	Number of services	
	Weekday	Weekend
Taree to Newcastle	3	2
Newcastle to Taree	3	2

Source: Busways, 2018

4.2.2 Regional and local bus services

Forster Coaches operates a number of school bus routes and six regular bus routes in the area. The regular bus services that operate in Tuncurry and Forster are:

- Route 303: Stockland – Forster – Tuncurry via Cape Hawke Hospital and Legacy Village
- Route 304: Stockland – Forster – Tuncurry via Club Forster, Bowling Clubs and Cape Hawke Hospital
- Route 305: Stockland – Forster via One Mile and Forster Golf Club
- Route 306: Stockland – Forster Keys via Lakes Estate and Golden Ponds Resort
- Route 307: Coomba Park – Forster via Smiths Lake, Pacific Palms and Green Point
- Route 308: Gloucester – Forster via Nabiac and Failford.

The nearest bus corridor to NTURA is Manning Street (The Lakes Way). Route 304 and 308 operate on this corridor. The buses that operate in Tuncurry are shown in **Figure 6**. Other bus routes outlined above and not shown in **Figure 6** operate in Forster.

Figure 6 Existing local bus network (operated by Forster Coaches)

Source: Forster Coaches, 2013

The frequency of public bus services in Tuncurry and Forster is relatively limited. This is reflected in the low public transport mode-share for the area. Service frequencies are shown in **Table 8**.

Table 8 Frequencies of bus services in Tuncurry and Forster

Route	Description	Weekday – number of services			Weekend
		AM Peak (6am-9am)	Off Peak (9am-3pm)	PM Peak (3pm-6pm)	
303	Stockland – Forster – Tuncurry via Cape Hawke Hospital and Legacy Village	2	5	1	3
304	Stockland – Forster – Tuncurry via Club Forster, Bowling Clubs and Cape Hawke Hospital	1	4	2	3
305	Stockland – Forster via One Mile and Forster Golf Club	-	4	1	2
306	Stockland – Forster Keys via Lakes Estate and Golden Ponds Resort	2	4	1	3
307	Coomba Park – Foster via Smiths Lake, Pacific Palms and Green Point	1	1	1	1
308	Gloucester – Foster via Nabiac and Failford	1	-	1	-

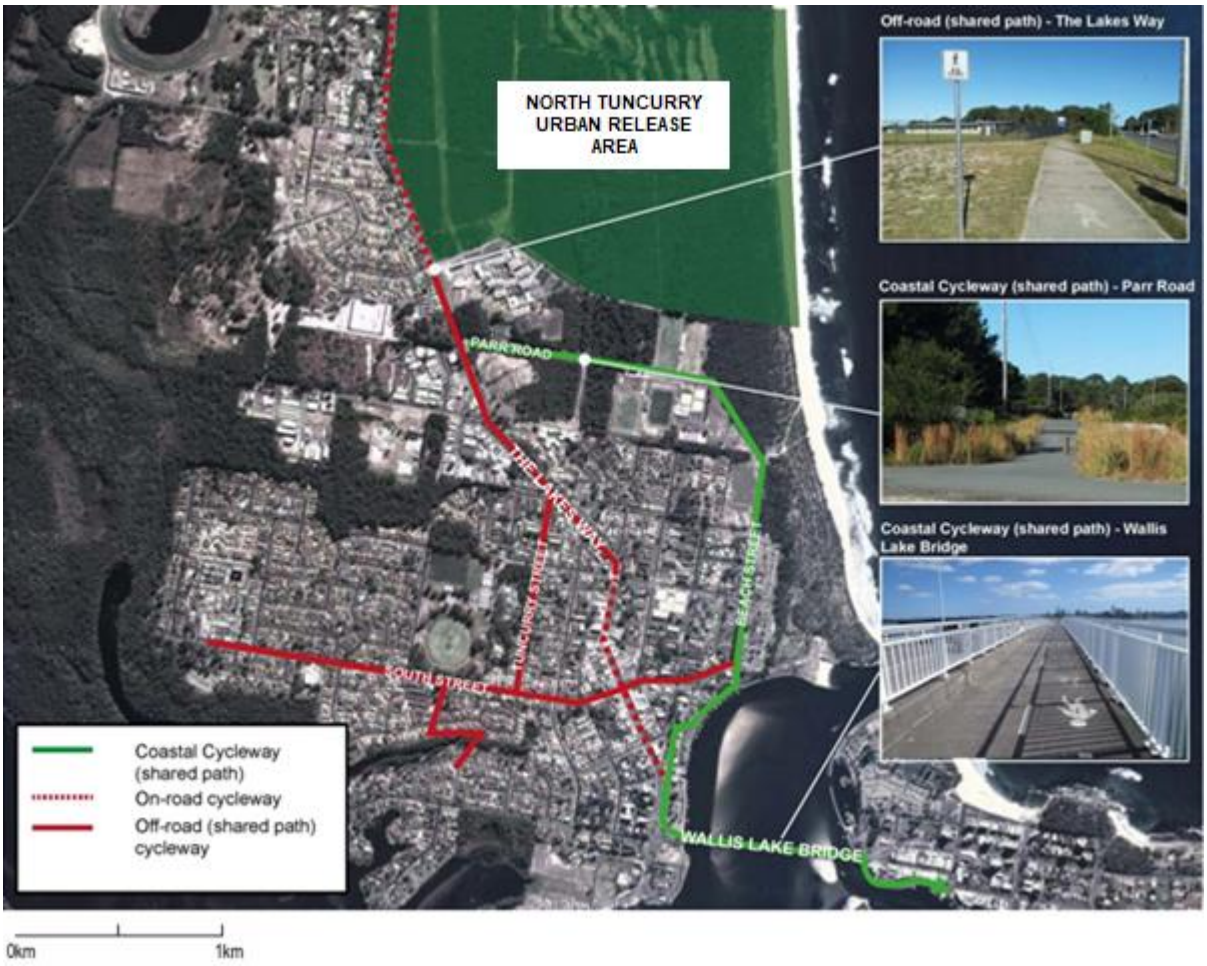
4.3 Existing active transport provision

4.3.1 Cycling routes and facilities

There are several cycling facilities in the study area which include on-road and off-road cycle routes, as shown in **Figure 7**. The Coastal Cycleway, an off-road shared path traverses through Tuncurry, providing links between the education campus, North Tuncurry Sports Complex, Nine Mile Beach and the Tuncurry Town Centre. The cycleway continues along Wallis Lake Bridge providing links to Forster.

The cycle route along the eastern side of Manning Street is mainly an off-road cycle route; however, this becomes an on-road route within the Tuncurry town centre. Additionally, off-road cycle routes along South Street and Tuncurry Street provide connections to the sport fields to the east and Tuncurry Public School.

Figure 7 Tuncurry and Forster cycle route map



Source: AECOM, 2013

4.3.2 Pedestrian routes and facilities

There are currently limited pedestrian facilities in proximity to the study area. However, several off-road shared paths are provided along Manning Street (The Lakes Way) and along the Coastal Cycleway.

MidCoast Council Bike Plan (Great Lakes Council Bike Plan 2010) outlines the strategy for a pedestrian and cycling wayfinding system along key walking and cycling routes to encourage active travel in the area. Signage provides route information such as distances to key destinations, maps and directions. Examples of wayfinding signs provided in Forster Waterside are shown in **Figure 8**. The pedestrian route map previously prepared for Tuncurry and Foster is shown in **Figure 9**.

Figure 8 Wayfinding signage

Source: AECOM, 2013

Figure 9 Tuncurry and Forster pedestrian route map

Source: Great Lakes Council, 2013

4.4 Existing road infrastructure

4.4.1 Road network

The key strategic road in the vicinity of the proposed NTURA site is The Lakes Way (Manning Street). Other key roads within the study area include Chapmans Road, Northern Parkway, Grey Gum Road and Beach Street. The major road network surrounding the study area is shown in **Figure 10**.

Figure 10 Road network

Source: AECOM, 2013

The Lakes Way / Manning Street

The Lakes Way is classified as a state road, providing inter-regional links between Bulahdelah, Smiths Lake, Forster, Tuncurry, Hallidays Point and Rainbow Flat. The Lakes Way provides Tuncurry and Forster with connections to the Pacific Motorway to the north and south and is the only north/south route to the east of the Pacific Highway. Through Tuncurry, The Lakes Way is known as both Manning Street and Tuncurry Road. It functions as the main road corridor for both Tuncurry and Forster. Through Tuncurry, the road is generally divided, with two lanes in each direction and a speed limit of 50km/h. Restricted on-street parking is provided within the town centre. The Lakes Way changes into a two-lane undivided road with a speed limit of 100km/h as it passes north of the town.

Beach Street

Beach Street is the most easterly road in Tuncurry and provides access to Nine Mile Beach, Tuncurry Beach Holiday Park and the Memorial Sports Club. Beach Street has one lane in each direction with a 50km/h speed limit. The wide carriageway allows for unrestricted on-street parking, which is permitted on both sides of the road. MidCoast Council has a proposal to extend Beach Street to the north so that it can link with the Northern Parkway.

Northern Parkway

Northern Parkway is a local road providing access to The Great Lakes Joint Education Campus and borders the southern boundary of the site. The undivided two-lane road does not have a sign posted speed limit however there is a school zone outside the Education Campus.

Northern Parkway intersects with Manning Road (The Lakes Way) at a signalised intersection and provides access to Tuncurry Golf Course.

Grey Gum Road

Grey Gum Road is a local road providing access to the industrial precinct of Tuncurry. It links with The Lakes Way at a priority intersection.

Chapmans Road

Chapmans Road is a local road providing access to residential property in the north-west of Tuncurry. The two-lane undivided road also provides access to The Jockey Club and Tuncurry Lakeside Resort.

4.5 Existing traffic conditions and road network performance

Traffic count surveys were undertaken by TTM Consulting during the morning (7 – 9am) and afternoon (3 – 5pm) peak periods on Tuesday 11 December 2018 at the following intersections:

- The Lakes Way | Chapmans Road
- The Lakes Way | Northern Parkway | Grandis Drive
- The Lakes Way | Grey Gum Road

The location of the intersections is shown in **Figure 11**.

Mid-block counts were undertaken on the Wallis Lake Bridge to assess the current capacity of the bridge. Similarly, mid-block counts were undertaken at two locations along Beach Street and one location along The Lakes Way (Manning Street) between Chapmans Road and The Northern Parkway.

Figure 11 Traffic count survey locations

Source: AECOM, 2018

Analysis of the traffic surveys showed that the AM peak hour occurred between 8:00am and 9:00am and that the PM peak hour was between 3:00pm and 4:00pm. This is consistent with the Household Travel Survey.

Table 9 shows the midblock traffic flows at each location alongside the estimated road capacity. Capacity of the two-lane two-way configuration of Manning Street, Beach Street and Wallis Lake Bridge has been based on the Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis. A theoretical capacity of 1,400 vehicles per lane per hour is assumed to be reasonable for Wallis Lake bridge, considering the configuration of the bridge and the traffic flow entering the bridge during peak hours. This midblock capacity for Wallis Lake Bridge is detailed in the Wallis Lake Bridge Capacity Assessment memo dated 02 October 2020 and was agreed with TfNSW on 29 October 2020. This memo and the relevant approval are contained in **Appendix B**.

Table 9 Midblock analysis

Section	Northbound/ Westbound			Southbound/ Eastbound		
	Volume	Capacity	V/C ratio	Volume	Capacity	V/C ratio
AM Peak						
The Lakes Way (Manning Street)						
North of Chapmans Road	529	1,200	44%	856	1,200	71%
Between Chapmans Road and Northern Parkway	587	1,000	59%	861	1,000	86%
Between Northern Parkway and Grey Gum Road	744	1,000	74%	983	1,000	98%
South of Grey Gum Road	798	1,000	80%	1019	1,000	102%
Beach Street						
North of North Street	15	300*	5%	16	300	5%
East of Wharf Street	72	500*	14%	80	500	16%
Wallis Lake Bridge						
Bridge	1,088	1,400**	78%	1,097	1,400	78%
PM Peak						
The Lakes Way (Manning Street)						
North of Chapmans Road	760	1,200	63%	612	1,200	51%
Between Chapmans Road and Northern Parkway	802	1,000	80%	627	1,000	63%
Between Northern Parkway and Grey Gum Road	869	1,000	87%	785	1,000	79%
South of Grey Gum Road	861	1,000	86%	842	1,000	84%
Beach Street						
North of North Street	31	300*	10%	29	300	10%
East of Wharf Street	78	500*	16%	92	500	18%

Section	Northbound/ Westbound			Southbound/ Eastbound		
	Volume	Capacity	V/C ratio	Volume	Capacity	V/C ratio
AM Peak						
Wallis Lake Bridge						
Bridge	1,140	1,400**	81%	1,129	1,400	81%

*The capacity along Beach Street has been based on the environmental capacity of residential streets, TfNSW Guide to Traffic Generating Developments
**The capacity of Wallis Lake Bridge of 1,400 vehicles per lane per hour was agreed with TfNSW on 29 October 2020.
Source: AECOM, 2018

Midblock analysis of the traffic data shows there is currently spare capacity along the majority of The Lakes Way (Manning Street) corridor in the vicinity of the site, as well as on Wallis Lake Bridge and Beach Street during typical weekday peak hours.

In the morning peak, the midblock analysis shows that Manning Street south of Grey Gum Road reaches capacity. Through travel speed is used to characterise vehicular LoS along a section of the road, and lower speeds indicate that delays along the link will increase when a link reaches capacity. However, this does not impact upon the capacity of the road network as the performance of the nearby intersection will be the key driver for overall network capacity.

4.5.1 Existing Intersection performance

Intersection performance was assessed using the SIDRA Intersection 8.0 modelling software. SIDRA output data used in this study includes:

- Degree of Saturation (DoS) – a measure of the ratio between traffic volumes and capacity of the intersection. As DoS approaches 1.0, both queue length and delays increase. Satisfactory operations usually occur with a DoS range between 0.7-0.8 or below
- Average Delay – average duration (in seconds) for a vehicle waiting at an intersection
- Level of Service (LoS) – a measure of the overall performance of the intersection (refer to **Table 10**).

Table 10 Level of Service criteria for intersections

Level of service	Average delay (secs/ veh)	Traffic signals and roundabouts	Give way and stop signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Trip Generating Development, Roads Maritime 2004

Level of service is one of the basic performance parameters used to describe the operation of an intersection. The levels of service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues). At signalised and roundabout intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority-controlled intersections, the LoS is based on the average delay (seconds per vehicle) for the worst movement.

The Lakes Way | Chapmans Road

The intersection of The Lakes Way (Manning Street) / Chapmans Road is a seagull intersection, with a dedicated right turn bay on the northern approach and merge lane for the eastbound right turn movement, as shown in **Figure 12**.

Figure 12 The Lakes Way | Chapmans Road intersection layout

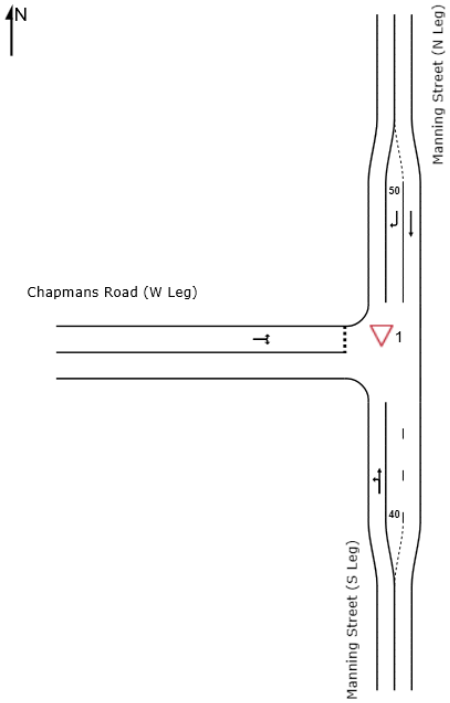


Table 11 Existing intersection performance of The Lakes Way | Chapmans Road

Approach	Veh/h	LoS	DoS	95% Back of Queue (m)	Average Delay (s)
AM Peak					
The Lakes Way (S Leg)	580	A	0.262	0.0	0.6
The Lakes Way (N Leg)	845	A	0.422	0.3	0.3
Chapmans Road (W Leg)	43	A	0.066	0.6	9.3
Total	1468	NA	0.422	0.6	0.7
PM Peak					
The Lakes Way (S Leg)	797	A	0.377	0.0	0.4
The Lakes Way (N Leg)	585	A	0.291	0.4	0.4
Chapmans Road (W Leg)	58	B	0.1106	1.0	12.5
Total	1440	NA	0.377	1.0	0.9

Source: AECOM, 2018

In the AM Peak, the intersection of The Lakes Way | Chapmans Road performs well, with Chapmans Road exhibiting the highest average delay of 9.3 seconds. In the PM Peak the intersection also performs well, with Chapmans Road exhibiting the highest average delay of 12.5 seconds.

The Lakes Way | Northern Parkway | Grandis Drive

The intersection of The Lakes Way | Northern Parkway| Grandis Drive is configured as a signalised intersection. A right turn bay is provided on both Lakes Way approaches. Both the Grandis Drive and

Northern Parkway approach have two entry lanes and one exit lane, whereas the Northern Parkway has a dedicated left turn lane. The intersection layout is shown in **Figure 13**.

Figure 13 The Lakes Way | Northern Parkway | Grandis Drive intersection layout

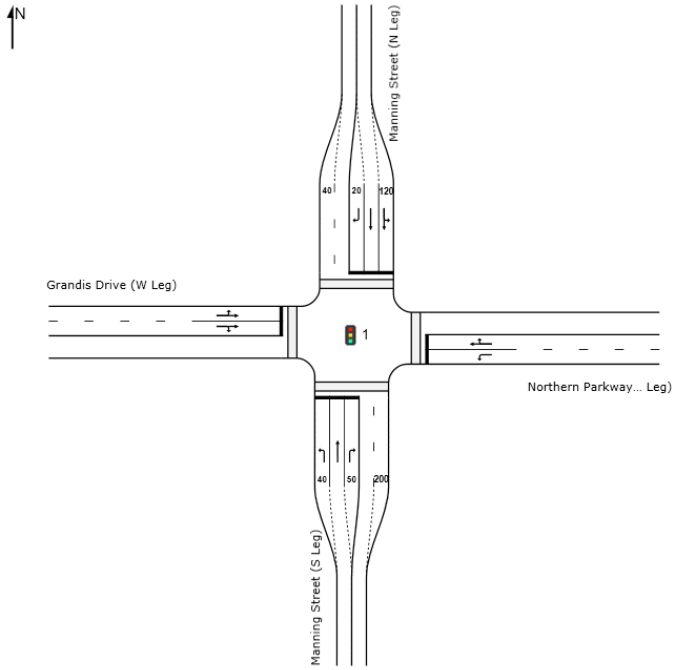


Table 12 Road Existing intersection performance of The Lakes Way | Northern Parkway | Grandis Drive

Approach	Veh/h	LoS	DoS	95% Back of Queue (m)	Average Delay (s)
AM Peak					
The Lakes Way (S Leg)	738	A	0.454	52.8	9.6
Northern Parkway (E Leg)	146	B	0.162	15.2	22.6
The Lakes Way (N Leg)	850	B	0.537	62.3	21.4
Grandis Drive (W Leg)	127	C	0.457	18.6	40.1
Total	1861	B	0.537	62.3	18.1
PM Peak					
The Lakes Way (S Leg)	862	A	0.707	82.2	10.8
Northern Parkway (E Leg)	159	B	0.160	12.6	24.6
The Lakes Way (N Leg)	606	B	0.347	33.8	14.9
Grandis Drive (W Leg)	63	C	0.202	8.1	33.6
Total	1690	A	0.707	82.2	14.4

Source: AECOM, 2018

The signalised intersection of The Lakes Way | Northern Parking | Grandis Drive operates satisfactorily, with Grandis Drive experiencing the highest average delay of 40.1 seconds.

In the PM Peak the intersection performs satisfactorily, with Grandis Drive experiencing the highest average delay of 33.6 seconds.

The Lakes Way | Grey Gum Road

The intersection of The Lakes Way | Grey Gum Road is configured as a seagull intersection, with a dedicated southbound right turn bay and a northbound left turn slip lane. Grey Gum Road has a wide

carriageway which allows parking on both sides of the road and one lane of through traffic in both directions. The intersection layout is shown in **Figure 14**.

Figure 14 The Lakes Way | Grey Gum Road intersection layout

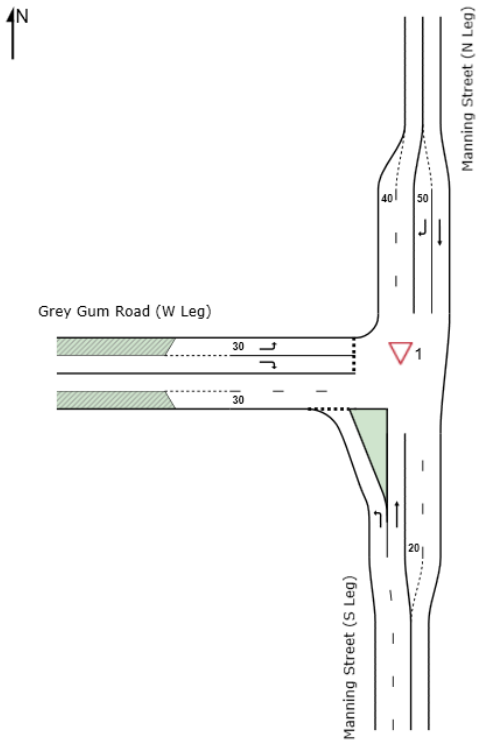


Table 13 Existing intersection performance of The Lakes Way | Grey Gum Road

Approach	Veh/h	LoS	DoS	95% Back of Queue (m)	Average Delay (s)
AM Peak					
The Lakes Way (S Leg)	797	A	0.378	1.0	0.5
The Lakes Way (N Leg)	967	A	0.504	0.4	0.3
Grey Gum Road (W Leg)	71	B	0.476	5.6	30.9
Total	1835	NA	0.504	5.6	1.7
PM Peak					
The Lakes Way (S Leg)	861	A	0.423	0.7	0.4
The Lakes Way (N Leg)	764	A	0.393	0.7	0.4
Grey Gum Road (W Leg)	148	B	0.564	6.3	27.4
Total	1773	NA	0.564	6.3	2.3

Source: AECOM, 2018

In the AM peak, the intersection of The Lakes Way | Grey Gum Road currently performs well, with Grey Gum Road exhibiting the highest average delay of 30.9 seconds.

In the PM Peak, the intersection also performs well, with Grey Gum Road exhibiting the highest average delay of 27.4 seconds.

5.0 Future context

This section summarises the expected growth in the Forster – Tuncurry area and the potential increase in traffic as a result of regional and surrounding development as well as the planned provision of transport infrastructure upgrades.

5.1 Road network upgrades

5.1.1 Manning Street and Point Road intersection upgrade

TfNSW is proposing to upgrade the intersection of Manning Street and Point Road to a roundabout, with the aim of improving the overall safety and operation of the intersection. Between July 2011 and June 2016, there were 15 reported crashes at the intersection which resulted in five injuries. Furthermore, surveys carried out in December 2017 under peak holiday conditions indicated there was extensive queuing on Manning Street.

Planning and investigations were conducted in 2017, and traffic modelling indicated during normal peak hour or peak holiday conditions the roundabout design would be effective in managing traffic flows. Construction was set to commence in May 2018, however TfNSW has since postponed the upgrade works due to backlash from the local community. The project is currently under review by Roads and Maritime.

5.1.2 S94 Plan

MidCoast Council has not indicated any plans for major road network upgrades in Tuncurry in the 2020/21 Capital Works Program. However, the S94 Plan identifies several of potential future road infrastructure upgrades in the vicinity of the study area. These upgrades include:

- Construction of two additional lanes along The Lakes Way (Manning Street) between Grey Gum Road and approximately 250m north of Chapmans Road
- An upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout
- An upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout
- Extension of Beach Street from North Street to Northern Parkway
- Duplication of the Wallis Lake Bridge.

These upgrades were previously identified by MidCoast Council, to plan for the potential infrastructure required to cater for development growth in Forster and Tuncurry accounting for the regional context. The estimated start dates scheduled for these infrastructure upgrades (outlined in **Table 14**) are based on the S94 Plan.

Table 14 Schedule of Works (S94 Plan, adopted on 28 October 2014)

Schedule of works	Type	Estimated start date (S94)
Construction of two additional lanes along The Lakes Way (Manning Street) from Grey Gum Road to approximately 250m north of Chapmans Road	Road network improvement	2021
Upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout	Intersection improvement	2017[1] *
Upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout	Intersection improvement	2017[1] *
Extension of Beach Street from North Street to Northern Parkway	Road network improvement	2027 **
Duplication of the Wallis Lake Bridge	Road network improvement	2025

Source: Great Lakes Council S94 Contribution Plan, 2014
*Discussions with Council in 2015 suggested that these upgrades will be associated with surrounding development at Leo Street and Chapmans Road.
**Proposed to be brought forward should the NTURA proceed.
[1]The intersection improvements have not yet commenced. The estimated start date is to be confirmed.

Figure 15 Road network and intersection improvements identified in the S94 Plan (for Tuncurry)

Source: Great Lakes Council, 2013

5.2 Cycle network upgrades

MidCoast Council is aiming to encourage the use of alternative transport options through the provision of a safe, accessible and connected cycling network. As part of the 2018-2021 Delivery Program strategies, Council is planning to review the existing bike plans and develop a single MidCoast Council Bike Plan.

MidCoast Council (previously the Great Lakes Council, the Council authority for Tuncurry), developed a Bike Plan which has identified several potential bicycle routes providing better connectivity to key destinations within Tuncurry.

As shown in **Figure 16** , proposed strategic cycle routes include:

- On road cycle route along Grey Gum Road to South Street with off road tracks
- On road cycle route from South Street to Point Road with off road tracks
- On road cycle route along Taree Street
- On road cycle route along Point Road
- Extension of the cycle network along The Lakes Way (Manning Street) north towards Chapmans Road, with the vision of ultimately linking to Hallidays Point.

Figure 16 Existing and proposed bicycles routes

Source: AECOM, 2013

5.3 Future development

5.3.1 Other development sites

Forecast.id has used several land development and infill assumptions as part of their population and household forecasts where an additional 1,249 dwellings are expected to be developed by 2036.

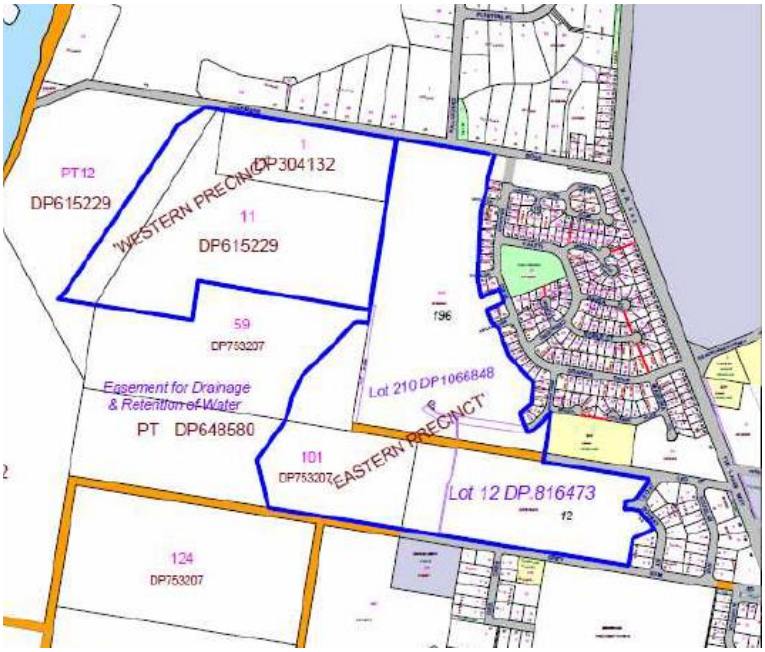
Table 15 Residential developments

Area	Assumed residential development	Additional dwellings by 2036
Tuncurry*	Crystal Waters Estate Chapmans Road Leo Street Housing NSW Senior Living Units Point Road North Tuncurry Small sites Low level of infill development	875
Nabiac – Failford – Darawank – Rural North	Glider Avenue Rural Residential Nabiac Street Cowper Street & Martin Street Failford Precinct Robertson Street & Dibbs Street Showgrounds Lane and Pacific Highway Small sites Low level of infill development	324

*The Forecast.id dwelling estimates for 2031 were higher than the currently available estimates for 2036. As such, the additional dwellings by 2036 for Tuncurry were based on the 2031 estimates (being 625 dwellings) with an additional 50 dwellings per year for the NTURA between 2031 - 2036.

Two new developments are proposed in the vicinity of the NTURA site, west of The Lakes Way as shown in **Figure 17**. Based on the Great Lakes Development Control Plan (2014), the Eastern Precinct proposes approximately 300 residential lots south of Chapmans Road and approximately 50 industrial lots north of Grey Gum Road and south of Leo Street. The Western Precinct proposes an additional 125 residential lots.

Figure 17 Proposed future developments



Source: Great Lakes Council, 2009

5.3.2 Background traffic growth

The historical annual average daily traffic (AADT) growth patterns at a selected RMS survey location in the vicinity of the NTURA is presented in **Table 16**. The average annual growth rate is obtained from the annual growth rate as summarised in **Table 17.**

Table 16 Historical AADT growth trends in the vicinity of the NTURA

ID	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
09923	The Lakes Way, at Wallis Lake Bridge	21,135	21,267	21,440	21,245	21,449	21,904	21,297	22,759	22,526	24,387	23,027

*- Station 09.923 is a permanent count station and the AADT shown is in vehicles.
Source: Roads and Maritime, 2018

Table 17 Average annual growth rate

2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Average
0.6%	0.8%	-0.9%	1.0%	2.1%	-2.8%	6.9%	-1.0%	8.3%	-5.6%	0.9%

A comparison of the historical annual average daily traffic (AADT) taken from the TfNSW permanent count station between 2008 and 2018 indicates that a background traffic growth of 0.9 per cent has occurred during this period. Furthermore, a meeting with RMS was held on the 10th of May 2013, where the year of assessment and the rate of future background traffic growth of 0.9% was agreed (full development assumed at 2050 due to current construction timelines). Therefore, for the purposes of this assessment the expected background traffic growth is assumed to be 0.9 per cent.

Based on this assumption, **Table 18** presents the future midblock forecasts without the NTURA or the road infrastructure upgrades.

Table 18 Future base traffic forecasts without NTURA

Section	Direction	Capacity	2050			
			AM Peak	V/C ratio	PM Peak	V/C ratio
The Lakes Way/ Manning Street						
North of Chapmans Road	NB	1,200	705	59%	1,012	84%
	SB		1,140	95%	815	68%
Between Chapmans Road and Northern Parkway	NB	1,000	782	78%	1,068	107%
	SB		1,147	115%	835	84%
Between Northern Parkway and Grey Gum Road	NB	1,000	991	99%	1,158	116%
	SB		1,309	131%	1,046	105%
South of Grey Gum Road	NB	1,000	1,063	106%	1,047	115%
	SB		1,357	136%	1,122	112%
Beach Street						
North of North Street	NB	300	20	7%	41	14%
	SB		21	7%	39	13%
East of Wharf Street	NB	500	107	21%	123	25%
	SB		96	19%	104	21%
Wallis Lake Bridge						
Bridge	WB	1,400	1,449	104%	1,519	108%
	EB		1,461	104%	1,504	107%

Background traffic forecast for sections along The Lakes Way/ Manning Street indicate the existing two-lane carriageway experiences capacity constraints resulting from the additional traffic in 2050, with The Lakes Way south of the Northern Parkway operating at capacity in 2050. Beach Street is not forecast to have capacity constraints in 2050.

The additional future year background traffic is expected to cause additional pressure on the existing two-lane configuration of the Wallis Lake Bridge, causing it to operate above the practical capacity of the bridge.

5.4 Future base intersection performance no development

In order to understand the operational performance of the surrounding localised road network with 2050 traffic forecasts, an analysis was undertaken for the following intersections during typical AM and PM peak periods:

- The Lakes Way | Chapmans Road
- The Lakes Way | Northern Parkway | Grandis Drive
- The Lakes Way | Grey Gum Road

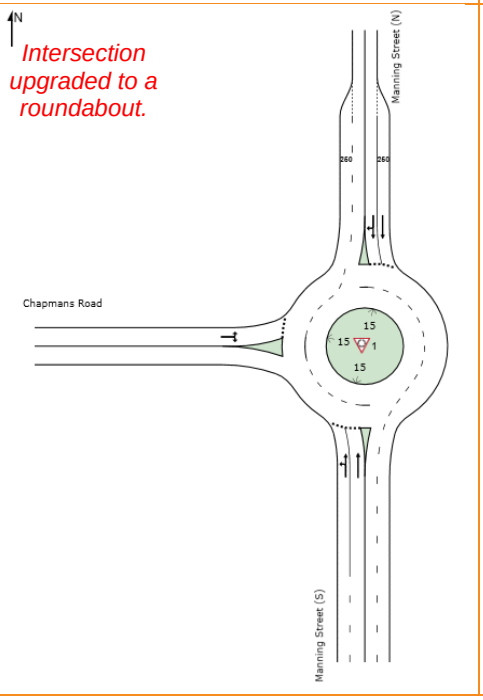
Given that the background traffic growth for 2050 is largely attributed to development at Chapmans Road and Leo Street, the 2050 assessment has assumed the road network and intersection improvements identified in **Section 5.1** have been delivered by 2050.

5.4.1 2050 intersection performance

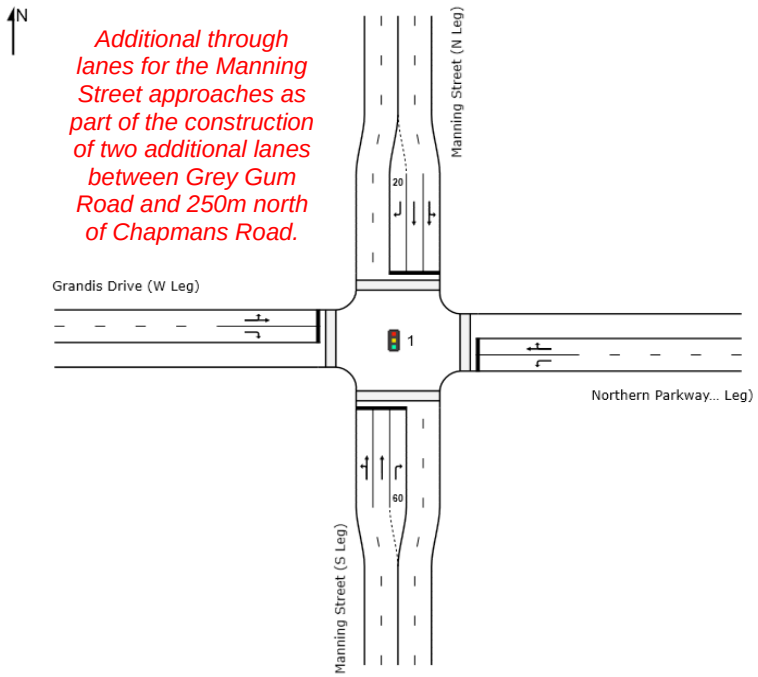
The 2050 future base intersection turning movements have been modelled and assessed with the road network and intersection upgrades identified in the S94 Plan. The geometric layout of the upgraded intersections is shown in **Figure 18**.

Figure 18 Intersection upgrades

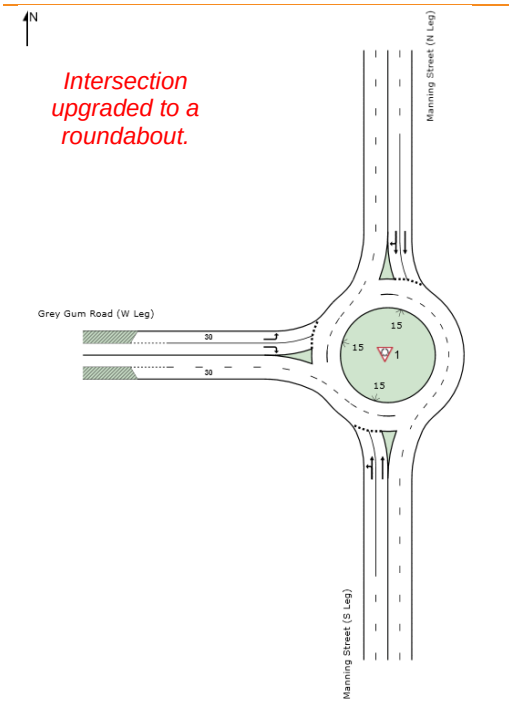
The Lakes Way | Chapmans Road



The Lakes Way | Northern Parkway | Grandis Drive



The Lakes Way | Grey Gum Road



A summary of the intersection performance under 2050 AM and PM peak hour base forecast traffic demand (without development) is presented in Table 19.

Table 19 2050 AM and PM peak hour intersection performance

Approach	Peak hour	Veh/ hr	LoS	DoS	95% Back of Queue (m)	Average Delay (s)
2050 without development						
The Lakes Way | Chapmans Road*	AM	225	A	0.319	3.3	8.8
	PM	77	A	0.135	1.4	9.1
The Lakes Way | Northern Parkway | Grandis Drive*	AM	2364	B	0.764	96.7	23.8
	PM	2211	A	0.513	56.9	14.2
The Lakes Way | Grey Gum Road*	AM	157	A	0.190	2.6	10.4
	PM	119	B	0.271	5.7	19.0

* Intersection upgraded as part of road network and infrastructure upgrade identified in the S94 Plan.

The key intersections assessed along The Lakes Way (Manning Street) operate well at a LoS B or better during the 2050 AM and PM peak period.

The intersection analysis shows an improvement in the LoS for the intersection of The Lakes Way | Chapmans Road and The Lakes Way | Grey Gum Road as part of the upgrade of the two intersections from a give way layout to a roundabout.

At the intersection of The Lakes Way | Northern Parkway | Grandis Drive, it is recommended that a dedicated right turn lane is marked on the Grandis Drive approach due to the high number of right turn movements experienced during the AM and PM peak.

6.0 Proposed development

This section summarises the proposed NTURA (including B2 local centre) Master plan. It also describes the proposed road hierarchy and how the NTURA will be accessed. Proposed bus, cycle and pedestrian networks are also detailed as well as summaries of road cross sections to be used within the NTURA and parking provision.

6.1 Master plan

The current NTURA master plan proposes a total of approximately 2,123 residential dwellings comprising of both low and medium densities, to accommodate an expected population of 4,500 residents. These dwellings surround the remodelled Tuncurry Golf Course and are bordered by Nine Mile Beach to the east and The Lakes Way in the west. Medium density dwellings are proposed in proximity to the B2 Local Centre. The NTURA proposed Master Plan is shown in **Figure 19**.

The master plan offers the following key elements:

- Residential flat buildings in proximity to the proposed B2 Local Centre Zone and in a smaller precinct to the south
- Water management basins and Ephemeral Zones
- A remodelled Tuncurry Golf Course integrated into the development
- A new re-positioned golf clubhouse to form part of the proposed B2 local centre
- Medium density housing in proximity to the proposed B2 local centre
- A looped road network for future bus routes
- Development of walking and cycling corridors that expand on existing coastal infrastructure in Forster-Tuncurry
- Three external access points at the Northern Parkway, Beach Street and a new northern access
- Integration of a new surf club, community centre and beach access with the proposed B2 Local Centre
- Business and Industrial areas to provide employment opportunities
- Parks and open spaces

A main feature of the proposed Master Plan is the addition of water management basins and ephemeral zones, mostly surrounding the remodelled Tuncurry Golf Course. These water management basins are necessary from a drainage perspective and have been integrated into the proposed Master Plan with consideration given to their potential as barriers for transport and access. The location of theses water management basins and ephemeral zones means they do not substantially intersect or cut across the site, acting to minimise the impacts on the transport network and the requirement of bridge infrastructure.

A local centre including a surf club and village green are proposed in the eastern part of the site in addition to a new golf clubhouse. The B2 Local Centre is designed to function as a ‘community hub’ with cafés, a supermarket and beach access. The B2 Local Centre Master Plan is shown in **Figure 20**.

6.6ha of Industrial lands for freight and logistics are proposed to the north of the B2 local centre and will encompass approximately 12,000m^2 of Gross Floor Area.

Retail land uses of approximately 2,292m^2 are proposed within the B2 local centre.

6.7ha of B5 Business Development land is proposed within the NTURA, however the land use and the yield for this use has not yet been determined.

Figure 19 NTURA proposed Master Plan

Source: Roberts Day, 2018

Figure 20 B2 local centre

Source: Roberts Day, 2014

6.2 Road hierarchy and site access arrangements

6.2.1 Site access

Access to the development is provided at three locations (as shown in **Figure 21**), to the north-west, south-west and south-east of the site as described below.

The following access points are provided:

- The existing intersection of The Lakes Way | Northern Parkway | Grandis Drive
- The Lakes Way approximately 1.2 km north of Chapmans Road (New Access Road)
- Beach Street extension

The main intersection for access to the site is proposed to be provided approximately 1.2km north of Chapmans Road, connecting to the north-west of the site via a new roundabout. This access will provide the most direct route for those within the site to connect to the Pacific Highway. It is also likely to be utilised by residents in the north of the site as the primary connection to Forster and Tuncurry. This access also provides the most direct connection to the proposed B2 Local Centre from The Lakes Way.

The existing road access via the Northern Parkway will provide a connection to the south west of the site and will act as the main access for the initial stages of the development (to be located to the south of the site). This access can be utilised without the need for an intersection upgrade however development of the NTURA should consider the access requirements of the existing Joint Education Campus and its proximity in relation to planned NTURA intersections to ensure that road user conflicts are minimised. Any issues would be addressed at a detailed design stage.

Figure 21 NTURA access points

Source: Roberts Day, 2018, modified by AECOM, 2019

Beach Street is proposed to be extended northwards to connect with the site, enabling a continuous coastal access route as an alternative to The Lakes Way. This route is proposed to be extended during the initial stage of the NTURA prior to development of the new main access from The Lakes Way, as development of the site is proposed to begin in the south. Ultimately the Beach Street access will provide a coastal connection between the proposed B2 Local Centre and existing centres in Tuncurry and Forster. This access will also function as a key part of a walking and cycling link between the B2 local centre and existing coastal cycleway. Beach Street could also potentially be used for buses (including school buses) to reduce pressure on the Northern Parkway and school turnaround facilities.

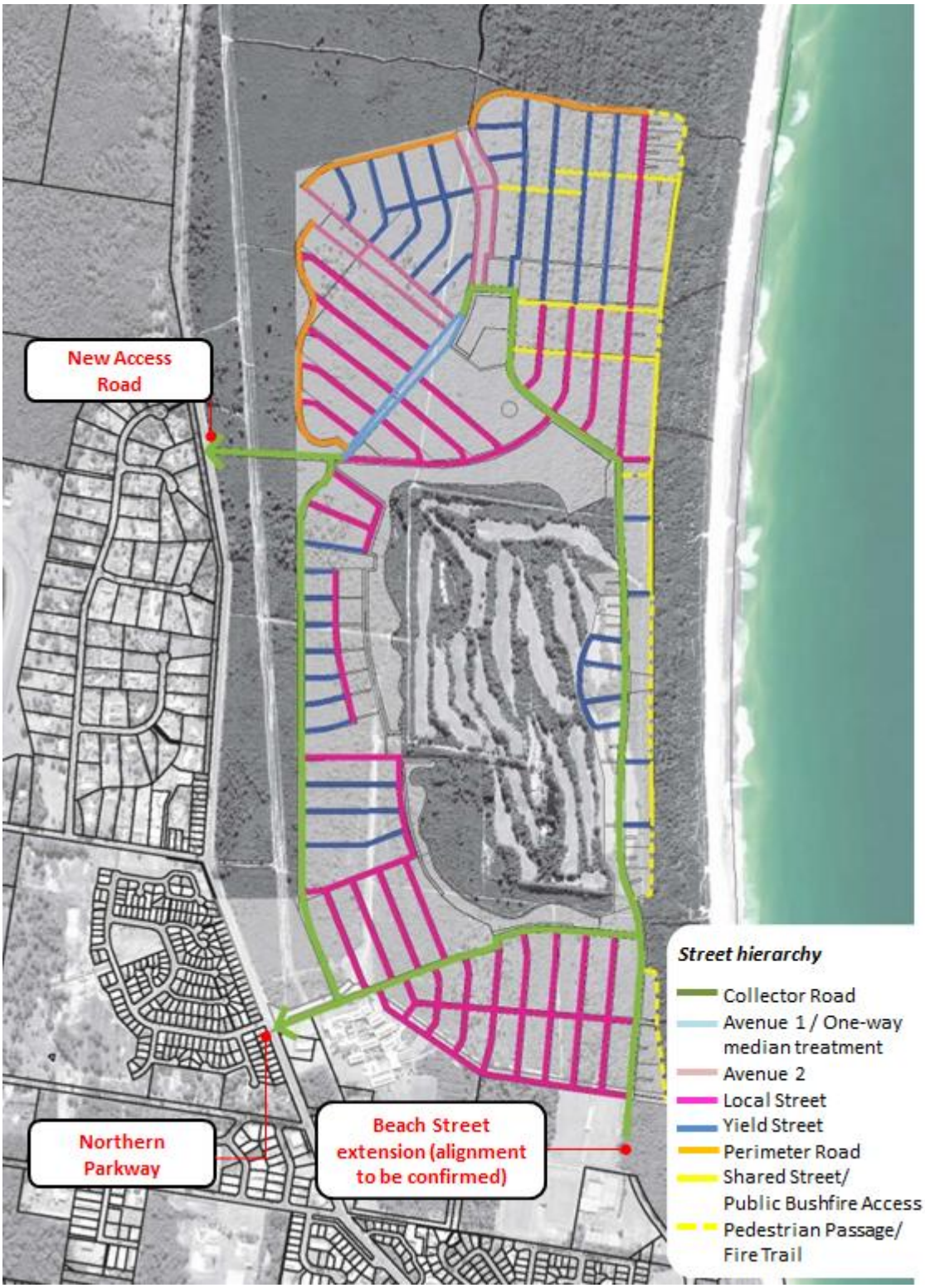
6.2.2 Street hierarchy

The internal road network features a collector road loop facilitating east-west and north-south movements within the development. The collector road loop provides linkages to key destination points including the B2 Local Centre and allows residents of the site access to bus services that are also proposed to operate along the route. Collector Roads also connect to the three site access intersections along The Lakes Way and to Beach Street. The connection to Beach Street is proposed to provide an alternative route for north-south movements between the development and Tuncurry/Forster. The remainder of the site will be serviced by lower order roads that provide access to residences, with varying cross sections as shown in **Section 6.2.3**. Shared roads are proposed for beach access areas to facilitate walking and cycling in coastal areas. The proposed Road Hierarchy is shown in **Figure 22**.

It is proposed to reduce the kerb radii to 3.5 metres throughout the site (with the exception of bus routes). Reduced kerb radii will require motorists to reduce their speed on corners, while improving sight distances and providing larger pedestrian waiting areas at corners. The removal of truncated or splayed corner lots has further been proposed to promote safety, walkability and improved social interaction throughout the site.

Furthermore, a range of traffic calming measures, including speed cushions or speed humps, narrowing traffic lanes and kerb extensions as well as raised pedestrian crossings, would be implemented in the road network within the proposed development, especially along the major north-south collector road traversing the eastern edge of the site as shown in **Figure 22**. These measures aim to reduce the speed of traffic within the proposed development and improve safety for motorists and vulnerable road users such as pedestrians and cyclists. These calming measures would further be implemented for use by buses, which would connect the proposal to the existing public network surrounding the site.

Figure 22 Street hierarchy



Source: Roberts Day, 2015, modified by AECOM, 2015

6.2.3 Proposed road cross sections

Table 20 Proposed road cross sections

Street type	Road reserve	Carriageway	Verge	Parking	Footpath/ shared path	Bus capable
Collector Street	**19.4m**	**7.0m**	**3.6m**	**4.6m**	**3.0m**	●
Collector Street with attached garden	32.3m	7.0m	3.6m	4.6m	4.5m	●
Avenue 1	23.3m	7.0m	7.6m	4.6m	1.5m	
Avenue 1*	23.3m	7.0m	6.7m	5.5m	1.5m	●
Avenue 2	45.3m	11.0m	7.6m	4.6m	1.5m	
Bushfire Perimeter Road	18.1m	8.0m	7.8m	2.3m	N/A	
Local Street	**16.4m**	**5.5m**	**3.6**	**4.6m**	**1.5m**	
Local Street water/park edge	15.7m	5.5m	5.8	2.3m	5.5	
Local Street within infiltration zone	17.6m	5.5m	4.8m	4.6m	1.5m	
Yield Street	**13.5m**	**3.0m**	**3.6m**	**4.2m**	**1.5m**	
Yield Street within infiltration zone	14.1m	3.0m	4.2	4.2m	1.5m	
Shared Street / Public Bushfire Access	9.7m	5.5m	4.2m	N/A	N/A	
Pedestrian Passage/ Fire Trail	7.5m	(4.1m for emergency vehicles only)	N/A	N/A	4.1m	

*at bus stops (to allow 3.2m wide bus parking and assuming bus stops are staggered)

Note that proposed road cross sections vary across the site with different road reserves for each road type depending on their location. This is largely due to the wider medians and flared verges required in some locations to meet flooding and drainage requirements, to provide a desirable pedestrian environment and contribute to the legibility of the project, particularly where direct connections to the foreshore have been established. The carriageways, parking and footpaths/shared paths are generally consistent.

6.3 Public transport network

The internal road network proposed in the Master Plan has been designed to accommodate bus movements within the NTURA. Avenue 1 and all proposed collector roads have been designed to be bus capable (as shown in **Figure 23**), providing the potential for a bus circuit within the proposed development. This would not only serve residents and visitors to the B2 Local Centre, but potentially improve the existing bus operations at the Joint Education Campus and improve access to the sporting fields and nearby beaches. Operating buses on the collector road network ensures the majority of the development is within a 400m walking catchment.

The provision of a bus route though the development would be beneficial for local residents, particularly given the aging demographic of Tuncurry which is likely to see increased demand for public transport. Bus Services along the collector road loop will also help to facilitate access to the B2 Local Centre.

During the initial stages of the proposed development and to encourage the use of public transport, it is recommended that a short-term bus route is to be provided by diverting the existing 304 bus route to loop through the southern part of the development via Northern Parkway and Beach Street.

Figure 23 shows the potential diversion of the existing 304 bus routes as well as the bus circuit proposed for ultimate development. Potential bus stops have also been shown and have been located in order to maximise the proportion of residences located within 400m of a bus stop.

Figure 23 Bus capable road and short-term bus route

Source: Roberts Day, 2015 modified by AECOM, 2015

6.4 Walking and cycling facilities

A comprehensive active travel network is proposed for the site which will link the B2 local centre, schools, and residential neighbourhoods with key strategic corridors, leisure routes and onward destinations. The proposed cycle network will be based on the use of off-road shared paths.

Cycle / pedestrian routes are proposed alongside the dunal system, parks and waterways, contributing to an extensive leisure based active travel network. Where these routes are not available, such as to the west of the NTURA, collector roads will have dedicated shared path bicycle facilities. In addition, local streets adjacent to water and park edges, Fire trails and shared streets / bushfire roads will provide beach access and cycle friendly routes throughout the NTURA.

The proposed cycling connections are designed to create a continuous network of facilities removing obstacles and barriers to cycling, both physical and perceived. This includes ensuring connections between the existing cycle network on Manning Street and Beach Street as well as possible future infrastructure on The Lakes Way. The proposed future cycle network is shown in **Figure 24**.

All proposed roads throughout the NTURA will have dedicated pedestrian footpaths to create a comprehensive network following proposed road alignments.

The proposed road grid network and block sizes will also work to facilitate pedestrian permeability and be conducive to encouraging walking trips. As the network has been designed around a linear grid structure the regular cross streets with pedestrian footpaths, and block sizes will encourage pedestrian activity, and achieve a high level of permeability.

Figure 24 Proposed cycle network

Source: Context, 2015, modified by AECOM, 2015

6.5 Car parking

On street car parking will be available on both sides of the road throughout the site with the exception of bushfire perimeter roads, pedestrian passages, shared streets and local streets adjacent to water/parks. Off street car parking will be provided as part of the proposed B2 Local Centre development allowing parking for access to the surf club, community centre, beach, supermarket, golf course, village green and speciality retail. Parking provision has been determined based on preliminary floor space estimate and is consistent with the recommendations in the *Roads Maritime Guide to Traffic Generating Development*. This includes the following public parking provisions:

- 50 spaces for a supermarket (42 spaces/1,000m^2 GLFA)
- 32 spaces for speciality retail (45 spaces/1,000m^2 GLFA)
- 100 spaces for beach, surf club and community centre access (based on similar developments)
- 150 spaces for the golf course (based on existing use and consultation with the golf club)

Note that the above parking provision for the B2 Local Centre is preliminary only and does not include residential parking or on-street parking provision.

Figure 25 B2 local centre parking provisions

Source: Roberts Day, 2014, modified by AECOM, 2014

7.0 Sustainable Travel Measures to Reduce Car Dependency

A number of Sustainable Transport and Travel Demand Management strategies have been identified for the NTURA to influence travel behaviours which encourage the uptake of sustainable forms of transport, i.e. non-car modes, wherever possible and to reduce the need to travel and hence reduce overall transport and travel demand and the impacts of new development.

7.1 Introduction

A Sustainable Travel Strategy (STS) for the NTURA is designed to encourage the use of public transport and walking and cycling facilities wherever possible for all journey purposes. Where the alternatives to the car are not viable, options to encourage car sharing can be promoted to minimise the need for single occupancy vehicle travel. The benefits of similar strategies are now widely understood and include:

- Reducing air and noise pollution and other types of negative environmental impact
- Improving fitness, health and wellbeing due to increased physical activity
- Reducing traffic congestion and associated road network delays and costs
- Reducing the need for costly road infrastructure upgrades (which research has shown only serves to attract additional vehicle traffic, necessitating future highway upgrades)
- Helping residents save money by reducing their need to own and operate motor vehicles
- Improving travel options, particularly for non-drivers or non-car owners
- Reducing the need for parking provisions and maximising land opportunity for other uses
- Supporting strategic land use planning objectives, such as reduced urban sprawl
- Improving local environmental quality and community cohesion.

The role of the STS for the NTURA is to encourage local trips by bus, bicycle and walking wherever possible and longer distance trips by bus, by making these modes viable and realistic alternatives. This is facilitated through the design of the built form of the NTURA to accommodate public transport penetration into the residential area which link to neighbourhood / retail shops and the town centres of Tuncurry and Foster. It is also facilitated through good quality, highly permeable pedestrian and bicycle networks throughout the development, including crossing facilities where appropriate and end-of-trip facilities such as bicycle parking.

7.2 Proposed sustainable travel measures

The proposed sustainable travel measures include a range of different types of initiatives which together reinforce the principles and objectives of the sustainable travel strategy. These measures include:

- Travel behaviour measures – initiatives to encourage sustainable travel
- Service measures – service delivery standards to maximise the potential uptake of sustainable modes
- Infrastructure measures – provision of infrastructure designed to facilities sustainable travel

Table 21 Sustainable travel measures

Item	Travel measures
Household Travel Behaviour Measures	
1	Household Information Packs (HIPs) for each household
2	One-week free public transport start up discount ticket
3	Discount voucher for purchasing bike (with local bike shop)
Public Transport Measures	
4	Integration of public transport services
5	Bus service coverage
6	Timing of bus services and developing staging – early 'Start up' buses
7	Good quality bus stops with coverage throughout North Tuncurry
Bicycle Measures	
8	Dedicated high quality cycle routes with good connections to the surrounding network and major land uses
9	Secure, weatherproof bicycle parking at key locations
10	Bicycle User Group
11	Promotion of bicycle initiatives
Pedestrian Measures	
12	Highly permeable and safe pedestrian network
13	Pedestrian facilities connecting to bus stops
Parking Restraint Measures	
15	Co-sharing parking provision
Travel Demand Management Measures	
16	Car sharing schemes such as GoGet (subject to agreement with operator)
17	Sustainable home deliveries of groceries

The implementation of the proposed STS measures listed above should result in a reduction of car dependency for the future residents of the NTURA, with improved mode shifts towards public transport and walking and cycling modes.

8.0 Traffic Impact Assessment (Method 1)

The proposed NTURA will result in an increase in vehicular trips and an increase in the use of the road network in the vicinity of the site in 2050. Demand for travel within the localised road network has been determined through the development of a spreadsheet model and assessed through SIDRA intersection modelling.

8.1 Introduction

Two methods of evaluation have been used to understand the potential impacts of the NTURA on the local road network. Method 1 assesses the likely impacts of the NTURA (for the future year 2050) to determine whether scheduled road network upgrades are sufficient to cater for full development.

Assessment for the future year 2050 also assumes the ultimate development of NTURA. Assessing full development in 2050 ensures that a "worst case scenario" is assumed. Previous discussions with MidCoast Council (previously Great Lakes Council) and TfNSW identified the initial development year 2026 for assessment during typical AM and PM peak periods. However, given the current construction timeline, it is assumed that a full development year at 2050 is considered more realistic. In addition, the likely low impacts resulting from the relatively slow/staggered nature of development (in line with existing regional growth rates) means that an initial development year has not been assessed in detail. Such an assessment would likely show no change to the Level of Service at intersections. Note that the holiday peak period does not form part of the scope of this study (previously agreed with MidCoast Council and TfNSW). The assumptions adopted in this assessment are contained in **Appendix C**.

Table 22 NTURA future year assessment assumptions

Assessment	Year	No. of dwellings
Ultimate Development	2050	2,123

8.2 Trip generation

8.2.1 Residential use

TfNSW *Guide to Traffic Generating Developments* provides guidance to assess the traffic impacts of land use developments. TfNSW has surveyed five regional areas within NSW in 2010, which resulted in the following:

- Daily vehicle trips of 7.4 per dwelling
- Weekday average morning peak hour vehicle trips of 0.71 per dwelling
- Weekday average evening peak hour vehicle trips of 0.78 per dwelling.

However, the Household Travel Survey undertaken by Great Lakes Council (now MidCoast Council) in 2012 showed the Foster – Tuncurry area had an average of 7.1 trips per dwelling. Based on the lower daily vehicle trip rate, it is recommended a lower peak hour trip rate is to be used as part of the traffic impact assessment. It is recommended a trip peak hour rate of 0.68 per dwelling in the AM peak and 0.75 per dwelling during the PM peak is applied.

Taking into consideration a portion of traffic generated will be contained within the development due to the B2 Local Centre, community facilities and open spaces, it is proposed 15 per cent is used to account for internal trips.

It is recommended a peak hour trip rate of 0.58 trips during the AM peak and 0.64 trips during the PM peak is applied to assess the traffic impacts of the development on the external surrounding road network. A summary of the trips generated at ultimate development is shown in **Table 23**.

Table 23 NTURA trip generation

Development	No. of dwellings	AM Trip rate	AM veh. trips	PM Trip rate	PM veh. trips
2050 - Ultimate Development	2,123	0.58	1,231	0.64	1,359

It should be noted that the impacts / influence on potential mode shifts from car travel as a result of the proposed sustainable travel strategies have not been reflected in the RMS trip rate and therefore the impact assessment has considered a worst-case scenario in terms of car trips generated by the development and impacts on the surrounding road network.

8.2.2 Industrial use

6.6ha of industrial lands for freight and logistics are proposed to the north of the B2 local centre and encompasses approximately 12,000m^2 of Gross Floor Area. TfNSW guidelines provide guidance to assess the traffic impacts of land use developments. TfNSW has surveyed seven of Business parks and industrial estates within regional areas in NSW in 2012, which resulted in the following:

- Daily vehicle trips of 7.83 per 100 m^2 of GFA
- Weekday average morning peak hour vehicle trips of 0.70 per 100 m^2 of GFA
- Weekday average evening peak hour vehicle trips of 0.78 per 100 m^2 of GFA.

It is recommended that the weekday average peak hour trip rates are applied to assess the traffic impacts of the development on the external surrounding road network. A summary of the trips generated at ultimate development is shown in **Table 24**.

Table 24 Industrial lands trip generation

Development	GFA in estate m^2 (occupied)	AM Trip rate	AM veh. trips	PM Trip rate	PM veh. trips
2050 - Ultimate Development	12,000	0.70	84	0.78	94

8.2.3 Retail land use

Retail uses are proposed to be built within the B2 local centre and consist of approximately 2,292m^2. TfNSW provides guidance to assess the traffic impacts of land use developments. TfNSW has conducted extensive surveys of retail developments and divided the floor area into retail categories. Given the size of the proposed retail land use, it is assumed that the retail area will be provided as specialty shops. The survey resulted in the following rates:

- Thursday peak hour generation rate of 4.6 vehicle trips per 100m^2 GLFA.

As such, it is recommended a peak hour trip rate of 4.6 trips per 100 m^2 of GLFA during peak is applied to assess the traffic impacts of the development on the external surrounding road network. A conversion rate of 90% is adopted between GFA and GLFA. The trips generated at ultimate development are shown in **Table 25**.

Table 25 Retail use lands trip generation

Development	GFA in estate m^2 (occupied)	GLFA (m^2)	Trip rate	Peak hour veh. trips
2050 - Ultimate Development	2,292	2,063	4.6 per 100m^2	95

The retail use generates around 95 vehicle trips during peak hour on a typical weekday. Given the proposed size of the retail use and its location within the B2 local centre, it is logical to assume that the retail use would predominantly service residents within the NTURA. In addition, the proposed residential trip rates assume a 15 per cent reduction of the generated traffic to account for internal trips. This represents around 212 trips during the morning peak and 234 trips during the evening peak, which more than encompasses the retail generated traffic. As such, it is considered that very few external trips will be attracted as a result of the proposed retail use, and therefore they have not been considered in the modelling assessment.

8.2.4 B5 Business Development land use

The NTURA contains 6.7ha of B5 Business Development land to the south of the site close to the intersection of The Northern Parkway / Grandis Drive. This zoning accommodates a range of employment generating land uses including offices, warehouses and retail premises (including those

with large floor areas), health care and educational establishments. This land use therefore provides a natural extension to the existing school, TAFE and other institutional uses immediately to the south of the NTURA. At this stage, the land use and development yield for the B5 Business Development land have not yet been determined. However, it is unlikely to be made up of retail uses due to the B2 Local Centre and existing Tuncurry shopping precinct providing sufficient retail uses.

The traffic generation from this land has not been considered as part of this assessment due to the land use and development yields being unknown. Traffic generation rates vary considerably between some land uses, and it is not appropriate to make assumptions that may either over or under estimate the likely traffic generation, and therefore potential traffic impacts.

The development proposed on this land will however be subject to MidCoast Council's development application (DA) process and as such, a traffic impact assessment would be prepared to support this application. This will allow the traffic impacts to be accurately assessed, and appropriate mitigation measures proposed.

8.3 Trip distribution and assignment

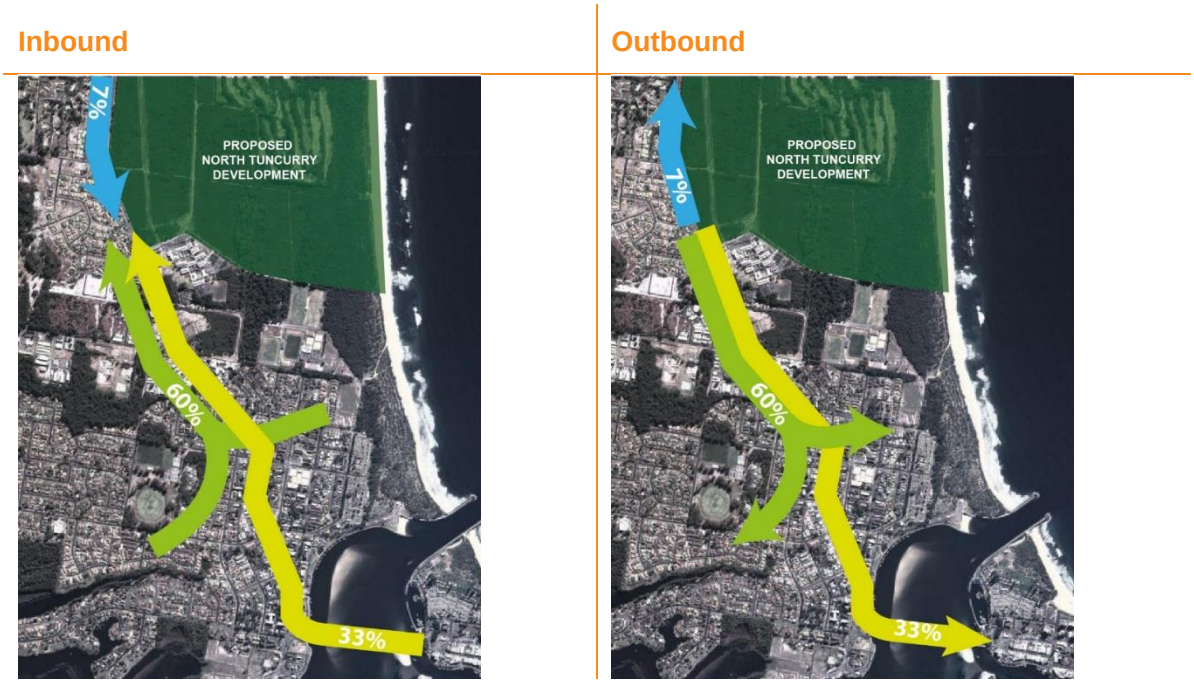
8.3.1 Residential use

Analysis of the Origin and Destination survey undertaken by Great Lakes Council (now part of MidCoast Council) was used to determine travel patterns for the Tuncurry area. The following travel patterns were identified during the AM peak:

- 33 per cent of outbound trips would continue along Wallis Lake Bridge
- 7 per cent of outbound trips were headed northbound
- 60 per cent of outbound trips would remain within Tuncurry.

It was assumed the same proportion of trips occurred in the opposite direction (inbound) during the AM peak. For the PM peak it will be assumed a similar travel pattern occurs. **Figure 26** shows the proportion of inbound and outbound trips to be applied to the trips generated by the NTURA.

Figure 26 Trip distribution



Source: AECOM, 2013

As described in Section **6.2**, the site has three available access points to the surrounding road network, two along The Lakes Way and the other via a Beach Street extension. The assignment of the trips generated by the development has been distributed to the three intersections based on their origin and destination and the likelihood of using the intersections. In the initial stages of development trips generated will utilise the Northern Parkway and Beach Street connection to access the development. By 2050, a new access road is proposed to be provided 1.2km north of Chapmans Road.

During the AM peak, it is assumed 90 per cent of the development trips are outbound trips and 10 per cent are inbound trips. During the PM peak, it is assumed 80 per cent were inbound trips and 20 per cent were outbound trips.

Table 26 NTURA ultimate development trips

	New Access Road (north of Chapmans Road)		Northern Parkway		Beach Street extension	
2050	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM	57	514	35	316	31	278
PM	504	126	310	77	273	68

8.3.2 Industrial use

Further to the above, the following travel patterns were assumed for the industrial land use during the AM peak:

- 50 per cent of inbound trips would approach the site from the north
- 50 per cent of inbound trips would approach the site from the south.

It was assumed the same proportion of trips occurred in the opposite direction (outbound) during the AM peak. For the PM peak, it will be assumed a similar travel pattern occurs.

The industrial land use is located to the north of the B2 local centre and will be accessed via a separate access point. As such, only the portion of traffic heading southbound on The Lakes Way will have an impact on the study intersections.

During the AM peak, it is assumed 30 per cent of the development trips are outbound trips and 70 per cent are inbound trips. During the PM peak, it is assumed the same proportion of trips occur in the opposite direction (70 per cent outbound trips and 30 per cent inbound trips).

Table 27 Industrial development trips

2050	Vehicle trips	Inbound	Outbound	Heading to/ approaching from the south	
				Inbound	Outbound
AM	84	59	25	30	13
PM	94	28	66	14	33

8.4 Future year traffic forecast (Method 1)

In **Section 5.1**, a number of road infrastructure upgrades have been identified in close proximity to the site, which includes:

- Construction of two additional lanes along The Lakes Way (Manning Street) between Grey Gum Road and approximately 250m north of Chapmans Road
- An upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout
- An upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout
- Extension of Beach Street from North Street to Northern Parkway (this is forecast to be commenced in 2027 however is assumed to be brought forward to 2023 with development of the NTURA).
- Duplication of the Wallis Lake Bridge.

Traffic generated as a result of the initial stages of the NTURA is expected to be low and therefore is likely to have a minor impact on the road network, with no change to the Level of Service at intersections. As such, no upgrades are likely to be required along the road corridors assessed in order to facilitate the initial stages of development. Note this assumes that access will be facilitated through the existing intersection of The Lakes Way / The Northern Parkway and the proposed Beach Street extension.

The 2050 traffic assessment has assumed the proposed road infrastructure upgrades have been implemented by 2050, including the Beach Street connection and new access onto The Lakes Way.

The additional trips generated by the NTURA and the proposed industrial development have been incorporated into the spreadsheet model. **Table 28** presents the 2050 base traffic forecasts along the main road corridors of the study area.

Table 28 2050 future traffic forecast with NTURA

Section	Direction	Capacity	AM Peak (veh/hr)		PM Peak (veh/hr)	
			without NTURA	with NTURA	without NTURA	with NTURA
The Lakes Way/ Manning Street						
North of New Access Road	NB	1,200	705	780	1,012	1,031
	SB		1,140	1,149	815	890
Between New Access Road and Chapmans Road	NB	1,200	705	774	1,012	1,466
	SB		1,140	1,600	815	946
Between Chapmans Road and Northern Parkway	NB	2,000	782	852	1,068	1,510
	SB		1,147	1,592	835	964
	NB	2,000	991	1,072	1,158	1,857

Section	Direction	Capacity	AM Peak (veh/hr)		PM Peak (veh/hr)	
			without NTURA	with NTURA	without NTURA	with NTURA
Between Northern Parkway and Grey Gum Road	SB		1,309	1,998	1,046	1,224
South of Grey Gum Road	NB	2,000	1,063	1,142	1,047	1,800
	SB		1,357	2,034	1,122	1,297
Beach Street						
North of North Street	NB	500*	20	51	41	314
	SB		21	299	39	107
East of Wharf Street	EB	500	107	137	123	395
	WB		96	374	104	172
Wallis Lake Bridge						
Bridge	WB	2,800	1,449	1490	1,519	1,877
	EB		1,461	1,827	1,504	1,594

* the provision of the Beach Street connection as part of the NTURA increases the capacity along Beach Street (north of North Street)

In 2050, the construction of two additional lanes along The Lakes Way (Manning Street) between Grey Gum Road and approximately 250m north of Chapmans Road and the duplication of Wallis Lake Bridge will be able to cope with the forecast traffic volumes. However, The Lakes Way experiences capacity constraints south of New Access Road in the southbound direction during the morning peak and in the northbound direction during the evening peak. As such, road upgrades may be required by 2050 as further studies are required to assess the relationship between road upgrades needed at the midblock level and intersection upgrades.

8.5 NTURA development intersection performance (Method 1)

Traffic generated by the NTURA has been modelled and assessed in SIDRA for the year 2050 during typical AM and PM peak periods to determine the impacts on intersection turning movements.

The traffic assessment assumes a dedicated right turn lane on the Grandis Drive approach at the intersection of The Lakes Way | Northern Parkway | Grandis Drive, as recommended in **Section 5.4.1**.

8.5.1 Initial development stages

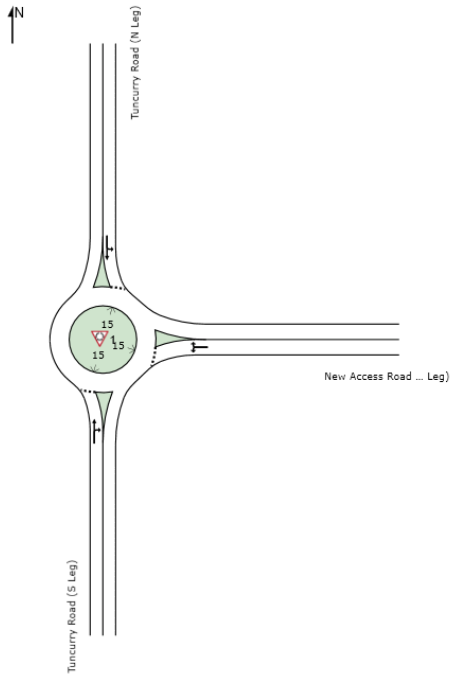
The initial stages of development are not anticipated to impact on intersection performance. Trip generation is expected to be low due to the likely slow pace of development (estimated to be in the order of 50 dwellings per year). Therefore, initial traffic impacts are expected to be similar to the base case scenario (without development). Sensitivity testing shows that intersections operate at the same LoS as the base case scenario, with only a marginal increase to delays and queue lengths.

8.5.2 2050 traffic impact assessment

The traffic generated by the full development of NTURA (including the industrial development) has been added to the road network to assess the performance of key intersections during the peak hours in 2050. A new intersection providing a connection between the NTURA and Tuncurry Road (The Lakes Way) has also been assessed.

A roundabout has been assessed for the new intersection of Tuncurry Road | New Access Road providing a connection to the northern region of the NTURA. The geometric layout is shown in **Figure 27**.

Figure 27 Tuncurry Road | New Access Road intersection layout



A summary of the intersection performance for the 2050 peak hour traffic flows are provided in **Table 29**.

Table 29 2050 AM and PM peak intersection performance summary

Approach	Peak hour	Veh/h	LoS	DoS	95% Back of Queue (m)	Average Delay (s)
2050 with Ultimate development						
Tuncurry Road | New Access Road	AM	2200	A	0.857	45.1	12.7
	PM	2251	B	0.922	75.4	14.7
The Lakes Way | Chapmans Road*	AM	2459	A	0.553	12.8	3.7
	PM	2502	A	0.540	11.5	4.2
The Lakes Way | Northern Parkway | Grandis Drive*	AM	3251	C	0.859	167.3	31.2
	PM	3189	B	0.796	124.4	20.8
The Lakes Way | Grey Gum Road*	AM	3238	A	0.820	36.2	5.6
	PM	3297	A	0.668	24.5	4.6

* Intersection upgraded as part of road network and infrastructure upgrade identified in the S94 Plan.

Intersection modelling indicates the intersection upgrades identified in the S94 Plan are able to accommodate the additional traffic generated by the full development of the NTURA. The SIDRA modelling shows no additional upgrades are required with the intersections operating at LoS C or better and with spare capacity. The proposed roundabout intersection of Tuncurry Road | New Access Road operates at a LoS B or better during the AM and PM peak.

It should be noted that traffic generation resulting from the B5 Business Development land uses have been omitted from the assessment as the land use and the development yield have not yet been determined. However, given the network in 2050 is performing well, this proposed use is expected to have limited impact on the overall network performance given the road network performance modelled suggests that there is additional capacity within the network.

Notwithstanding the above, additional traffic studies will be undertaken once the proposed land uses have been established to assess the likely traffic impacts. This assessment will be submitted as part of Council's DA process.

8.5.2.1 The Lakes Way | Midge Orchid Road

The intersection of The Lakes Way (Manning Street) / Midge Orchid Road is a seagull intersection, with a dedicated right turn bay on the southern approach and merge lane for the westbound right turn movement. The intersection will be providing the main access to the industrial lands for vehicles approaching the site from the north.

Given the low traffic volumes generated by the industrial site (43 trips in the morning peak and 47 trips in the evening peak), the site is expected to have limited impact on the overall performance of The Lakes Way/ Midge Orchid Road and is not likely to result in a change to intersection level of service. At this stage, it is concluded that SIDRA Intersection modelling does not need to be undertaken for this intersection. However, further studies might be undertaken before the site is developed.

9.0 Traffic Impact Assessment (Method 2)

Background traffic growth and traffic generated by the proposed NTURA will contribute to the requirement for road network infrastructure improvements. The year of upgrade for each piece of infrastructure has been estimated through the development of a spreadsheet model and assessed through SIDRA intersection modelling.

9.1 Introduction

Two methods of evaluation have been used to understand the potential impacts of the NTURA on the local road network. Method 2 assesses the impacts of background traffic growth and the proposed NTURA on the timing of intersection upgrades and estimates the year in which these are likely to be required. This excludes the Beach Street extension (which has previously been assumed to be developed by 2018; however, given current construction timing, it is assumed that the extension will be constructed by 2023) to facilitate the initial stages of development (if the NTURA is to proceed). Note that the holiday peak period does not form part of the scope of this study (previously agreed with MidCoast Council and TfNSW). It is also noted that the industrial use does not form part of this assessment due to the relatively low generated traffic volumes.

9.2 Trip generation and Trip distribution

Trip generation and trip distribution is based on the same principles identified in **Section 8.2**. However rather than assuming full development in 2050, development of the NTURA has been estimated to show an additional 50 residential lots per year from 2023 (with the resulting full development not anticipated until approximately 2065). This is a more realistic assumption for NTURA growth in comparison to Method 1.

9.3 Future year traffic forecast (Method 2)

MidCoast Council have identified several potential road infrastructure upgrades under their S94 Plan.

Infrastructure upgrades in the vicinity of the study area include:

- Construction of two additional lanes along The Lakes Way (Manning Street) between Grey Gum Road and approximately 250m north of Chapmans Road
- An upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout
- An upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout
- Extension of Beach Street from North Street to Northern Parkway
- Duplication of the Wallis Lake Bridge.

To assist in estimating any potential impact on the proposed timing of these infrastructure upgrades, traffic modelling has been undertaken for the following scenarios:

- Traffic forecasts without the NTURA
- Traffic forecasts with the NTURA

The following assumptions were used as part of the analysis:

- The NTURA is developed at a rate of 50 lots per year from 2023
- The Beach Street connection is provided by 2023
- The new access road intersection and connection to The Lakes Way from the north of the site opens in 2038 to coincide with the estimated release of lots in the northern third of the site.
- The future Leo Street and Chapman Street development is developed at a rate of 21 lots per year between 2021 and 2040, which is equivalent to a background growth of 0.9 per cent per year
- A 0.9 per cent background traffic growth has been applied post 2040 (note that this growth rate has been assumed for both the NTURA as well as other developments).

- The AM peak trip rate is 0.58 with 10 per cent being inbound trips and 90 per cent outbound
- The PM peak trip rate is 0.64 with 80 per cent being inbound trips and 20 per cent outbound
- The same trip distribution and assignment used in the Traffic Impact Assessment has been applied

A spreadsheet model was developed for the future year of 2023, 2028, 2033, 2038, 2043, 2048, 2053, 2058, 2063 and 2065. The Wallis Lake Bridge assessment is contained in **Appendix D**.

9.4 NTURA road network upgrade timing requirements (Method 2)

Intersection modelling indicates that the timing of the infrastructure upgrades identified in the S94 Plan can be delayed under both scenarios (as per the assumptions outlined above, this excludes the extension of Beach Street which is assumed to be provided by 2023 to facilitate the early stages of NTURA development).

Table 26 presents the traffic modelling results and timing of the proposed infrastructure upgrades.

Table 30 Timing of Road Network Infrastructure Upgrades

Schedule of works	S94 Plan Estimated start date	Without NTURA	With NTURA	Lot Threshold
Construction of two additional lanes along The Lakes Way (Manning Street) from Grey Gum Road to approximately 250m north of Chapmans Road	2021	2040-2043	2033-2038	550-800
Upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout	2017	2040 - 2043	2038-2040	800-900
Upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout	2017	2065	2063-2065	2050-2123
Extension of Beach Street from North Street to Northern Parkway	2027		2023	
Duplication of the Wallis Lake Bridge	2025	2048	2034	600

Based on the assumptions of this modelling assessment the infrastructure upgrades proposed in the S94 Plan are scheduled to occur before capacity is estimated to be reached, suggesting the timing of the infrastructure upgrades in the S94 Plan may be delayed under both scenarios.

The signalised intersection of The Lakes Way | Northern Parkway | Grandis Drive may require further upgrade to the existing layout post 2048. This timeframe remains within the NTURA release window (based on 50 lots per year, development is estimated to conclude in approximately 2060). However, the upgrade may not be required if the staging of development or the distribution of traffic through the access points to the NTURA are altered. Note that an upgrade of this intersection has not been identified as part of the S94 Plan.

An estimated lot development threshold has also been provided in **Table 26**. Should development not proceed at the estimated rate of 50 lots per year, road network infrastructure would likely need to be upgraded at whichever occurred first, the year or the lot threshold.

Note, the S94 Plan does not indicate how the estimated start date was determined. The following provides possible reasons for the difference in the timing of the proposed upgrades:

- Assumptions on the timing of future developments and future traffic forecasts

- The proposed upgrades at the intersection of The Lakes Way | Grey Gum Road and The Lakes Way | Chapmans Road in 2017 could be due to the requirement of having the upgrade in place prior to the opening year of the future Leo Street and Chapmans Road development.

10.0 Conclusions and Recommendations

This section summarises the outcomes of the study. The most important outcome is that with full development of the NTURA no additional road network upgrades are required other than those previously identified for upgrade by Council and the new northern access roundabout. In addition, the infrastructure upgrades proposed in the S94 Plan are scheduled to occur before capacity is estimated to be reached, therefore the timing of the infrastructure upgrades are able to be delayed both with and without development of the NTURA.

10.1 Conclusions and recommendations

To understand the impacts of the development on the local road network a spreadsheet model has been developed and key intersections were assessed in SIDRA.

Method 1 assesses the likely impacts of the NTURA for the future year of 2050 (Ultimate Development). For the full development of the NTURA, a total of 1,231 and 1,359 trips are expected during the AM and PM peak in 2050. The proposed industrial development, located to the north of the NTURA, is expected to generate 84 and 94 trips during the AM and PM peak. Further to the above, given the size and the location of the retail use, it is expected that the proposed retail development will not generate new trips.

The traffic generation resulting from the B5 Business Development land uses have been omitted from the assessment given the land use and the development yields have not yet been determined. However, any proposed development on this land will be subject to the MidCoast Council DA process and a separate traffic impact assessment detailing the impacts of this use will be prepared. It is further noted that given the proposed on-site uses, it is not likely that this proposed use will be retail; it will however act as an ancillary use within the proposed NTURA.

The 2050 traffic assessment assumes the following road infrastructure upgrades have been implemented, as identified in the S94 Plan for the Forster District:

- Construction of two additional lanes along The Lakes Way (Manning Street) between Grey Gum Road and approximately 250m north of Chapmans Road
- An upgrade to the intersection of The Lakes Way | Grey Gum Road to a roundabout
- An upgrade to the intersection of The Lakes Way | Chapmans Road to a roundabout
- Extension of Beach Street from North Street to Northern Parkway (scheduled for 2027 but assumed to be developed in 2023 to facilitate the initial stage of the NTURA.
- Duplication of the Wallis Lake Bridge.

Assuming the proposed infrastructure upgrades have been implemented, no additional upgrades are required with the exception of providing the proposed roundabout for the new intersection providing access to the northern region of the NTURA.

Method 2 assesses the required timing of infrastructure upgrades based on background traffic growth and the NTURA.

Based on the assumptions of this modelling assessment the infrastructure upgrades proposed in the S94 Plan are scheduled to occur before capacity is estimated to be reached, therefore the timing of the infrastructure upgrades in the S94 Plan can be delayed under both scenarios.

The implementation of the proposed STS measures listed in **Section 7.2** should result in a reduction of car dependency for the future residents of the NTURA, with improved mode shifts towards public transport and walking and cycling modes.

11.0 References

Austroads Inc. 2009. *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis*.

Great Lakes Council. 2009 (draft amended March 2014). *Forster District Section 94 Development Contributions Plan*

TfNSW, 2002. Guide to Traffic Generating Development

Appendix A

Response to Submission

North Tuncurry Urban Renewal Area - Consultation Outcomes and Response Summary

This document has been prepared to respond to feedback received from Transport for NSW and MidCoast City Council during preliminary consultation activities completed in mid 2020 in relation to the proposed NTURA rezoning proposal. Copies of the submissions are attached to this schedule for reference.

Item no.	Raised by	Comment / feedback	Response	Status
1	MidCoast Council	The new access onto The Lakes Way (1.2km north of Chapmans Road) is proposed to be a roundabout. However, The Lakes Way at this location has a speed limit of 100km/h and roundabouts are not allowed on roads with speeds higher than 80km/h. This roundabout should be two lanes to ensure capacity along The Lakes Way.	Noted. The speed limit on The Lakes Way near the new access is currently 100km/h. The speed at the roundabout could be reduced to 80km/h in agreement with TfNSW (given the Lakes Way is a state road). A reduction in speed limit would be best addressed through subsequent stages of design, and more specifically post rezoning when development commences. Furthermore, the intersection is configured with one lane in each direction to match the proposed upgrades identified in Council's Forster District Development Contributions Plan (still titled as a Section 94 Plan on Council's website but construed to be a Section 7.11 Contributions Plan in line with amendments to the *Environmental Planning and Assessment Act, 1979* and herein referred to as the Contribution Plan (Section 94). It should be noted that the Contributions Plan indicates that the duplication of The Lakes Way is only proposed from between 250 metres north of Chapmans Road and Grey Gum Road. The TMAP adopts the design assumed by Council's existing Contributions Plan. *Note: For clarification, it should be noted that the Contributions Plan refers to The Lakes Way as Tuncurry Road.*	Closed
2	MidCoast Council	The Lakes Way should be considered for two lanes each way between the new northern access and Chapmans Road to maximise capacity and flow along this section. The report is assuming 100km/h capacity (1,200) but as the speed limit will have to be reduced for the roundabout then the capacity will be reduced creating delays on a single lane road.	As outlined above, Council's existing Contributions Plan (Section 94) indicates that the duplication of The Lakes Way is only proposed from between 250 metres north of Chapmans Road and Grey Gum Road. As such, The Lakes Way is modelled with one lane in each direction 250m north of Chapmans Road and the TMAP has been updated. In addition, the midblock has been assessed based on the 1,200 vph as it is anticipated the speed would be 100km/h at the midblock location, noting that the speed would only reduce to 80km/h closer to the roundabout. In any case, the intersection capacity and performance are based on SIDRA modelling. As such, the performance of this roundabout is not dependent in speed.	Closed
3	MidCoast Council	The proposal of connecting Beach Street with NTURA road network should be assessed and modelled to determine the effects of the additional traffic on the eastern side of Tuncurry, plus the impact on access points onto Manning Street. This route may be considered a quicker route to the shops, Manning Street and travel further south to Foster and beyond.	The NTURA proposal nominates The Lakes Way/New access road intersection, located approximately 1.2km north of Chapmans Road, as the primary access point into the site. This access point would connect to the north-west of the site and is proposed to provide the most direct route for those within the site to travel connect to the Pacific Highway and beyond. The majority of NTURA residents wishing to access Manning Street, Forster and beyond are not expected to use the Beach Street access. This is evidenced by Council's Contributions Plan which forecasts a 2027 opening date, suggesting that this is not a strong path of travel. The extension is proposed primarily to facilitate staging and also provide permeability. In any case, the TMAP assessment of the future scenarios indicates there is good network performance along The Lakes Way to accommodate future traffic movements from the NTURA and there is currently spare capacity on Beach Street during typical weekday peak hours. Modelling of the Beach Street intersection could be completed to support a future development application which seeks to construct that connection following confirmation that the proposed road layout and hierarchy and staging strategy are approved through the Rezoning Proposal.	Closed
4	MidCoast Council	The long north-south collector road on the eastern edge of the development may require traffic calming management to discourage speeding. Any devices proposed for this route must be bus friendly as it is a bus route.	Noted and agreed. Section 6.2.2 of the TMAP (street hierarchy in the proposed development section) has been revised to acknowledge the future need to instal traffic calming measures along the north-south road to reduce speeds. Examples of measures that could be delivered during construction include speed cushions, speed humps, narrowing traffic lanes and kerb extensions. These initiatives are all matters of detail that would be best addressed as part of future development applications, however there is nothing at this stage of the rezoning proposal to preclude those initiatives from being implemented.	Closed
5	TfNSW	Midcoast Council's Development Contributions Plan (the Contributions Plan) for the Forster District lists the Wallis Lake Bridge duplication (including approaches) total cost at $23,910,000, costed in 2011. The Plan, recommending delivery year for the bridge to be 2025, notes that half the bridge construction cost will be apportioned to the Contributions Plan, with Council expecting the remainder to be funded by government grants. The Contributions Plan states 'it is reiterated here that there is no need for any Council contribution towards the funding of the bridge's major upgrade.	Transport for NSW's comment is noted.	Closed

6	TfNSW	TfNSW consider the construction cost estimate for duplication as contemplated by the Contributions Plan to be inadequate. Furthermore, there is no State funding commitment towards the duplication of the bridge. As the proposed URA relies on the duplication funding for such should be identified prior to the rezoning exhibition.	Transport for NSW's comment is noted, The value of the duplication works, funding source assumptions, status of funding collected and consequently likely timing of delivery are matters for Council, Transport for NSW and possibly DPIE to address. Nonetheless, the TMAP has assumed the duplication is in place by 2034, on the basis that the Contributions Plan's identified 2025 delivery date is probably an unlikely proposition. It is also worth highlighting that the TMAP forecasts that by 2050, traffic movements on the Wallis Lake Bridge are expected to increase as follows without the NTURA: - 1,449 trips westbound and 1,461 trips eastbound in the AM peak; and - 1,519 trips westbound and 1,504 trips eastbound in the PM peak. Under a development scenario, when the NTURA is realised, these trips increase to: - 1,490 trips westbound and 1,877 trips eastbound in the AM peak; and - 1,504 trips westbound and 1,594 trips eastbound in the PM peak. This represents only: - 9 additional trips westbound and 416 additional trips eastbound in the AM peak; and - 15 less trips westbound and 90 additional trips eastbound in the PM peak. Through it's Statement of Intent prepared to support the offer to Council to enter into a Planning Agreement, Landcom proposes to pay a monetary contribution to Council that is consistent with the rates in Council's existing Contributions Plan and would presumably be allocated in part to the Bridge's duplication. This is considered a reasonable position based on the published and publicly available level of commitment and funding sources to the Bridge's duplication.	Closed
7	TfNSW	The capacity for Wallis Lake Bridge within Table 9 of the TMAR is listed at a higher rate than the surrounding road network, and higher than the typical midblock flow capacity from Table 5.1 of Austroads Guide to Traffic Management, Part 3, Transport Study and Analysis Method. Given the narrow bridge lanes, road alignment on the western approach and intersections close to each end of the bridge, the capacity should be further refined.	The TMAP has adopted a theoretical capacity of 1,400 vehicles per lane per hour for Wallis Lake Bridge as agreed with TfNSW in relation to the assessment prepared for the bridge and contained in the Wallis Lake Bridge Memo dated 02 October 2020 appended to this TMAP (Appendix B).	Closed
8	TfNSW	The TMAR offers a revised delivery date for the bridge of 2038. TfNSW notes Table 30 provides a lot threshold of 800 dwellings triggering the need for the bridge duplication by 2038.	Noted. The delivery date is revised to 2034. This corresponds to a lot threshold of 600 dwellings which would be the trigger for the upgrade.	Closed
9	TfNSW	To ensure the subject rezoning does not use the spare capacity of the bridge to failure, TfNSW requires a 10 year background growth buffer (in accordance with Austroads Guide to Traffic Management, Part 12, Integrated Transport Assessments for Developments).	A 10-year background growth buffer is not an appropriate method of assessment. The Austroads Guide to Traffic Management, Part 12, Integrated Transport Assessments for Developments (2020) indicates that for the purposes of traffic assessment, the impacts to be assessed will be for year of opening and 10 years after opening. Reflecting Landcom's intention to deliver the project in stages, the TMAP considers background traffic growth of 0.9 per cent year on year and considers opening year (2023) and ultimate development year (2050), which accurately forecasts the traffic volumes. Adding a 10 year growth buffer to all of the traffic volumes would produce unrealistic results.	Closed
10	TfNSW	The NTURA is proposed to connect to the Lakes Way at two intersections, as follows: o The Manning Street, Northern Parkway and Grandis Drive is currently signalised, with no future upgrade identified within the Contributions Plan. The TMAR is to be updated to assess if an upgrade of this intersection is required as a result of the NTURA, complete with a proposed upgrade, lot threshold trigger and identification of an appropriate funding mechanism.	The intersection of Manning Street (The Lakes Way), Northern Parkway and Grandis Drive has been modelled without the Manning Street duplication in 2050. This assessment indicates that during the AM peak, the through movement on the north leg of Manning Street performs at LoS F in 2050 while in the PM peak, the through movement on the south leg of Manning Street also operates at LoS F. The assessment contained in Table 30 indicates the duplication of The Lakes Way from Grey Gum Road to 250m north of Chapmans Road will be required by 2033-2038 with a lot threshold of 550-800. As such, the intersection would naturally be upgraded at this time. The TMAP has consequently not been updated to reflect the operation of this intersection without the Manning Street duplication.	Closed
11	TfNSW	o A new access intersection proposed at the northern end of the NTURA. This new intersection is noted within the TMAR to be provided both by 2026 (section 8.3.1), and also by 2038 (section 9.3) to coincide with the release of lots within the northern end of the NTURA. The intersection, proposed to be located approximately 1.2km north of Chapmans Road, is shown as a two lane circulating roundabout with the Lakes Way fully duplicated. The Contributions Plan provides for the duplication of the Lakes Way from 250 metres north of Chapmans Road to Grey Gum Road, and does not provide duplication in the location of the new access. The TMAR should be updated to demonstrate the trigger for the new access intersection, the upgrade to be provided initially, and whether any further upgrades (such as duplication of the Lakes Way) are to be provided as development progresses. The funding mechanism for this intersection and any subsequent upgrades are also to be identified.	Noted. The TMAP has modelled the intersection of The Lakes Way/New access road intersection (approximately 1.2km north of Chapmans Road) with one lane in each direction as the duplication of the Lakes Way is from 250m north of Chapmans Road, consistent with Council's Contribution Plan. The updated assessment indicates the intersection operates well with minimal delays and queues during the full development year (2050). This means that Transport for NSW's request that the TMAP demonstrate the trigger for the new access intersection and details of any future upgrade is not required as the subject intersection performs satisfactorily upon completion of development.	Closed
12	TfNSW	It is considered that Council may need to revise the Contributions Plan to ensure that the upgrades proposed within that plan along the Lakes Way, and the timing triggers, remain appropriate as the development related to this planning proposal progresses.	Transport for NSW's comment is noted. Any update of the Contributions Plan is a matter for Council, and is outside the scope of this project. Notwithstanding this, the TMAP, in conjunction with the Rezoning Study and supporting appendices, has demonstrated that the NTURA proposal can be implemented with the proposed suite of road works and monetary contributions to Council as per Planning Agreement to manage road network impacts.	Closed

Appendix B

Wallis Lake Bridge Capacity Memo

AECOM Imagine it. Delivered.

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Memorandum

To	Marc Desmond (TfNSW)	Page	1/5
CC	Michael Pring (Landcom) Stephanie Ballango (Savills) Martin Mallia (AECOM)		
Subject	Wallis Lake Bridge Capacity Assessment North Tuncurry Urban Renewal Area TMAP		
From	Ghizlane Chergaoui (AECOM)		
File/Ref No.	60594018	Date	02-Oct-2020

1.0 Introduction

1.1 Background

AECOM was commissioned by Landcom to prepare a Traffic Management and Accessibility Plan (TMAP) to support a Rezoning Proposal and Development Control Plan proposed for the North Tuncurry Urban Renewal Area (NTURA) in 2013. The TMAP was subsequently been revised in 2018 to reflect administrative and legislative changes that had occurred in the preceding period, which was submitted to the Department of Planning, Industry and Environment (DPIE) for review prior to public consultation. DPIE referred the TMAP to Transport for New South Wales (TfNSW) for comment prior to public exhibition.

TfNSW provided comments in the form of a letter dated 7 July 2020 with reference CR2020/002273. Included in these comments was the following request for further information (among other matters that are being addressed under separate cover):

The capacity for Wallis Lake Bridge within Table 9 of the TMAR is listed at a higher rate than the surrounding road network, and higher than the typical midblock flow capacity from Table 5.1 of Austroads Guide to Traffic Management, Part 3, Transport Study and Analysis Method. Given the narrow bridge lanes, road alignment on the western approach and intersections close to each end of the bridge, the capacity should be further refined

The TMAP adopts a road capacity of 1,400 vehicles per hour in each direction for the assessment of Wallis Lake Bridge. This capacity is used to develop the mid-block assessment for the bridge and to assess the anticipated timing of the duplication of Wallis Lake Bridge. This memo will provide the justification for using this mid-block capacity, and to satisfy TfNSW on this comment.

2.0 Existing traffic conditions

2.1 Road description

Wallis Lake Bridge is classified as a state road, providing regional links between Forster and Forster – Tuncurry in the south and Tuncurry in the north. It is oriented in an east-west direction and functions as the main road corridor linking Tuncurry town centre in the west to Forster town centre in the east.

Wallis Lake Bridge connects Manning Street in the west to Head Street in the east. It has a wide divided carriageway measuring approximately 7.5 metres, with one lane in each direction and has a posted speed limit of 50km/h. The bridge measures approximately 700 metres with a straight alignment, with the closest signalised intersections located around 500 metres on either side of the bridge. There is no crossing or entering traffic and no minor approaches or right turns along the bridge.

Parking is not permitted on either side of the carriageway. A pedestrian bridge is provided on the north side of the bridge connecting the existing pedestrian facilities on John Wright Park and Manning Street in the west to John Holland Park and Head Street in the east.

2.2 Existing traffic volumes and speeds

Mid-block counts were undertaken by TTM Consulting for seven days starting from Tuesday 11 December 2018 to assess the current traffic volumes and speeds on Wallis Lake Bridge. The surveys indicate that the AM peak hour occurs from 8:00am to 9:00am and the PM peak hour occurs from 3:00pm to 4:00pm, which is consistent with the Household Travel Survey data. It is noted that this survey data was valid at the time of the assessment. In addition, recent traffic data is not available at selected TfNSW permanent count stations. As such, these volumes are going to be used for the purposes of this assessment.

The weekday average traffic volumes and vehicle speeds along Wallis Lake Bridge during the AM and PM peak hours in both eastbound and westbound directions are presented in Table 1.

The average recorded speeds have been assessed against the sign posted speed limit on Wallis Lake Bridge of 50km/h to determine the percentage of the base free flow speed (BFFS). This assessment is also presented in Table 1.

Table 1 Average weekday peak volumes and travel speeds along Wallis Lake Bridge

Peak hour	Direction[1]	Weekday average total volumes (veh/h)	Weekday average speed (km/h)	% of the BFFS[2]
AM Peak (8am-9am)	WB	998	40	80
	EB	1,136	44	88
PM Peak (3pm-4pm)	WB	1,131	38	76
	EB	1,062	44	89

[1] EB=Eastbound and WB=Westbound.
[2] The BFFS is the base free flow speed from the base conditions.
Source: AECOM, 2020 (adapted from TTM traffic surveys)

Table 1 indicates that over 1,000 vehicles generally travel along Wallis Lake Bridge in each direction during both the AM and PM peak hours. The historical weekday average peak hour traffic patterns at a selected TfNSW permanent count station on the Wallis Lake Bridge (Station ID 09.923) also indicate that traffic volumes along the bridge exceed 1,000 vehicles per hour during these peak hours in the period between 2008 and 2018. This confirms that traffic volumes have remained consistent along the bridge.

Table 1 further indicates that the average weekday travel speed along the Wallis Lake Bridge was 40km/h westbound and 44km/h eastbound during the AM peak hour. This represents 80 per cent and 88 per cent of the sign-posted speed limit in the westbound and eastbound directions respectively. During the PM peak hour, the weekday average speed was 38km/h in the westbound direction and 44km/h in the eastbound direction, representing 76% and 89% of the BFFS in the westbound and eastbound directions respectively. Based on the free flow speeds for interrupted flow facilities outlined in the *Austroads Guide to Traffic Management – Part 3: Traffic Studies and Analysis*, where the average speed is above 67% of the BFFS, this represents reasonably unimpeded traffic operation with limited capacity constraints. As such these speeds indicate that the bridge is operating well at a level of service (LOS) in the region of LOS A or LOS B based on this assessment methodology.

3.0 Midblock capacity assessment – Interrupted flow facilities

The *Austroads Guide to Traffic Management – Part 3: Transport Studies and Analysis Methods* further outlines the assessment criteria for interrupted flow facilities, as requested by TfNSW.

Interrupted flow facilities are those facilities on which traffic flow conditions are subject to the influence of fixed elements such as traffic signals, stop signs, give-way signs, roundabouts or other controls which cause traffic to stop periodically, irrespective of the total amount of traffic; examples include urban streets, unsignalised and signalised intersections.

The Guide sets out typical mid-block capacities for various types of urban roads with interrupted flow, with unflared major intersections and with interruptions from cross and turning traffic at minor intersections, as summarised in Table 2. The Guide further outlines that these capacities can be taken as limiting values when improvements to isolated intersections are being considered without any change to upstream conditions. In addition, these volumes are theoretical capacities for mid-block, with the level of service experienced by drivers, subject to the exact quantum of traffic, which can be influenced by downstream conditions and vehicles queuing back from intersections.

Table 2 Typical theoretical mid-block capacities for urban roads with interrupted flows

Type of lane	One-way mid-block capacity (pc/h)*
Median or inner lane	
Divided road	1,000
Undivided road	900
Median lane (of a three-lane carriageway)	
Divided road	900
Undivided road	1,000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

*pc/h = passenger car per hour
Source: Table 6.1 of Austroads Guide to Traffic Management – Part 3: Traffic Studies and Analysis

The Guide further indicates that peak-period mid-block traffic volumes may increase to 1,200 to 1,400 pc per hour per traffic lane on any approach road when the following conditions exist or can be implemented. These conditions include the following:

- uninterrupted flow from a wider carriageway upstream of an intersection approach and flowing at capacity
- control or absence of crossing or entering traffic at minor intersections by major road priority controls
- control or absence of parking
- control or absence of right turns by banning turning at difficult intersections
- high-volume flows of traffic from upstream intersections during more than one phase of a signal cycle.

The Austroads Guide also provides descriptions of levels of service associated with urban and suburban arterial roads with interrupted flow conditions. Mid-block level of service (LOS) is summarised in Table 3.

Table 3 Mid-block level of service criteria

Level of service	Interrupted flow facilities (arterial and collector roads)	Volume to capacity ratio (VCR) range
A	Describes primarily free-flow operation. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at the boundary intersections is minimal. The travel speed exceeds 80% of the BFFS*.	≤ 0.34
B	Describes reasonably unimpeded operation. The ability to manoeuvre within the traffic stream is only slightly restricted and control delay at the boundary intersections is not significant. The travel speed is between 67% and 80% of the BFFS.	0.35 to 0.50
C	Describes stable operation. The ability to manoeuvre and change lanes at mid- segment locations may be more restricted than at LOS B. Longer queues at the boundary intersections may contribute to lower travel speeds. The travel speed is between 50% and 67% of the BFFS.	0.51 to 0.74
D	Indicates a less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volume, or inappropriate signal timing at the boundary intersections. The travel speed is between 40% and 50% of the BFFS.	0.75 to 0.89
E	Indicates unstable operation and significant delay. Such operations may be due to some combination of adverse progression, high volume, and inappropriate signal timing at the boundary intersections. The travel speed is between 30% and 40% of the BFFS.	0.90 to 0.99
F	Indicates flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay and extensive queuing. The travel speed is 30% or less of the BFFS. LOS F is assigned to the subject direction of travel if the through movement at one or more boundary intersections has a VCR ratio greater than 1.0.	1.0 or greater

*BFFS is the base free flow speed which determines the free-flow speed.
Source: Based on Austroads Guide to Traffic Management – Part 3: Traffic Studies and Analysis

The mid-block capacity of Wallis Lake Bridge as indicated in Table 3, would be in the order of 900 pc per hour per traffic lane based on urban roads with interrupted flows, assuming clearway conditions for kerb lanes. However, traffic survey data compiled in Table 1 indicates that over 1,000 vehicles generally travel along Wallis Lake Bridge in each direction during both the AM and PM peak hours. This is further supported by historic data collected along the bridge.

Analysis of the average travel speed along the bridge presented in Table 1 and discussed in Section 2.2 has indicated that the average travel speed during the weekday peak hours in both directions are above 67% of the sign posted speed limit on the bridge. Based on the description of LOS for interrupted flow facilities presented in Table 3, these rates describe a primarily free-flow operation along the bridge, representing an LOS A or LOS B.

The use of this assessment methodology to calculate the theoretical capacity of Wallis Lake Bridge is not necessarily correct as the bridge is a long straight section of uninterrupted flow configured with a wide carriageway, with no crossing or entering traffic along the bridge, and no minor approaches, right turns or parking provided along the bridge. As such, there are opportunities to use the permitted mid-block capacity range of 1,200 – 1,400 pc/hr based on this discussion, and the use of the uninterrupted flow facilities for single lane traffic flow methodology.

4.0 Midblock capacity assessment – Uninterrupted flow facilities

The *Austroads Guide to Traffic Management – Part 3* provides information on capacity analysis for uninterrupted flow facilities, which are facilities on which traffic flow conditions are the result of interactions between vehicles in the traffic stream, and between vehicles and the geometric characteristics of the road. In uninterrupted flow facilities, there are no fixed elements external to the traffic stream, such as traffic control signals, that cause interruptions to traffic flow.

The Austroads Guide provides guidance on the assessment of capacity for single-lane traffic flow without overtaking and assumes a linear relationship between the average speed and the density of vehicles.

The Guide indicates that the traffic capacity for these facilities can be estimated as per the equation below:

$$C = k_j V_f / 4$$

Where: C is the capacity (passenger cars per hour – pc/h), V_f is the free speed (km/h) and k_j is the jam density (pc per km).

Source: Section 5.1 of Based Austroads Guide to Traffic Management – Part 3: Traffic Studies and Analysis.

The theoretical capacity for Wallis Lake Bridge has been calculated based on the Austroads Guide assessment methodology using the following values:

V_f = based on the observed travel speeds along Wallis Lake Bridge as described in Section 2.2.

k_j = 142.86pc per km (based on a queue length of 7 metres per vehicle).

The resultant theoretical capacity of the bridge in the eastbound and westbound direction during the AM and PM peak hours is presented in Table 4.

Table 4 Theoretical midblock capacity along Wallis Lake Bridge

Location	Direction*	Capacity (pc/h)	
		AM Peak (8am-9am)	PM Peak (3pm-4pm)
Wallis Lake Bridge	WB	1,429	1,357
	EB	1,571	1,571

*EB=Eastbound, WB=Westbound.
Source: AECOM, 2020

The assessment presented in Table 4 indicates that the theoretical capacity of the bridge generally exceeds 1,400 passenger cars per hour during peak hours. The capacity of the bridge reaches 1,571 passenger cars per hour in the eastbound direction during both peak hours. In the westbound direction, the capacity of the bridge ranges between 1,357 and 1,429 passenger cars in the PM and AM peak hours respectively.

As such, the assessment presented above demonstrates that the peak-period mid-block traffic volumes along Wallis Lake Bridge generally exceed 1,400 pc per hour per traffic lane. As such, the maximum one-way mid-block capacity of 1,400 pc per hour per traffic lane is considered conservative, and therefore reasonable for the assessment of Wallis Lake Bridge.

5.0 Site Observations

Site observations along Wallis Lake Bridge indicate that vehicles travelling along the bridge generally do so with limited capacity constraints and are considered to be free flowing during peak hours. No significant queues or traffic congestion have been observed along Wallis Lake Bridge. Therefore, this would further support the use of the uninterrupted flow facilities for single lane traffic flow methodology.

6.0 Conclusion

The assessment of the bridge based on The Austroads Guide to Traffic Management – Part 3 for both interrupted and uninterrupted flow facilities indicate that the proposed theoretical peak hour mid-block capacity along Wallis Lake Bridge of 1,400 pc per hour per traffic lane is a reasonable assumption to use when assessing the future year when the bridge may require duplication.

When assessed using the interrupted flow facilities methodology, the existing traffic volumes and high BFFS along Wallis Lake Bridge indicates that the maximum capacity of 1,400 vehicles per hour per traffic lane is a reasonable assumption to make. Especially considering the configuration of the bridge with a wide carriageway and no crossing or entering traffic, no minor approaches, right turns or parking provided along the bridge. Furthermore, using the uninterrupted flow facilities for single lane traffic flow; being the more appropriate methodology to assess the mid-block capacity of Wallis Lake Bridge further supports the use of the 1,400 vehicles per hour per traffic lane assumption.

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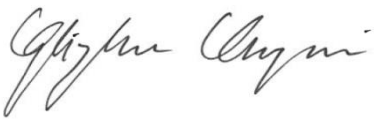

From: Marc Desmond <marc.j.desmond@transport.nsw.gov.au>
Sent: Thursday, 29 October 2020 12:37 PM
To: Stephanie Ballango <sballango@savills.com.au>
Subject: TfNSW response - CR2020/005114 - NTURA - Wallis Lake Bridge Capacity

Hi Stephanie

Thank you for the capacity assessment forwarded for the Wallis Lake Bridge, dated 2 October 2020. TfNSW has reviewed the assessment and compared it to the available traffic count data and undertaken a travel speed analysis using Here and Google. It is noted that holiday periods show an increase of 15% in traffic flows.

TfNSW considers the assessment to be appropriate and is satisfied that the capacity of the Wallis Lake bridge can be considered 1,400 vehicles per lane per hour.

Regards,

Marc Desmond
Development Assessment Officer
Land Use Assessment Hunter
Regional and Outer Metropolitan
Transport for NSW

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Appendix C

Traffic Assumptions

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Memorandum

To	Wade Holmes (Great Lakes Council)	Page	1
CC	Roger Busby (Great Lakes Council) Andy Yung (AECOM) Dan Riley (AECOM)		
Subject	North Tuncurry - Traffic Assumptions		
From	Marcel Cruz (AECOM)		
File/Ref No.	60290907	Date	2-Jul-2013

1.0 Introduction and background

The proposed North Tuncurry development comprises an area of 615 hectares between The Lakes Way and Nine Mile Beach. The site is located in the Great Lakes Local Government Area (LGA), at the northern edge of Tuncurry and approximately 4km northwest of Forster.

Source: Allen Jack + Cottier 2013

It is the intention of UrbanGrowth NSW to develop the site in stages for a mix of land uses, including approximately 1,500 – 2,000 dwellings (pending outcomes of technical investigations); employment lands; a new local neighbourhood centre incorporating retail, business and commercial floor space; tourist, community and education facilities; and open space and environmental conservation purposes.

This memo has been prepared to justify the proposed trip generation rates to be used to assess the traffic impacts of the residential dwellings in the North Tuncurry development. In addition the memo also provides justification for the proposed background traffic growth rate applied to the road network and the trip distribution pattern for trips generated by the proposed development.

2.0 Existing conditions

2.1 2011 Census Data

To gain an understanding of the likely characteristics of the development, the 2011 Census data was analysed. The table below provides an overview of the adjacent regional areas of Tuncurry and Forster in comparison with Greater Sydney.

	Tuncurry	Forster	Greater Sydney
Population and Employment			
Population	5,800	13,116	4,391,674
Persons aged 15+	5,152	11,137	3,548,458
Labour Force *	1,772 (30%)	4,441 (34%)	2,188,153 (50%)
Employment rate	88.9%	91.9%	94.3%
Age structure			
Median age	59	53	36
People aged 60 years and over	49%	41%	18%
Dwelling structure			
Average people per household	1.9	2.2	2.7
Unoccupied dwellings	20%	23%	7%

* percentage provided is based on the labour force divided by population

Source: 2011 Census Data, ABS

The 2011 Census data highlighted the following:

- Tuncurry and Forster have an unemployment rate of approximately 11% and 8% respectively. This is higher to Greater Sydney's 6%;
- Tuncurry and Forster have a significantly higher median age than Greater Sydney;
- The proportion of people aged 60 years and over in Tuncurry (49%) and Forster (41%) is significantly higher than Greater Sydney (18%);
- Tuncurry has a lower average household size of 1.9 compared to Forster (2.2) and Greater Sydney (2.7)
- Tuncurry (20%) and Forster (23%) have a higher proportion of unoccupied dwellings compared to Greater Sydney.

The high proportion of people aged 60 and over suggests that Tuncurry and Forster have a high number of retirees. Tuncurry and Forster also recorded a high proportion of unoccupied dwellings which is likely due to a higher portion of dwellings being used as holiday homes.

2.2 Traffic surveys

Traffic count surveys were undertaken by Skyhigh during the morning (7 – 9am) and afternoon (3 – 5pm) peak periods on the 16th May 2013 at the intersections of Manning Street / Chapmans Road, Manning Street / Northern Parkway / Grandis Drive and Manning Street / Grey Gum Road.

Analysis of the traffic surveys showed that the AM Peak hour occurred between 8:00am and 9:00am and that the PM Peak hour was between 3:00pm and 4:00pm. This is consistent with the peak hours in the Household Travel Survey and origin and destination surveys undertaken by Great Lakes Council.

3.0 Traffic generation rate

3.1 Methodologies

Based on the vastly differing nature of Tuncurry and Forster in comparison to Greater Sydney, several methodologies have been taken into consideration to determine an appropriate traffic generation rate for the proposed residential dwellings within the North Tuncurry development.

RMS Guide to Traffic Generating Development

The Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (2002) recommends the following traffic generation rates for residential dwellings:

- Daily vehicle trips of 9.0 per dwelling; and
- Weekday peak hour vehicle trips of 0.85 per dwelling

It is important to note that the above rates are not all external trips. The RMS guide outlines that approximately 25% of trips are internal trips contained within the area of a development, involving local shopping, school and social visits.

In addition, RMS has recently provided trip rates for regional areas based on five surveys conducted within regional NSW in 2010. The results of the survey for regional areas were as follows:

- Daily vehicle trips of 7.4 per dwelling
- Weekday average morning peak hour vehicle trips of 0.71 per dwelling; and
- Weekday average evening peak hour vehicle trips of 0.78 per dwelling

The above rates for regional areas do not include trips made internal to the subdivision; however the regional areas surveyed had limited internal services where three of the five regional areas surveyed had no traffic generating developments within the area.

Household Travel Survey

Great Lakes Council undertook a Household Travel Survey (HTS) on 16th August 2012 to assess the travel patterns of residents in the Forster – Tuncurry area. The HTS asked respondents to provide details about every trip that was made on that day, categorising trips as work, home, shopping, education/child care, personal or business trips, etc. The results of the HTS were verified against the 2011 Census to ensure a realistic representation of the Forster – Tuncurry area.

The HTS showed that an average of 7.1 trips was made per dwelling on the day of the survey. This is lower than the RMS rate and supports the application of using a lower peak hour trip rate to the traffic impact assessment. Using RMS's peak hour trip rate for regional areas as a baseline, the 7.1 daily trips per dwelling equates to approximately 0.68 morning peak hour trips and 0.75 evening peak hour trips per dwelling.

Note that Great Lakes Council has also used 7 daily trips per residential dwelling as part of their Development Contribution Plan.

Census Data – Method of Travel to Work (MTW)

A first principles method was used to determine a trip rate based on the 2011 Census data for Tuncurry and Forster, with the assumption of 2,000 dwellings to be developed. The following equations were used to determine the peak hour trip rate:

- No. of peak hour trips = No. of dwellings x Average people per household x Proportion of employed residents x Proportion of people who travelled to work by car
- Peak hour trip rate = No of trips / No. of dwellings

Ref	Description	Tuncurry	Forster
A	Proposed no. of dwellings	2,000	2,000
B	Average people per household	1.9	2.2
C	Proportion of employed residents (No. of employed residents / Total population)	27.2%	31.1%
D	Proportion of people who travelled to work by car (Car driver and passenger also includes truck)	67.1%	72.6%
E	No of peak hour trips (E = A x B x C x D)	688	994
F	Peak hour trip rate (F = E / A)	0.34	0.50

Source: AECOM, 2013

Note:

- It is assumed majority of the MTW trips are made during the AM Peak. This could overestimate the peak hour trip rate if a lot of trips are made outside the peak hour.
- The first principles method also assumes the development is fully occupied presenting a worst case scenario.

It is acknowledge that this method of determining a peak hour trip rate for the development is limited as it only takes into consideration vehicle trips made by commuters and does not take into consideration vehicle trips by other purposes such as shopping, education and social trips. However, it provides a benchmark in regards to the trip rate's lower limit.

3.2 Recommended trip rate

The following table summarises the traffic generation rates for the different methodologies discussed in **Section 3.1**.

Methodology	Traffic generation rates	
	Daily Vehicle trips	Peak Hour Vehicle Trips
RMS – Residential dwelling Houses (2002)	9.0 per dwelling	0.85 per dwelling
RMS – Regional areas (2013)	7.4 per dwelling	0.71 (AM) / 0.78 (PM) per dwelling
Household Travel Survey (2012)	**7.1 per dwelling**	**0.68 (AM) / 0.75 (PM) per dwelling**
Method of Travel to Work (2011) – Forster		0.50 per dwelling
Method of Travel to Work (2011) – Tuncurry		0.34 per dwelling

Source: AECOM, 2013

Based on the traffic generation rates above, a peak hour trip rate for the North Tuncurry development ranges between 0.34 – 0.85 trips per dwelling. It is recommended for the purpose of assessing the traffic impacts of the development a peak hour trip rate of 0.68 per dwelling during the AM Peak and 0.75 per dwelling during the PM Peak is used. The peak hour trip rate based on the HTS was deemed to be the most appropriate since it reflects all trip purposes.

With the developments intent of providing a local neighbourhood centre incorporating retail, business and commercial floor space, community and education facilities and open spaces, a portion of the traffic will be contained within the development. As discussed earlier, RMS's trip rates for regional areas were based on areas that had limited internal services, this allows for a reduction in the peak hour trip rate to account for internal trips.

RMS suggest approximately 25% of trips are internal however it is proposed a more conservative proportion of 15% is to be used to take into account internal trips due to the likely extent of facilities to be provided within North Tuncurry. Therefore it is recommended a peak hour trip rate of **0.58 trips** (AM Peak) and **0.64 trips** (PM Peak) per dwelling is applied to assess the traffic impacts of the development on the external surrounding road network.

A slightly lower trip rate than the RMS trip rate can be justified for North Tuncurry given the lower than average employment rate and higher percentage of holiday homes.

4.0 Background traffic growth

A meeting with RMS was held on the 10th of May 2013, where it was agreed the future year assessment for the development would be 2016 and 2026 – with full development to be assumed at 2026.

The background traffic growth for the assessment of the future year of 2016 and 2026 has been estimated based on the population forecasts for the Forster-Tuncurry area by Forecast.id.

Population and household forecasts

Forecast.id provides population and household forecasts for areas within the Great Lakes Council, where the population of Forster-Tuncurry is expected to grow by 1-2% per annum based on 2031 population forecasts, as shown in the table below.

Area name	2011	2021	2031	Growth p.a (2011 – 31)
North Tuncurry Areas				
Tuncurry Balance	4,116	4,568	5,286	1.3%
Nabiac – Failford – Darawank – Rural North	2,615	2,966	3,658	1.7%

Source: Forecast.id, 2013

The proposed North Tuncurry development site is located in the Great Lakes Council's areas of Tuncurry Balance and Nabiac – Failford – Darawank – Rural North, which are expected to grow by 1.3% and 1.7% per annum respectively.

Residential developments

Forecast.id has used a number of land development and infill assumptions as part of their population and household forecasts. The table below provides the residential development assumptions for the areas where the development site is situated. Note that Forecast.id has assumed an additional 1,102 dwellings will be developed by 2031.

Area name	Assumed residential development	Total additional dwellings (2011 – 2031)
Tuncurry Balance	Chapmans Road Leo Street North Tuncurry Greenfield (Tuncurry)	625

Area name	Assumed residential development	Total additional dwellings (2011 – 2031)
	Various vacant lots Low level of infill development	
Nabiac – Failford – Darawank – Rural North	Glider Avenue Rural Residential Showgrounds Lane, Nabiac Failford Precinct North Tuncurry (Darawank) Various vacant lots Low level of infill development	477

Source: Forecast.id, 2009

Of the expected growth of 625 dwellings in Tuncurry Balance, 425 residential lots are expected to be delivered in the Chapmans Road and Leo Street Precinct, west of The Lakes Way within a short distance of the proposed North Tuncurry development site. Therefore, the remaining 200 lots are assumed to be developed in North Tuncurry. If these 200 lots are removed from the increase in population for Tuncurry Balance, the growth would be 0.9%.

On the other hand, an increase of 477 dwellings is expected in the area of Nabiac – Failford – Darawank – Rural North. Given the proposed 1,500 to 2,000 lots development in North Tuncurry, one could argue the demand for developing 477 lots in this region would be absorbed by the development in North Tuncurry. For the purpose of this analysis it is assumed 50 per cent of the additional dwellings will be part of the North Tuncurry development. Based on this assumption the increase in population for the Nabiac – Failford – Darawank – Rural North area without the North Tuncurry development would be 0.9%.

The table below provides a summary of the population growth without the North Tuncurry development based on the assumptions above.

Area name	2011	2021	2031	Growth p.a (2011 – 31)
North Tuncurry Areas				
Tuncurry Balance	4,116	4,568	4,912	0.9%
Nabiac – Failford – Darawank – Rural North*	2,615	2,966	3,137	0.9%

Therefore, it can be concluded the expected background traffic growth would be 0.9%, in line with the expected population growth in the surrounding area.

Note: Background growth will be applied to the surrounding road network which accounts for traffic growth due to surrounding developments. Additional traffic generated by the proposed North Tuncurry development will then be added to the surrounding road network. The assessment will then be able to consider the total impacts of traffic growth due to surrounding developments and the proposed North Tuncurry development.

5.0 Trip distribution

Great Lakes Council undertook an origin and destination (OD) survey for the Forster – Tuncurry region to identify travel patterns in the area. The distribution of trips generated by the proposed North Tuncurry development will be based on the existing travel patterns of Tuncurry.

As part of the traffic and transport study, RMS requires an impact assessment of the proposed development on the Wallis Lake Bridge. Since the OD survey does not provide information on the number of localised trips within Tuncurry, further analysis of the OD survey results were undertaken to determine the proportion of trips that will utilise Wallis Lake Bridge.

The results of the OD surveys during the AM Peak is presented in the table below. It should be noted that this presents a trip distribution pattern at a suburb level only. Cells highlighted in grey are southbound trips originating from Tuncurry and cells highlighted in blue are northbound trips originating from Tuncurry.

AM Peak (8 – 9)	North of Tuncurry	Tuncurry	Forster	South of Forster
North of Tuncurry		214	432	19
Tuncurry	113		504	37
Forster	272	583		46
South of Forster	19	89	180	

Source: Great Lakes Council, 2012

Using the population of Tuncurry (5,800) to interpret the results of the OD survey, the following travel patterns were identified:

- Approximately 9% of the total population from Tuncurry crossed the Wallis Lake Bridge eastbound during the AM Peak; and
- Approximately 2% of the total population from Tuncurry were headed northbound during the AM Peak.

A first principle method was developed to determine the proportion of development trips utilising Wallis Lake Bridge using several factors determined in Section **2.0**, Section **3.0** and Section **5.0**. The table below provides a summary of how the proportion of development trips crossing Wallis Lake Bridge was determined. It was assumed 90% of the development trips were outbound trips in the AM Peak and 80% were inbound in the PM Peak (**Ref F**).

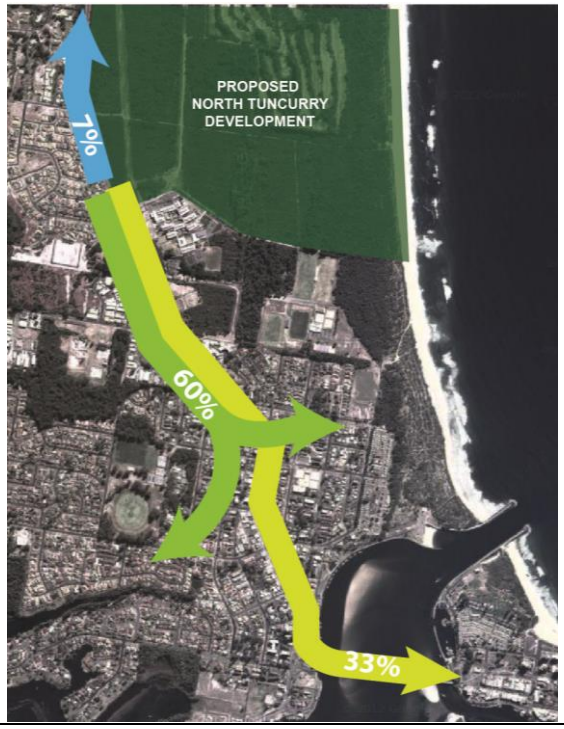
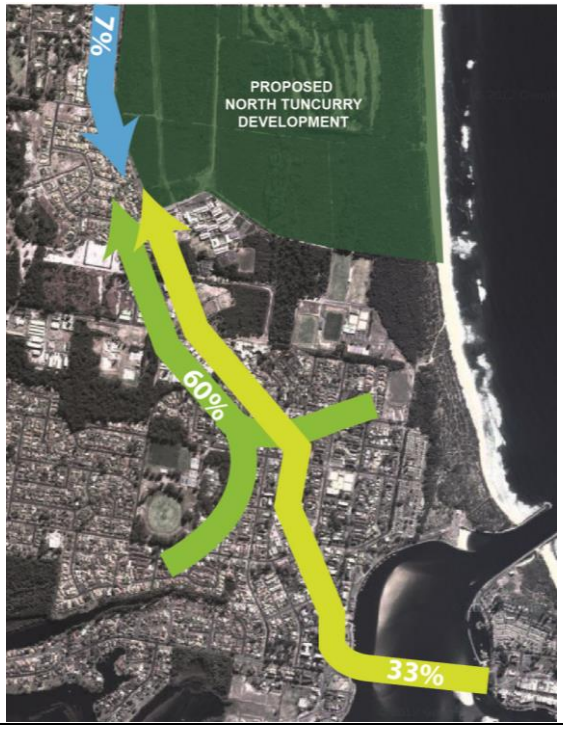
Ref	Description	AM Peak – outbound trips	
		Southbound – to Wallis Lake Bridge	Northbound
Expected development trips			
A	Proportion of the population (**Section 5.0**)	9%	2%
B	No. of dwellings	2,000	2,000
C	Average people per household (**Section 2.0**)	1.9	1.9
D	No. of development trips (D = A x B x C)	342	74
Total development trip (peak direction)			
B	No of dwellings	2000	
E	Trip rate (**Section 3.2**)	0.58	
F	Proportion of trips generated	90% (outbound)	
H	No of development trips (H = B x E x F x G)	1,044	
Proportion of trips across Wallis Lake Bridge			
I	Proportion of trips (I = D / H)	33%	7%

Source: AECOM, 2013

Based on the methodology above 33% of outbound trips would continue along Wallis Lake Bridge in the AM Peak and 7% of outbound trips were heading northbound during the AM Peak. It has been assumed the remaining proportion of outbound trips (60%) is to be assigned to Tuncurry and the same proportion of trips occurs in the opposite direction (inbound) during the AM Peak.

A summary of the proportion of outbound trips and inbound trips during the AM Peak is shown in the figures below. For the PM Peak, it will be assumed a similar the travel pattern occurs as identified during the AM Peak

AM / PM Peak – Outbound	AM / PM Peak – Inbound

AM / PM Peak – Outbound	AM / PM Peak – Inbound
	

Source: AECOM, 2013

The trip distribution above will be used when assessing the impacts of the development on the surrounding road network during the AM and PM Peak.

To validate the above travel patterns, the Journey to Work (JTW) data for Tuncurry was analysed at a statistical area level 2 (SA2). Vehicle trips which included car drivers and passengers, trucks and taxi trips were extracted from the 2011 JTW data and assigned a direction based on their workplace location, as shown in the table below.

AM Peak	North	South	Internal	No fixed address
2011 JTW data – Tuncurry	20%*	33%	42%	6%
2011 OD survey – first principle method	7%	33%	60%	-

Source: AECOM, 2013

Note:

* 3% of trips required the use of the Pacific Highway to head south to their destination where it was assumed these trips would head north along The Lakes Way (Tuncurry Road) and Failford Road to get onto the Pacific Highway

\- It is also assumed majority of the JTW trips are made during the AM Peak.

The 2011 JTW data for Tuncurry showed a similar pattern occurred as derived from the first principle method above, with:

- 33% of vehicle trips heading south utilising Wallis Lake Bridge to get to their workplace;
- 20% of vehicle trips heading north; and
- 42% of vehicle trips being internal to Tuncurry.

The higher proportion of internal trips derived from the first principle method can be attributed the inclusion of other trip purposes such as shopping, education and social trips being generated by internal services within Tuncurry, compared to potentially more trips heading north for JTW related trips.

6.0 Summary

The table below provides a summary of the proposed factors to be used as part of the traffic and transport study for the North Tuncurry development.

		AM / PM Peak
Trip Rate (Section 3)		
Trip rate per dwelling (external to North Tuncurrry)		0.58 (AM) / 0.64 (PM)
Background traffic growth (Section 4)		
Background traffic growth		0.9% p.a.
Trip Distribution (Section 5.1)		
Outbound trips	Northbound	7%
	Southbound – to Tuncurry	60%
	Southbound – to Wallis Lake Bridge	33%
Inbound trips	Southbound	7%
	Northbound – from Tuncurry	60%
	Northbound – from Wallis Lake Bridge	33%

Source: AECOM, 2013

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Appendix D

Wallis Lake Bridge Assessment

[NTDP – Transport Assessment]

Wallis Lake Bridge analysis

The Wallis Lake Bridge has been identified for duplication as part of the Forster District Development Contributions Plan 2009.

Analysis has been undertaken to estimate the year in which duplication of the Wallis Lake bridge is likely to be required based on forecast future traffic volumes. The proportionate impact of the North Tuncurry Development Project (NTDP) has also been identified.

The following assumptions were used as part of the analysis:

- The NTDP is developed at a rate of 50 lots per year from 2023
- Background traffic growth along Wallis Lake Bridge is 0.9 per cent per annum (agreed with RMS, Council)
- The AM peak trip rate is 0.58 with 10 per cent being inbound trips and 90 per cent outbound
- The PM peak trip rate is 0.64 with 80 per cent being inbound trips and 20 per cent outbound
- 33 per cent of trips generated by the NTDP utilise Wallis Lake Bridge
- The maximum capacity of Wallis Lake Bridge is 1,400 veh/h per lane as per *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* (agreed with TfNSW)

Figure 1 –Forecast traffic volumes along Wallis Lake Bridge (AM peak)

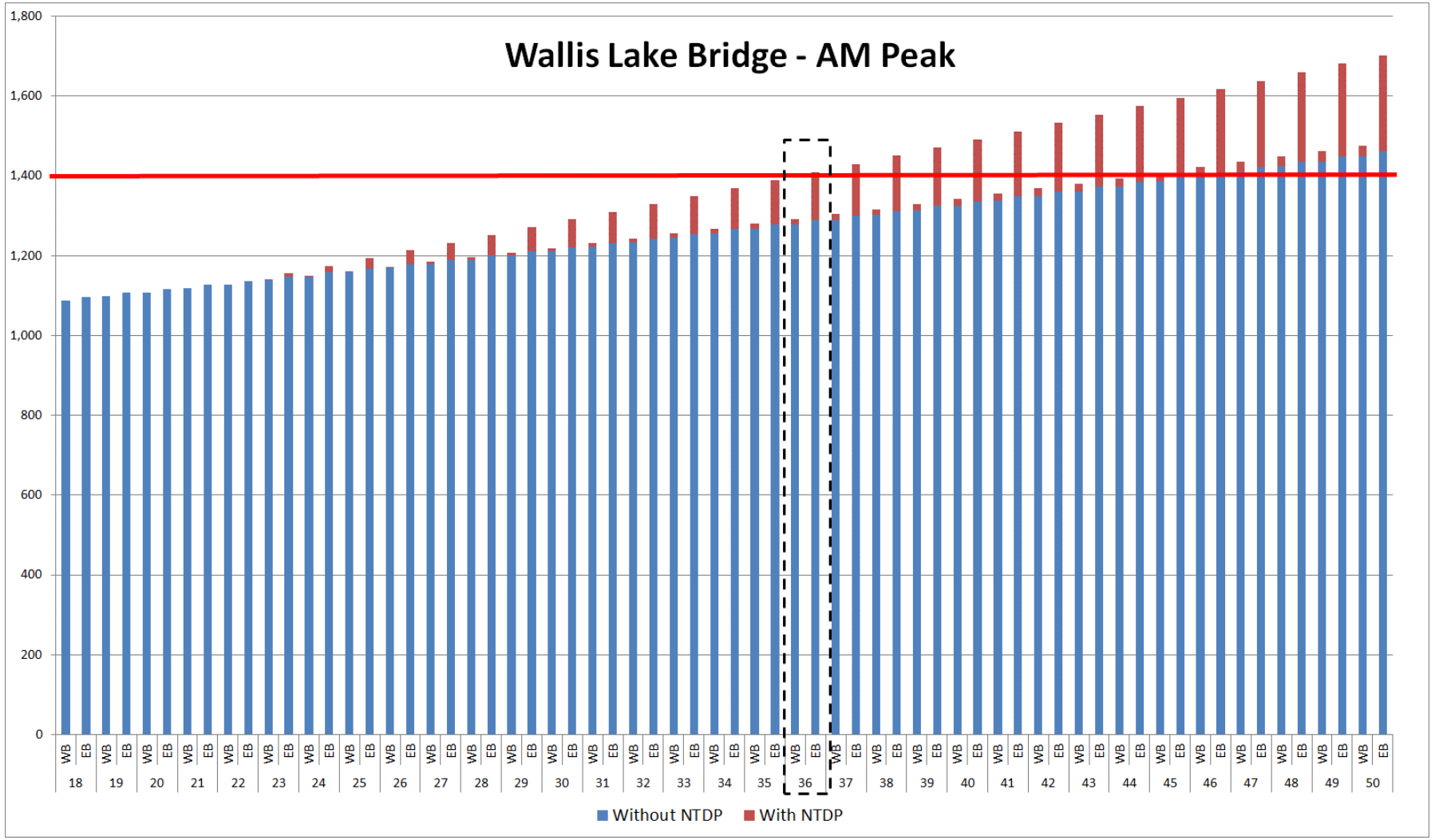
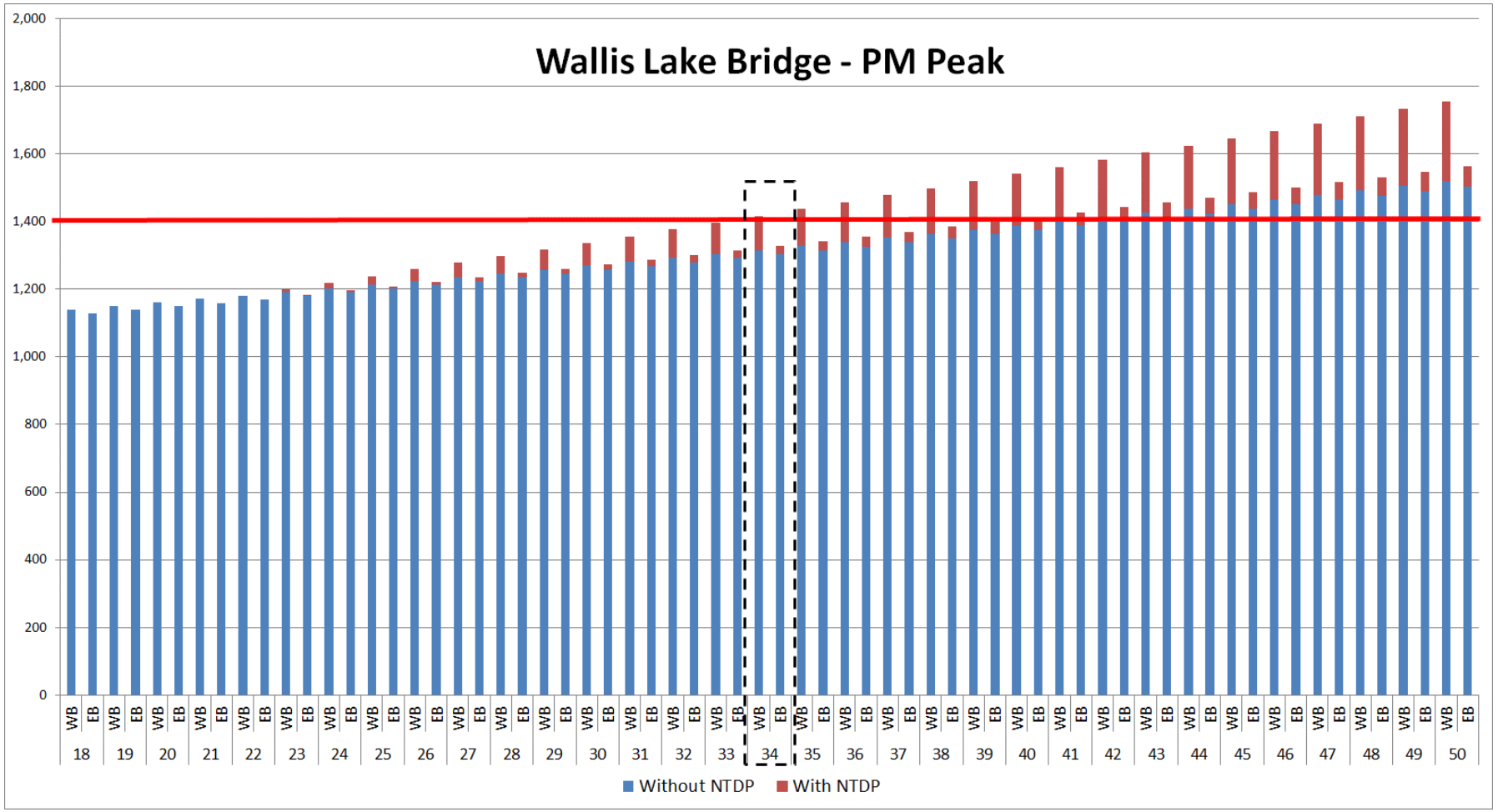


Figure 2 – Forecast traffic volumes along Wallis Lake Bridge (PM peak)



Based on the results shown in **Figure 2**, Wallis Lake Bridge is likely to require additional capacity in 2041 without the NTDP as traffic volumes in the PM peak direction (westbound) exceed capacity. With the NTDP, the estimated year in which additional capacity is required along Wallis Lake Bridge is brought forward to 2034**.**

Refer to **Table 2** and **Table 3** for the forecast traffic volumes along Wallis Lake Bridge between 2023 and 2065.

The proportion of traffic generated by the NTDP along Wallis Lake Bridge at 2034 and 2065 (ultimate development) is provided in **Table 1**.

Table 1 – Proportion of NTDP traffic

Peak	NTDP traffic	Additional background traffic	Total Traffic
2034 (600 lots)			
AM	115 (4.4%)	237	2,637
PM	127 (4.6%)	246	2,745
Average	121 (4.5%)	241	2,691
2065 (2,123 lots)			
AM	412 (11.0%)	1,044	3,741
PM	454 (11.6%)	1,084	3,911
Average	433 (11.3%)	1,064	3,826

Based on forecast traffic volumes, the NTDP is expected to account for 4 – 5 per cent of traffic along Wallis Lake Bridge during the peak hour periods in 2034. At full development (2065) proportion of the traffic is expected to increase to 11 – 12 per cent.

Table 2 – Forecast traffic along Wallis Lake Bridge (AM peak)

AM Peak	Without NTDP		With NTDP	
Year	Westbound	Eastbound	Westbound	Eastbound
2023	1,138	1,147	1,139	1,156
2024	1,148	1,158	1,150	1,175
2025	1,158	1,168	1,161	1,194
2026	1,169	1,179	1,173	1,213
2027	1,179	1,189	1,184	1,232
2028	1,190	1,200	1,196	1,252
2029	1,201	1,211	1,207	1,271
2030	1,211	1,222	1,219	1,290
2031	1,222	1,233	1,231	1,310
2032	1,233	1,244	1,243	1,330
2033	1,245	1,255	1,255	1,350
2034	1,256	1,266	1,267	1,369
2035	1,267	1,277	1,279	1,389
2036	1,278	1,289	1,292	**1,410**
2037	1,290	1,301	1,304	1,430
2038	1,302	1,312	1,317	1,450
2039	1,313	1,324	1,330	1,471
2040	1,325	1,336	1,342	1,491
2041	1,337	1,348	1,355	1,512
2042	1,349	1,360	1,368	1,532
2043	1,361	1,372	1,381	1,553
2044	1,373	1,385	1,394	1,574
2045	1,386	1,397	1,408	1,595
2046	1,398	**1,410**	1,421	1,617
2047	1,411	1,422	1,435	1,638
2048	1,424	1,435	1,448	1,659
2049	1,436	1,448	1,462	1,681
2050	1,449	1,461	1,476	1,702
2051	1,462	1,474	1,490	1,724
2052	1,475	1,488	1,504	1,746
2053	1,489	1,501	1,518	1,768
2054	1,502	1,515	1,533	1,790
2055	1,516	1,528	1,547	1,812
2056	1,529	1,542	1,562	1,835
2057	1,543	1,556	1,577	1,857
2058	1,557	1,570	1,591	1,880
2059	1,571	1,584	1,606	1,903
2060	1,585	1,598	1,621	1,926
2061	1,599	1,613	1,637	1,949
2062	1,614	1,627	1,652	1,972
2063	1,628	1,642	1,668	1,995
2064	1,643	1,657	1,683	2,018
2065	1,658	1,671	1,699	2,042

Table 3 – Forecast traffic along Wallis Lake Bridge (PM peak)

PM Peak	Without NTDP		With NTDP	
Year	Westbound	Eastbound	Westbound	Eastbound
2023	1,192	1,181	1,201	1,183
2024	1,203	1,191	1,220	1,196
2025	1,214	1,202	1,239	1,208
2026	1,225	1,213	1,259	1,221
2027	1,236	1,224	1,278	1,234
2028	1,247	1,235	1,298	1,247
2029	1,258	1,246	1,317	1,261
2030	1,269	1,257	1,337	1,274
2031	1,281	1,268	1,357	1,287
2032	1,292	1,280	1,377	1,301
2033	1,304	1,291	1,397	1,315
2034	1,316	1,303	**1,417**	1,328
2035	1,328	1,315	1,437	1,342
2036	1,340	1,327	1,458	1,356
2037	1,352	1,339	1,478	1,370
2038	1,364	1,351	1,499	1,384
2039	1,376	1,363	1,520	1,399
2040	1,388	1,375	1,540	1,413
2041	**1,401**	1,387	1,561	1,427
2042	1,413	1,400	1,582	1,442
2043	1,426	1,412	1,604	1,457
2044	1,439	1,425	1,625	1,472
2045	1,452	1,438	1,646	1,487
2046	1,465	1,451	1,668	1,502
2047	1,478	1,464	1,689	1,517
2048	1,492	1,477	1,711	1,532
2049	1,505	1,490	1,733	1,547
2050	1,519	1,504	1,755	1,563
2051	1,532	1,517	1,777	1,579
2052	1,546	1,531	1,799	1,594
2053	1,560	1,545	1,822	1,610
2054	1,574	1,559	1,844	1,626
2055	1,588	1,573	1,867	1,642
2056	1,602	1,587	1,890	1,659
2057	1,617	1,601	1,912	1,675
2058	1,631	1,616	1,935	1,692
2059	1,646	1,630	1,959	1,708
2060	1,661	1,645	1,982	1,725
2061	1,676	1,660	2,005	1,742
2062	1,691	1,675	2,029	1,759
2063	1,706	1,690	2,052	1,776
2064	1,721	1,705	2,076	1,794
2065	1,737	1,720	2,100	1,811