UrbanGrowth NSW

Newcastle Urban Transformation and Transport Project
Rezoning of surplus rail corridor lands

Traffic Impact Assessment

March 2017

Executive summary

This report has examined the traffic implications of the proposed rezoning of the surplus rail corridor through the Newcastle CBD. This report is subject to, and must be read in conjunction with, the limitations and qualifications contained throughout the Report.

The proposed rezoning would provide for public recreation, a major attraction and several mixed use sites. Land that is the subject of the rezoning application includes the assumed potential for 400-500 residential units, and up to 5,000 m^2 Gross Floor Area of non-residential land use (most likely for employment-generating uses such as office and/or retail). Development on three adjacent and related sites, which do not form part of the rezoning application, has also been considered in this assessment.

Traffic impacts

Conservative estimates of expected traffic generation have been adopted, based on rates published by Roads and Maritime Services for a location in suburban Newcastle, and on the parking requirements outlined in the Newcastle Development Control Plan 2012. Daily traffic movements of almost 3,300 (2-way) have been estimated. However, with good access to the Newcastle CBD, light rail services, bus services and active transport connections, traffic generation from the proposed development sites will be substantially less than this conservative estimate.

Traffic modelling of the assumed traffic generation has been undertaken, using the traffic model developed for TfNSW to assess the traffic impacts of the Newcastle Light Rail project. The model was developed in collaboration between TfNSW, Roads and Maritime Services, Newcastle City Council and GHD. The base case models assume that the Light Rail is in place and operational.

The modelling shows that for forecast peak hour traffic conditions in 2018 and 2028 the additional traffic generated by the proposed rezoning could be accommodated within the road network, without any modifications or mitigation works beyond those already proposed by TfNSW in response to the Light Rail project.

Parking impacts

A Parking Strategy, developed by TfNSW, has considered the cumulative impacts of the Light Rail project and various known developments sites on public parking supply. A net loss of 407 spaces is expected, which would increase overall peak occupancy to 81% with current demand levels. The Strategy recommends demand management, rather than demand satisfaction, as the most appropriate approach into the future. The Parking Strategy concludes that the overall net loss of parking supply is manageable in the context of broader objectives of parking demand management and increased public transport use.

Pedestrian impacts

The proposal would maintain and enhance pedestrian connectivity between the CBD and the waterfront. The proposed development sites will enhance the public open space surrounding each site, with retail land uses activating building frontages to provide increased opportunity for movement, recreation and service transactions.

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1. Introduction

This report has been prepared to support the amendment to the Newcastle Local Environmental Plan (NLEP) 2012 that applies to the surplus rail corridor land ('rail corridor land') between Worth Place and Watt Street in Newcastle city centre (Figure 1-1).

Figure 1-1 Rezoning study area

Source: Elton Consulting

The Newcastle Urban Transformation and Transport Program ('Program') has been established to deliver on NSW Government's more than $500 million commitment to revitalise the city centre through: the truncation of the heavy rail line at Wickham and creation of the Wickham Transport Interchange; the provision of a new light rail line from Wickham to the Beach; and the delivery of a package of urban transformation initiatives.

The transformation element of the Program aims to bring people back to the city centre by strengthening connections between the city and the waterfront, creating employment opportunities, providing more public space and amenity, and delivering better transport.

The proposed rezoning of the rail corridor land forms a part of the delivery of urban transformation initiatives, comprising a package of transport, built form and public domain improvements.

1.1 Purpose of this report

This report outlines the potential traffic impacts arising from the proposed rezoning of land in the Newcastle City Centre, as part of the Program. It details the process used to undertake the assessment, including traffic generation and distribution, traffic modelling and reporting of model outputs. Other traffic impacts, including parking, site access, and pedestrian and bicycle issues, are also assessed.

Any future development of the rezoned land will be subject to further detailed investigation and assessment through the Development Application process.

1.2 Basis of assessment

The basis of the assessment for this project is the Newcastle City Centre Microsimulation Traffic Model, which was used by Transport for New South Wales (TfNSW) to model the impacts of the Newcastle Light Rail on the road network of the Newcastle CBD. This model was developed in collaboration between TfNSW, Roads and Maritime Services, Newcastle City Council and GHD.

The development of the model is detailed in Section 5.1. The spatial coverage of the model is shown in Figure 1-2.

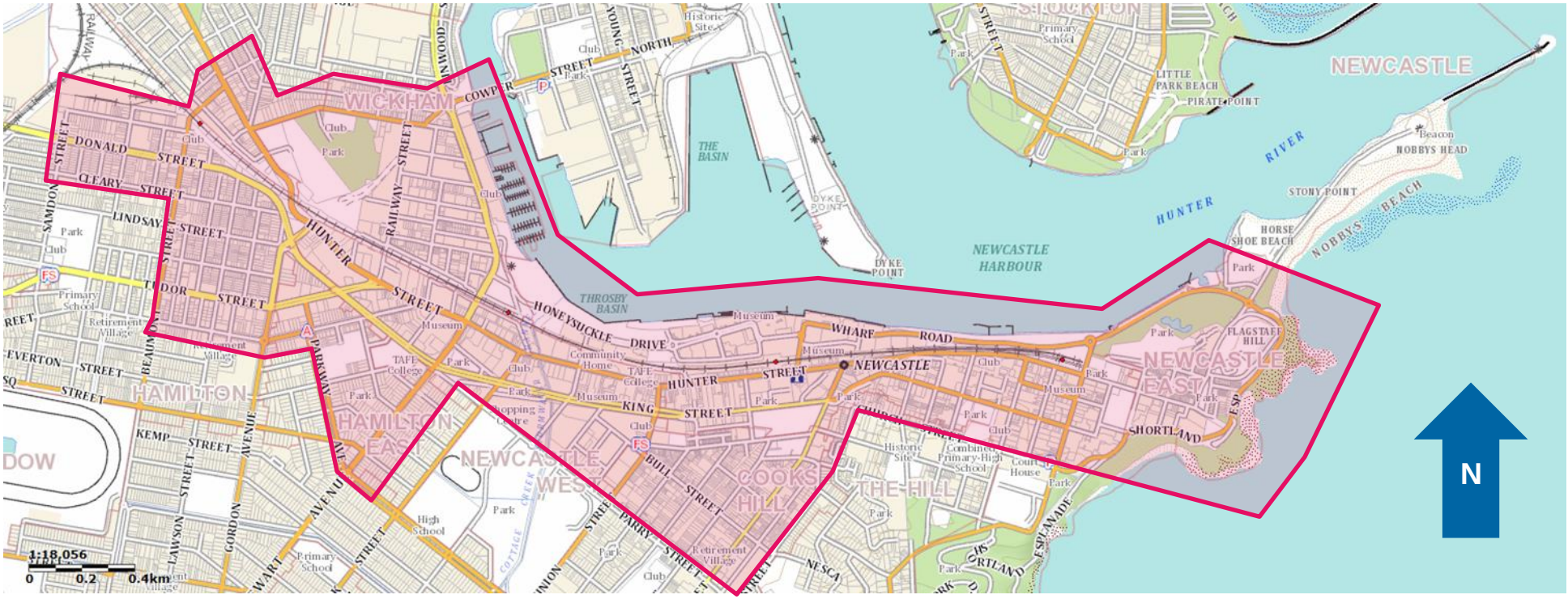


Figure 1-2 Study area for the Newcastle light rail traffic modelling

Source: https://maps.six.nsw.gov.au/

2. Newcastle urban transformation and transportation project

2.1 Newcastle urban transformation

The Newcastle Urban Renewal Strategy (NURS) sets out the NSW Government's long term approach and vision for the revitalisation of Newcastle city centre to the year 2036.

The NURS identifies three character precincts in Newcastle city centre (West End, Civic and East End), within which significant housing and employment opportunities, together with built form and public domain changes and improvements exist. The NURS describes these precincts as:

- East End: residential, retail, leisure and entertainment.
- Civic: the government, business and cultural hub of the city.
- West End: the proposed future business district including the western end of Honeysuckle (Cottage Creek).

UrbanGrowth NSW has been directed by NSW Government to deliver on NURS through the Program, in partnership with Transport for NSW (TfNSW), the Hunter Development Corporation (HDC) and Newcastle City Council (Council).

2.2 Proposed rezoning

UrbanGrowth NSW seeks to amend the Newcastle Local Environmental Plan 2012 (NLEP) to enable the delivery of the Program and the objectives of NURS planning outcomes.

2.2.1 Vision

The Program vision has been informed by feedback from the community, Council, government agencies and urban renewal experts.

> *Our vision is an activated city centre and waterfront that attracts people, new enterprises and tourism. Overtime, we see great opportunities to build on the strengths of the city centre to encourage innovative and enterprising industries to survive. In the longer term, we see an opportunity to strengthen Newcastle's position on the regional, national and international stage, with a view to stronger ties with Asia Pacific.*
>
> *UrbanGrowth NSW, 2015*

2.2.2 Program objectives

The Program is underpinned by five objectives which will drive successful urban transformation:

- **Bring people back to the city centre**
  - Re-imagine the city centre as an enhanced destination, supported by new employment, educational and housing opportunities and public domain, that will attract people.
- **Connect the city to its waterfront**
  - Unite the city centre and the harbour to improve the experience of being in and moving around the city.

- **Help grow new jobs in the city centre**
  - Invest in initiatives that create jobs, with a focus on innovative industries, higher education and initiatives to encourage a range of businesses to the city centre.
- **Create great places linked to new transport**
  - Integrate urban transformation with new, efficient transport to activate Hunter and Scott Streets and return them to thriving main streets.
- **Creating economically sustainable public domain and community assets**
  - Leave a positive legacy for the people of Newcastle. Ensure that new public domain and community facilities can be maintained to a high standard into the future.
- **Preserve and enhance heritage and culture**
  - Respect, maintain and enhance the unique heritage and character of Newcastle city centre through the revitalisation activities.

2.2.3 Urban transformation concept plan

Surplus rail corridor land runs through the East End and Civic city centre precincts (established by NURS). Based on this vision and the results of extensive stakeholder and community engagement, an overall urban transformation concept plan ('concept plan') has been prepared for the surplus rail corridor (rezoning sites), as well as surrounding areas. The concept plan considers and integrates with the delivery of light rail. It is also coordinated with the proposed Hunter Street Mall development to create an interactive, synergised and cohesive city centre and foreshore area.

The concept plan (as shown in Figure 2-1) includes five key 'key moves', two that relate to the Civic precinct and three of which relate to the East End.

Civic link (Civic)

This area is the civic heart of Newcastle and includes some of the region's most important civic and cultural assets, including Civic Park, City Hall, Civic Theatre and Newcastle Museum. Current investment in the area includes the law courts development and the University of Newcastle NeW Space campus – both of which are under construction.

The focus of this key 'move' is to leverage best value from new investments by creating new open space and walking and cycling connections that link Newcastle's civic buildings to the waterfront and the light rail system.

- **Civic Green.** Creating a new civic focused public space linking Hunter Street to the Newcastle Museum that will provide direct visual and physical connection from Wheeler Place to the harbour, activate light rail on Hunter Street and meet the needs of the incoming legal and student populations
- **Built form improvements.** Sensibly scaled mixed use development that forms part of the Honeysuckle development.

Darby Plaza (Civic)

Darby Street is Newcastle's premier 'eat street', offering a mix of shops, cafes, restaurants and night life. At present Darby Street ends at the intersection with Hunter Street, and this key 'move' seeks to create a new node of activity and linkage through to the harbour that complements the delivery of light rail.

- **Darby Plaza.** A new community focused public space including provision of new walking and cycling facilities from Hunter Street to the harbour.
- **Built form improvements.** Zoning of rail corridor land between Merewether Street and Argyle Street to allow for future mixed use development in conjunction with surrounding lands in the longer term.

Hunter Street revitalisation (East End)

Hunter Street features some of Newcastle's best heritage buildings and offers a mix of shops, cafes, restaurants and other local business. Hunter Street has experienced decline in recent years, and the opportunity exists to reinstate Hunter Street as the regions premier main street that complements the delivery of light rail.

- **Built form improvements.** Sensibly scaled mixed use development consistent with the adjoining land uses to create an activated street with 'two edges', celebrate heritage and create new linkages from Hunter Street to the waterfront, provide activation around light rail stops and improve walking and cycling facilities.

Entertainment precinct (East End)

This key 'move' aims to create a place where people can come to play, relax and reconnect with the harbour in a new public space stretching from Scott Street to the waterfront incorporating a new connection from Market Street to Queens Wharf. This key 'move' will assist to activate the area with a variety of activities to create an exciting place for the East End.

- **Recreational opportunities.** This precinct will incorporate the adaptive re-use of the signal box and provision of recreation opportunities for all ages and abilities. Public domain will be designed to provide a thoughtful series of character areas and experiences as one walks the length. The area will also provide opportunities for viewing and interpretation of heritage character that respect the unique qualities of place.

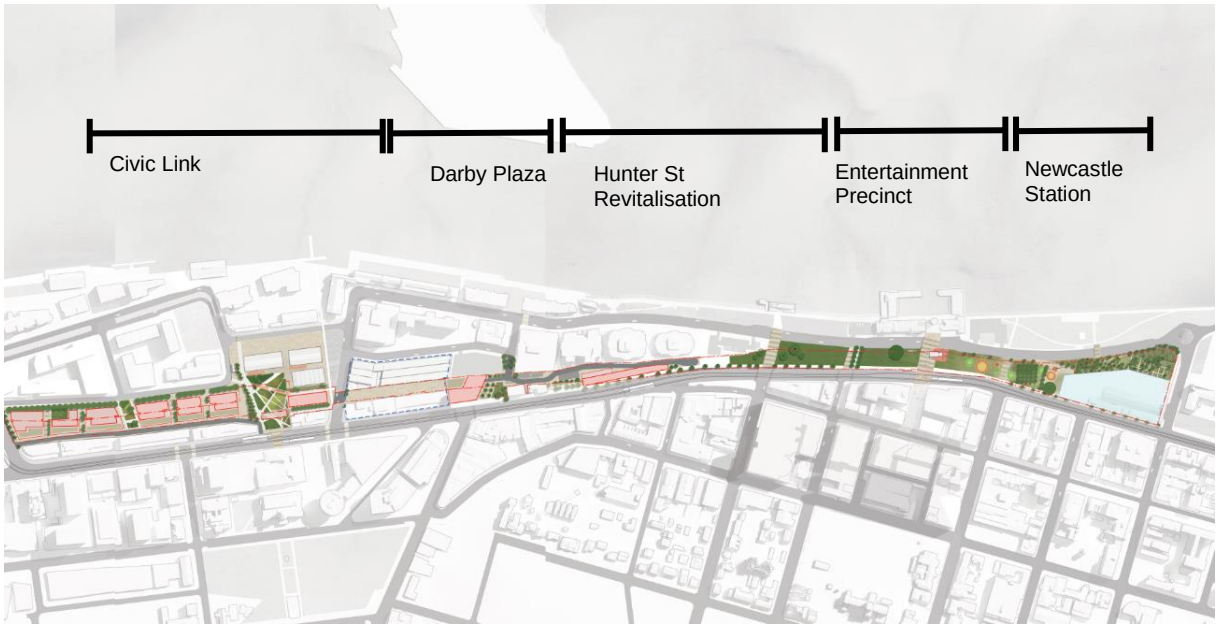
Newcastle Station (East End)

Newcastle Railway Station is proposed to be re-purposed into a hallmark destination and focal point for the new East End, accommodating enterprises and activities that attract visitors and stimulate the economy.

Refurbishment would fully respect and celebrate the heritage integrity of the Station, and could accommodate a range of different activities including community, retail, leisure and commercial uses.

2.2.4 Rezoning concept plan

The proposed rezoning of the surplus rail corridor lands is the focus of this report. Figure 2-1 defines the site rezoning area within the broader program planning outcomes.



Source: Elton Consulting

Figure 2-1 Rezoning concept plan

Amendments to the NLEP are required to deliver part of the concept plan. The proposed amendments are on surplus rail corridor land only.

Necessary amendments to the NLEP include:

- Amend the Land Use Zoning Map to introduce new B4 Mixed Use, SP3 Tourism and RE1 Public Recreation zones.
- Amend the Height of Building and Floor Space Ratio maps to facilitate development on select parcels of land.

The concept plan will also form the basis for updates to the Newcastle City Centre Development Control Plan design controls to guide development and public domain works for rezoning sites.

2.2.5 Proposed rezoning

This planning proposal seeks to rezone rail corridor land (rezoning sites) to enable the delivery of the proposed urban uses established in the concept plan. The planning proposal concept plan includes public domain, entertainment, mixed use and commercial and residential development.

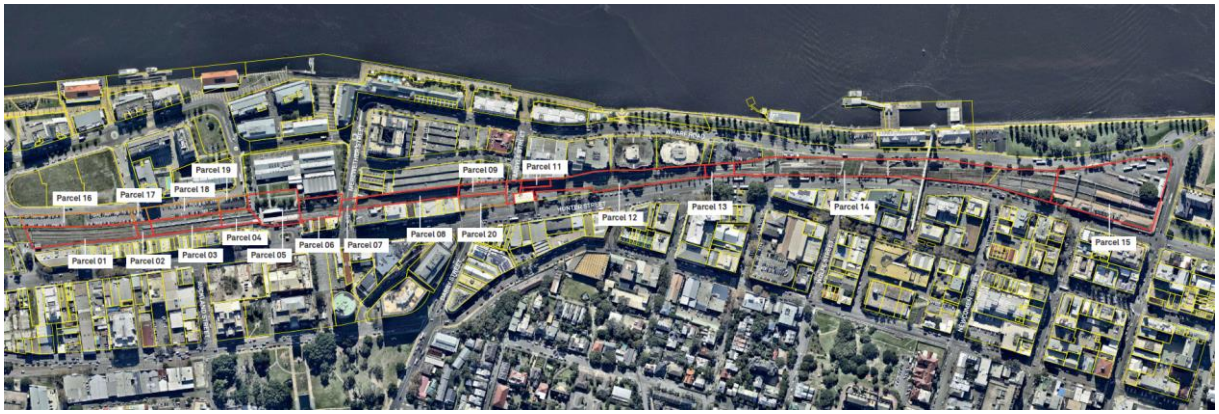
In general the proposed rezoning will provide a mix of uses with between 400-500 dwellings which will comprise a variety of styles and types, and around 5,000 m^2 of commercial, restaurant and other entertainment uses, as described in Table 2.1, and excluding any education or associated uses. An assumed development mix, as advised by Elton Consulting and used to assess the traffic generation for this assessment, is detailed in Section 4.2.

Proposed maximum building height and floor space ratio controls respect existing controls that apply to surrounding land.

This report has been based upon the proposed zoning under the Planning Proposal as submitted for Gateway determination, with the inclusion of Parcel 13. It is noted that this parcel

has been removed from the current Planning Proposal in accordance with the Gateway determination as issued by the NSW Department of Planning and Environment. Nevertheless, for completeness, this report has considered the potential for some development occurring within this parcel in the future (subject to outcomes of a separate Planning Proposal). The recommendations of this report discuss whether there are any specific implications arising from this additional parcel.

The location of the proposed rezoning parcels is indicated in Figure 2-2 below.



Source: Hassell

Figure 2-2 Rezoning explanatory map - Parcels

Table 2.1 Sites for rezoning – Proposed development summary

Previous Parcel Number prior to Gateway	Updated Parcel Number post Gateway	Size	Proposed Zoning	Proposed FSR	Proposed Height
Parcel 01 B4 Mixed Use 3,370m^2	Now parcel 01	3,370 m^2	B4 Mixed Use	FSR – 3:1	30m
Parcel 02 B4 Mixed Use 408 m^2	Now parcel 02	408 m^2	B4 Mixed Use	FSR – 3:1	30m
Parcel 03 B4 Mixed Use 3,146 m^2	Now parcel 03	1,869 m^2	B4 Mixed Use	FSR – 3:1	30m
	Now parcel 04	900 m^2	B4 Mixed Use	FSR – 3:1	24m
Parcel 04 RE1 Public Recreation 2,464 m^2	Now parcel 05 (and small corner of old 03 where western boundary of park realigned)	2,839 m^2	RE1 Public Recreation	N/A	N/A
Parcel 05 B4 Mixed Use 1,603 m^2	Now parcel 06	1,604 m^2	B4 Mixed Use	FSR – 3:1	18m
Parcel 06 B4 Mixed Use 295 m^2	Now parcel 07	295 m^2	B4 Mixed Use (road)	FSR – 2.5:1	30m
Parcel 07 B4 Mixed Use 2,040 m^2	Now parcel 08	2,040 m^2	B4 Mixed Use	FSR – 2.5:1	30m
Parcel 08 B4 Mixed Use 988 m^2	Now parcel 09	988 m^2	B4 Mixed Use	FSR – 4:1	24m
Parcel 09 B4 Mixed Use 467 m^2	Now parcel 10	467 m^2	RE1 Public Recreation	N/A	N/A
Parcel 10 SP2 Infrastructure 386 m^2	Now parcel 11	386 m^2	SP2 Infrastructure	N/A	N/A

Previous Parcel Number prior to Gateway	Updated Parcel Number post Gateway	Size	Proposed Zoning	Proposed FSR	Proposed Height
Parcel 11 B4 Mixed Use 4,542 m^2	Now parcel 12	4,542 m^2	B4 Mixed Use	FSR – 1.5:1	14m
Parcel 12 B4 Mixed Use 1,544 m^2	Now parcel 13 (and has been reduced in size)	659 m^2	SP2 Infrastructure	N/A	N/A
Parcel 13 RE1 Public Recreation 303 m^2	Now parcel 14 (new parcel 14 encompasses part of old parcel 12, and the whole of old parcel 13, 14 and 15)	11,151m^2	RE1 Public Recreation	N/A	N/A
Parcel 14 B4 Mixed Use 2,251 m^2					
Parcel 15 RE1 Public Recreation 7,713 m^2					
Parcel 16 SP3 Tourist 10,698 m^2	Now parcel 15	10,698m^2	SP3 Tourist	FSR – 1.5:1	10-15m

2.3 Newcastle light rail

The NSW Government is introducing light rail to Newcastle as part of a broader strategy to revitalise the Newcastle city centre. Light rail will travel from a new transport interchange at Wickham, through the Newcastle city centre to Pacific Park.

The truncation of heavy rail services at Wickham and the building of a new interchange are the first steps in delivering an urban renewal and transport solution for Newcastle.

Transport for NSW has been working closely with UrbanGrowth NSW, Newcastle City Council and Roads and Maritime Services in planning for light rail. Light rail will help improve public transport and access, reunite the city centre with its waterfront and improve the attractiveness of public spaces. The light rail route will travel east from the new transport interchange at Wickham along the existing rail corridor to Worth Place, before moving south to connect with Hunter Street and Scott Street before reaching Pacific Park, near the beach.

Initial geotechnical investigations have been completed and detailed design and environmental planning is well underway.

Transport for NSW and a combined team of Newcastle-based experts have prepared an environmental assessment for the Newcastle Light Rail project. The environmental assessment studies include heritage, visual and urban design, noise and vibration, social impacts, air quality and traffic, and access.

The Review of Environmental Factors has been approved and implementation has commenced.

2.3.1 Light rail alignment

The proposed alignment for the light rail is shown in Figure 2-3.

The six light rail stops on this alignment are located at:

- Wickham west of Stewart Avenue (terminus)
- Honeysuckle at Kuwami Place in the existing railway corridor
- Civic in Hunter Street
- Crown Street in Hunter Street
- Queens Wharf in Scott Street at Market Street
- Pacific Park on the south side of Scott Street between Pacific Street and Telford Street (terminus).

Light Rail services

The Light Rail service will operate with 10 minute headways in each direction, with travel times between Wickham and Pacific Park in the order of 12 minutes.

The Light Rail terminus is on the western side of Stewart Avenue at the new Wickham Interchange, requiring light rail vehicles to cross Stewart Avenue and access the existing rail corridor via Beresford Street. Additionally, with the new road connection at Steel Street the light rail vehicle will be required to cross Steel Street before accessing the Hunter Street dedicated Light Rail Lane at Worth Place. The Hunter Street dedicated lane continues until Market Street where the alignment becomes shared running with regular traffic until Pacific Street, where the light rail terminates at the terminus on the northern side of Pacific Park near Newcastle Beach.

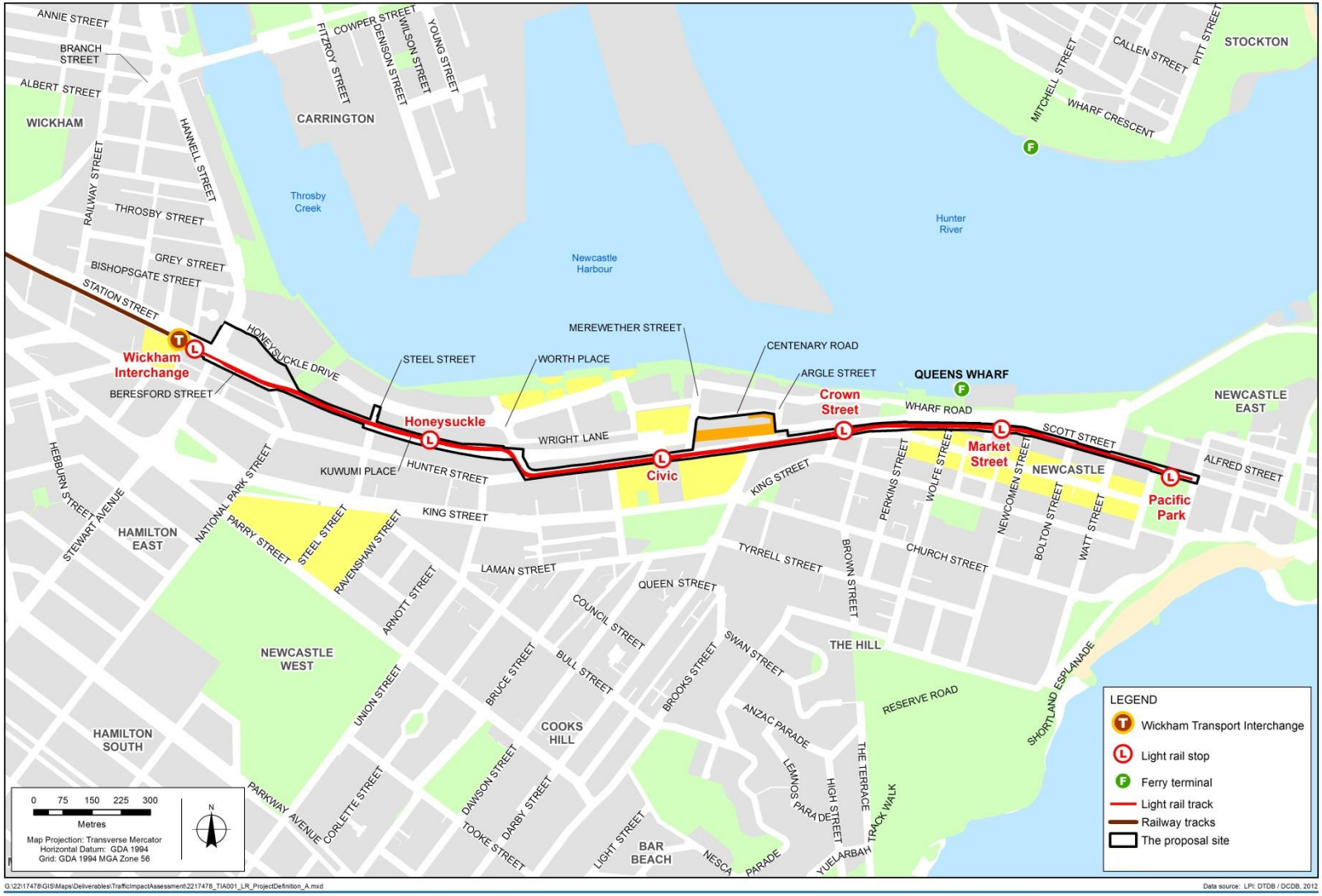


Figure 2-3 Proposed Newcastle light rail alignment and stop locations

3. Base conditions

The NUTTP rezoning proposal is being delivered in conjunction with the Newcastle Light Rail project. As such the Base, or pre-development scenario for this study is the TfNSW Light Rail Proposal. The establishment of this Base scenario, including the light rail alignment and stop locations, and changes to the road network to accommodate light rail traffic impacts, has been the subject of separate discussions between TfNSW, RMS and Newcastle City Council, and a separate REF has been approved for that project.

3.1 Road network

Key elements of the road network relevant to the rezoning proposal are described below, including planned changes associated with the Light Rail project.

Hunter Street

Hunter Street is an arterial road that runs in an east-west direction, running parallel to the former heavy rail line between Wickham and Newcastle. It is generally a two-way four lane undivided road. The former railway corridor runs parallel to Hunter Street on the road's northern side. Between Perkins Street and Bolton Street, most traffic uses the parallel Scott Street, with Hunter Street being a one-way westbound 10km/h shared zone through the 'Hunter Street Mall'. Hunter Street and Scott Street have a sign posted speed limit of 60 km/h and carries up to 1200 vehicles per hour in the peak period. Hunter Street provides access to residential and commercial properties and a local shopping and café precinct in the eastern mall area.

King and Parry Street

King Street is an arterial road that runs parallel to Hunter Street. Between Union Street and Stewart Avenue, it is a four lane divided road, with peak volumes up to 1,400 vehicles per hour. The adjacent land-uses are generally commercial however there are also a number of hotels and residential apartment blocks along its length. To the west of the intersection with Stewart Avenue, King Street becomes Parry Street. At this location Parry Street is also a four lane divided road with a third west bound clearway lane in the afternoon. Parry Street connects with Donald Street, Hamilton and ultimately becomes Newcastle Road to the western suburbs and the M1 Motorway. The posted speed limit varies between 40 km/hr, 50 km/hr and 60 km/hr, reflecting the road configuration, adjacent land use and pedestrian activity levels.

Union Street

Union Street is a collector road that runs in a north-south direction between Hunter Street and The Junction, terminating at Mitchell Street, Merewether. Union Street is a two-lane carriageway with a speed limit that varies between 40km/h and 60km/h, and carries up to 800 vehicles per hour in the peak period. On-street parking is permitted along most of its length and provides direct access to a number of residential properties and The Junction shopping precinct.

Darby Street

Darby Street is a collector road that runs in a north-south direction between Hunter Street and Parkway Avenue. Between Bull Street and Queen Street, the sign posted speed limit is 40km/h and the road is characterised by a bar and café precinct, generating high levels of pedestrian activity. Darby Street is generally a two-lane carriageway that carries approximately 1000 vehicles per hour in the peak period.

Honeysuckle Drive and Wharf Road

Honeysuckle Drive runs generally east-west between the former heavy rail corridor and Newcastle Harbour. It becomes Workshop Way before changing to Wharf Road at Merewether Street. Honeysuckle Drive services the commercial office space, residential and restaurant/bar precincts that are adjacent to Newcastle Harbour. East of Merewether Street, there are several medium density residential and commercial developments. Peak period traffic volumes are up to 700 vehicles per hour, highest at the western end of the road. A 50 km/hr speed limit applies.

3.1.1 Road network changes with light rail

The concept for the light rail included the following changes to the road network:

- New traffic signals on Stewart Avenue at Beresford Street to allow safe crossing of Stewart Avenue by the light rail vehicles.
- East/West 'light rail only' dedicated lanes in Beresford Street.
- A westbound dedicated vehicle lane in Beresford Street.
- A new road connection between Hunter Street and Honeysuckle Drive, across the existing heavy rail corridor, at Steel Street with new traffic signals at the intersection of Steel Street and the light rail track.
- A signalised intersection at the new Steel Street connection at Honeysuckle Drive. Right turns from Honeysuckle Drive onto Steel Street are to be banned.
- A new road connection between Hunter Street and Honeysuckle Drive at Worth Place. The intersection of Worth Place and Hunter Street is to be left in / left out, with traffic signals to control light rail movements across Hunter Street.
- Changes to all the intersections along Hunter Street between Worth Place and Pacific Street to control all right turns across the light rail track through green / amber /red arrows.
- New traffics signals at the Wolfe Street/Scott Street intersection with the north approach being a new connection to Wharf Road.
- A new pedestrian crossing of Scott Street at Market Street, and Hunter Street at Civic.
- New traffics signals at the Scott Street/Pacific Street intersection to facilitate northbound left turning and eastbound right turning light rail vehicles accessing the eastern terminus at Pacific Park.
- Light rail with separated running in Hunter Street between Worth Place and Market Street.
- Light rail with shared running in Hunter Street between Market Street and Wolfe Street.

The following additional changes to the road network have also been considered, as outlined in the Newcastle Light Rail Associated Road Upgrades REF (TfNSW, 2016):

- Stewart Avenue / Hannell Street intersection upgrade, including new and extended turn lanes.
- Hunter Street / Steel Street intersection upgrade, including a new right turn lane and additional lanes on Hunter Street.
- King Street / Darby Street intersection upgrade, including extended turn lanes.

3.2 Bus services

All of the existing 30 bus routes that pass through the city centre terminate at Newcastle bus interchange adjacent to Newcastle station. When light rail is implemented, the bus network within the city centre would be reconfigured. The final arrangement would depend on the newly appointed network operator. However for the purposes of the Light Rail REF most bus routes were assumed to terminate in Hunter Street at Auckland Street. This is the bus network that has been assumed for this assessment.

3.3 Pedestrians and cyclists

Pedestrians are well catered for in and around the study area, with footpaths provided adjacent to most roadways. Since the termination of the former heavy rail line, a number of at-grade pedestrian connections have been made across the corridor, including at Steel Street, Kuwami Place, Worth Place, Civic Station, Argyle Street, Perkins Street and Wolfe Street.

On-road bike lanes are provided on several streets in the study area, including parts of Honeysuckle Drive, King Street, and Auckland Street.

Shared paths are also provided along the harbour through Honeysuckle and parallel to Wharf Road towards Nobbys Head.

3.4 Parking

On-street and off-street parking is provided within the study area, both by Newcastle City Council and private operators. Car parking is generally time restricted, with pay and display systems in operation.

Several parking studies and strategies have been completed for Newcastle in recent years, including by Council and TfNSW. The most recent study, the "Newcastle Transport Program Parking Strategy" was prepared by Bitzios Consulting in late 2016 for TfNSW, in the context of managing changes in parking associated with the Light Rail project and other developments. The Draft Parking Strategy (February 2017) included the following key findings:

- Parking Supply
  - Existing parking supply in the inner Newcastle area is 11,374 spaces, including 7,623 on-street spaces and 3,751 off-street spaces.
  - Peak occupancy across all spaces was 78%, although the range in individual locations was between 53% and 98%. The majority of spare capacity occurs in fringe areas surrounding the CBD. This is consistent with recent studies by Council, which also concluded that parking demand has increased since previous surveys in 2014 (prior to the heavy rail truncation).
  - The Newcastle Light Rail and Wickham Transport Interchange projects will result in the loss of 475 on-street spaces. Some 223 on-street spaces would be gained through enabling works for the Supercar event, and refinements to the light rail and roadworks design, with a net loss of 252 on-street spaces.
  - The progressive closure of existing temporary car parks at Lee Wharf and Throsby Wharf between 2018 and 2020 to allow for development of these sites, as well as at Wrights Lane (Parcels 16-19 adjacent to this current proposal), would result in the loss of 740 off-street spaces. These changes are not related to the light rail project, associated roadworks or transport interchange construction. Parking at these locations was planned to be temporary until economic and market conditions supported new development opportunities on these sites, Expansion of the existing

Gibson Street car park, and further Supercar enabling works, would reduce the net loss of off-street spaces to 293.

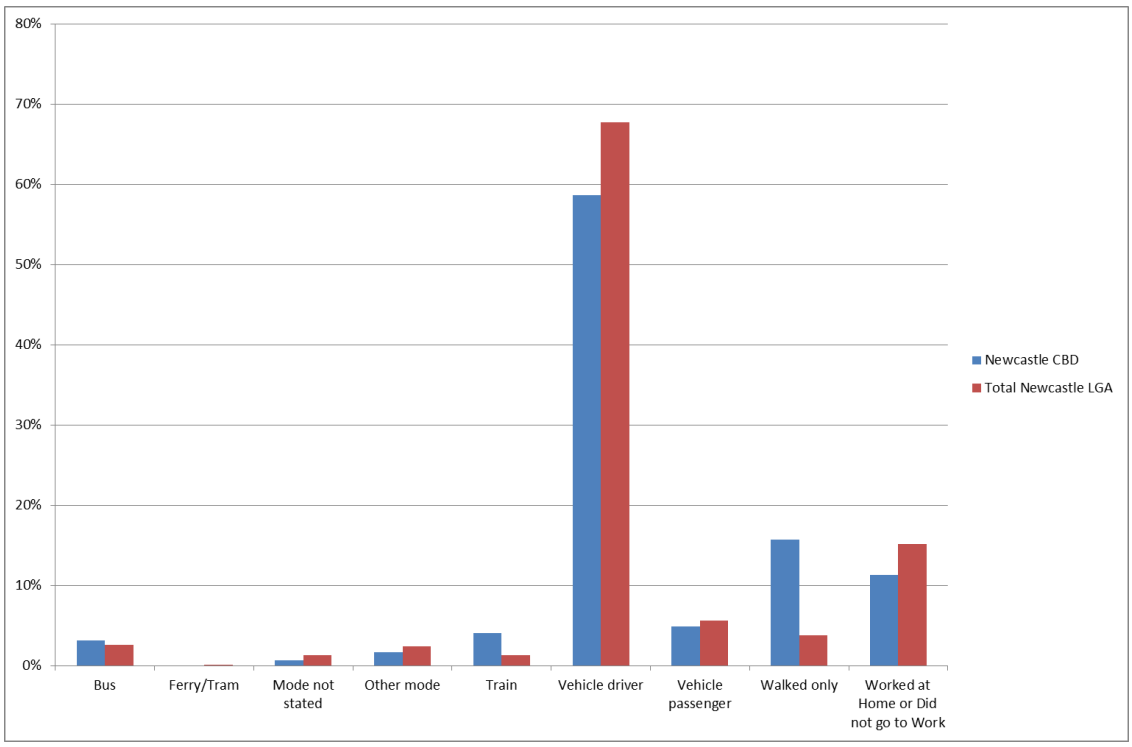
  - The potential for an additional 138 spaces was identified, including new spaces in Steel Lane, Worth Place and expansion of the Boat Harbour car park.
  - The net reduction in parking would be 407 spaces, increasing the peak occupancy across all spaces to 81% (approximately 2,060 spare spaces) for current 2016 demand.
- Future Demand
  - If parking demand increases at the same rate as employment in the Newcastle CBD is predicted to grow, the current public parking supply would be fully occupied by 2024.
  - The most sustainable approach to parking in Newcastle is about demand management, not demand satisfaction.
- Recommendations
  - Limiting parking supply is necessary to support increased active transport mode share and reduce congestion.
  - The strategy recommends overarching directions including:
    - Demand management, rather than demand satisfaction.
    - Progressive relocation of all-day parking outwards from the centre.
    - Prioritise short-stay, high turnover parking over long stay, low turnover parking.
    - Utilise on-street parking for short-stay use only.
    - Reduce on-street time limits to maximise efficiency and turnover.
    - Progressively increase public transport use to reduce parking demand.
    - Cap off-street parking in the eastern parts of the CBD.
    - Intercept cars before they enter the city centre, through investigation of new off-street parking, or park and ride opportunities.

3.5 Travel behaviour

The majority of trips undertaken within Newcastle are made by car. The 2011/12 Household Travel Survey from the Bureau of Transport Statistics indicates that for residents of the Newcastle Local Government Area, 57% of trips are made as a vehicle driver, with 23% as a vehicle passenger. Walking accounts for 15% of trips, while all other modes combined make up only 5% of trips.

A breakdown of similar data included in the 2015 Newcastle Transport Strategy suggests that in Inner Newcastle, the car is still dominant but other modes are more popular.

Results of the 2011 Census Journey to Work data validate this observation. Figure 3-1 compares the mode of commute trips for residents of the Newcastle CBD with the whole Newcastle Local Government Area. For the CBD vehicle driver and passenger are less dominant and public transport and walking more popular. It is noted that the truncation of the heavy rail line since this data was collected may affect mode share to public transport in the CBD area. Similarly, the introduction of light rail is also expected to influence travel behaviour.



Data Source; Australian Bureau of Statistics

Figure 3-1 Journey to work mode share, 2011

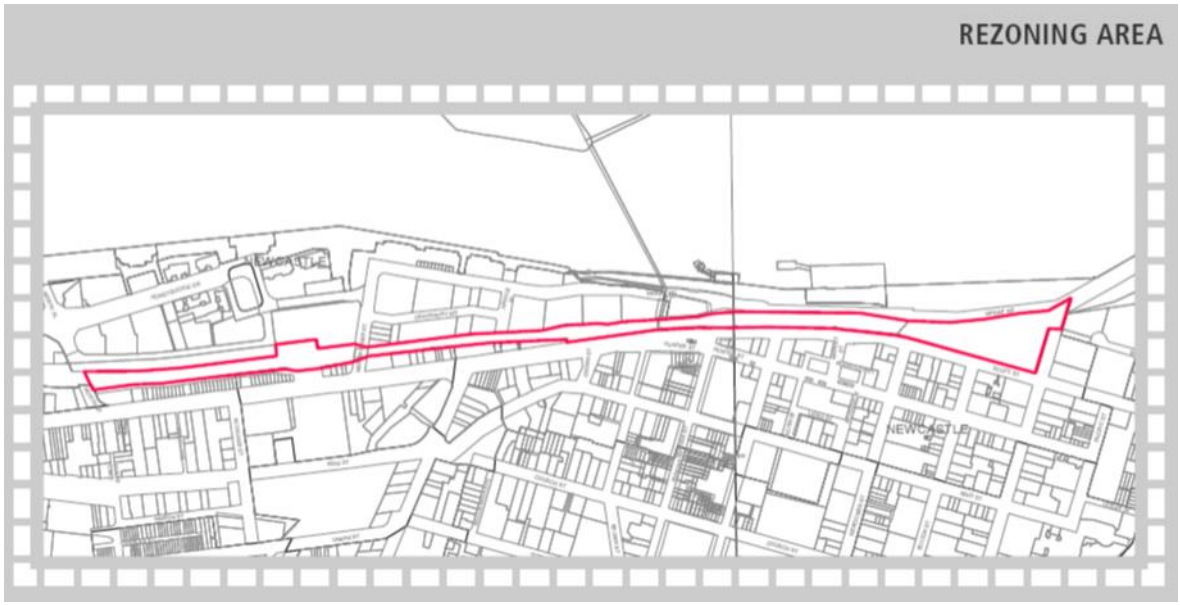
4. Rezoning proposal

4.1 Overview

The rezoning site is located in Newcastle city centre and comprises a collection of land holdings within the surplus rail corridor lands.

The site is approximately 2.1km in length generally bounded by Wharf Road to the north, Watt Street to the east, Hunter and Scott Streets to the south and Worth Street to the west. The site includes Civic and Newcastle Stations.

The site area subject to the rezoning is provided in Figure 4-1.



Source: Elton Consulting

Figure 4-1 Rezoning site area

4.2 Assumed development mix

Table 4.1 shows the assumed Gross Floor Area (GFA) that could be achieved on each land parcel. It has been assumed that 10% of GFA would be for non-residential uses, and that all sites can achieve a full GFA entitlement.

Future development applications will be subject to planning approval and public exhibition to determine final development outcomes.

Note that the subject of this rezoning proposal is only land within the existing rail corridor. However, the assessment includes three adjacent parcels where development could be influenced by this proposal. These are:

- Parcel 16, adjacent to Parcel 1 in Wright Lane
- Parcel 18, adjacent to Parcel 3 in Wright Lane
- Parcel 19, adjacent to Parcel 4 in Wright Lane
- Parcel 20, adjacent to Hunter Street opposite Darby Street

Table 4.1 Anticipated gross floor areas

Parcel	Gross Floor Area	
	Non-residential (m2)	Residential (m2)
01	1,100	9,100
03	600	5,050
04	270	2,400
06	480	4,300
08	500	4,600
09	400	3,500
12	690	6,100
Total	**4,040**	**35,494**

Source: Hassell

Within the above floor areas for non-residential land uses, it has been assumed that 50% would be used for retail purposes, and 50% for office uses, for the purpose of estimating parking requirements (see Section 4.4).

Table 4.2 shows the assumed mix of residential units on each site, with an average apartment size of 80 m^2 per apartment.

Table 4.2 Anticipated dwelling yield

Parcel	Number of dwellings				
	Total	Studio	1 bed	2 bed	3 bed
		20%	*35%*	*35%*	*10%*
Within the rail corridor					
01	114	23	40	40	11
03	63	13	22	22	6
04	30	6	11	11	3
06	54	11	19	19	5
08	57	11	20	20	6
09	44	9	16	16	4
12	77	15	27	27	8
Sub-total	***440***	***88***	***154***	***154***	***44***
Outside the rail corridor					
16	86	17	30	30	9
18	60	12	21	21	6
19	25	5	9	9	2
20	49	10	17	17	5
Sub-total	***220***	***44***	***77***	***77***	***22***
TOTAL	**660**	**132**	**231**	**231**	**66**

Source: Hassell

4.3 Site access

4.3.1 Vehicular access

Each site would be accessed separately, with a basement car park anticipated for each mixed-use development. A summary of access arrangements for each site is provided in Table 4.3.

Table 4.3 Vehicular access arrangements

Parcel	Vehicular access / Egress route	Minimum access widths
1 / 16	Site access onto Wright Lane to connect to Worth Place or Settlement Lane. Potential for service vehicle access via Civic Lane. No change proposed in Civic Lane (subject to Development Application).	Combined entry / exit 6.0 to 9.0 metres wide.
3 / 4 / 18 / 19	Site access onto Wright Lane to connect to Worth Place or Settlement Lane. Potential for service vehicle access via Civic Lane. No change proposed in Civic Lane (subject to Development Application).	Combined entry / exit 6.0 to 9.0 metres wide.
6	Access connects to Merewether Street (left-in / left-out only), replicating an existing laneway between Hunter Street properties and the railway station. Access to Hunter Street is via Workshop Way roundabout.	Combined entry / exit 3.0 to 5.5m wide.
8	Left-in / left-out access to Merewether Street. Access from Hunter Street via Workshop Way roundabout.	Combined entry / exit 3.0 to 5.5m wide.
9	Site access via Argyle Street.	Combined entry / exit 3.0 to 5.5m wide.
20	Site access via Argyle Street. No access off Hunter Street.	Combined entry / exit 3.0 to 5.5m wide.
12	Site access via Argyle Street. No access off Hunter Street.	Combined entry / exit 6.0 to 9.0 metres wide.
15	Entry from Watt Street, exit to Wharf Road, similar to existing bus layover area access and egress arrangements. Final configuration to be confirmed at Development Application stage.	Access geometry to be confirmed at Development Application stage.

Generally, Council has indicated a strong preference to avoid vehicle crossovers on Hunter Street and Scott Street, hence rear access has been assumed.

4.3.2 Access to public transport

Each of the rezoning sites is well situated with regard to public transport. Table 4.4 details the approximate walking distances between each of the rezoning sites and public transport services in Hunter Street.

Table 4.4 Approximate distances to public transport

Parcel	Walking distance to Proposed Light Rail stop	Walking distance to Proposed Bus Stop
1 / 16	300 m (Civic)	240 m
3 / 18	150 m (Civic)	215 m
4 / 19	110m (Civic)	180 m
6	80 m (Civic)	190 m
8	190 m (Civic)	300 m
9	220 m (Crown Street)	60 m
20	210 m (Crown Street)	50 m
12	30 m (Crown Street)	160 m
16	230 m (Market Place)	10 m

Pedestrian access around each of the development sites will be facilitated by the public open space that is proposed, that will connect to the existing footpath network.

4.4 Parking provision

The Newcastle Development Control Plan (DCP) 2012 outlines requirements for car parking for various land use categories. Requirements relevant to this proposal are shown in Table 4.5.

Table 4.5 Newcastle DCP 2012 parking requirements

Land use	Car parking	Bike parking	Motorbike parking
Residential Accommodation (Attached Dwellings, Multi Dwelling Housing, Residential Flat Buildings, Shop Top Housing)	*(Refer to Note 1)* Small (<75 m^2 or 1 bedroom) average 0.6 spaces per dwelling Medium (75 m^2 - 100m^2 or 2 bedrooms) average 0.9 spaces per dwelling Large (>100 m^2 or 3 bedrooms) average 1.4 spaces per dwelling 1 space for the first 3 dwellings plus 1 space for every 5 thereafter or part thereof for visitors		
Office	1 space per 50 m^2 GFA	1 space per 200 m^2 GFA (Class 2)	1 space per 20 car spaces
Restaurant or Café	1 space per 6.5 m^2 GFA or 1 space per 3 seats	1 space per 100 m^2 GFA (Class 2)	1 space per 20 car spaces
Shops	1 space per 40 m^2 GLFA	1 space per 200 m^2 GFA (50% Class 2, 50% Class 3)	1 space per 20 car spaces

Note 1: Requirements are for the Newcastle City Centre and Renewal Corridors

The DCP also allows for departures from the above rates to be approved in certain circumstances, including:

- Shared use opportunities arising from the different hours of demand for various uses.
- Where a Green Travel Plan has been prepared and agreed between the Council and the owner / occupier.
- Access to public transport services, and likely modes of travel.
- Whether a car sharing scheme is proposed.
- Availability and accessibility of public parking facilities, including on-street and off-street spaces.
- Considering the impacts of providing on-site parking.

For these development sites, it is expected that the requirements on the DCP for on-site parking could be satisfied. However it is possible that within the framework of the DCP future Development Applications could propose reduce on-site parking provision primarily based on:

- Locality in the city centre and thus accessible to many different land uses.
- Access to public transport (see Section 4.3.2)
- Limited on-site capacity

There is also the possibility that future Development Applications could include shared use parking, a Green Travel Plan and/or car share schemes which could reduce parking demand. The final parking requirement will be determined at the development application stage following public exhibition.

Table 4.6 shows the number of spaces required by the DCP for each land parcel, based on the anticipated dwelling yield and proposed non-residential floor area.

Table 4.6 DCP parking requirements

Parcel	Proposed zone	DCP parking requirement (no discount)
1 / 16 *	B4 Mixed Use	236
3 / 18 *	B4 Mixed Use	146
4 / 19 *	B4 Mixed Use	67
6	B4 Mixed Use	64
8	B4 Mixed Use	67
9	B4 Mixed Use	53
12	B4 Mixed Use	90
20 *	B4 Mixed Use	59
Total		**781**

** Includes part outside existing rail corridor*

4.5 Traffic generation and distribution

Traffic generation rates for the proposed development sites has been estimated based on information provided in the NSW RMS Guide to Traffic Generating Developments 2013 Update, and agreed with Council and RMS.

The Guide does not provide rates for the Newcastle CBD specifically, and the adopted traffic generation rate is as stated in the Guide for an existing site at Charlestown. Data for this site has been adopted in preference to an average across several sites, or to an alternative site in Sydney or elsewhere. It provides a conservatively high estimate of traffic generation for the proposed rezoning, given the greater accessibility to activity centres and public transport in the CBD, relative to Charlestown.

For the purposes of estimating the traffic impacts of the proposed rezoning, the adopted traffic generation rates are conservatively based on the full number of parking spaces required by the DCP for each site. The adopted rates are shown in Table 4.7 and are higher than alternative trip generation rates determined by measures such as vehicle trips per unit or per bedroom. This allows for some flexibility in the ultimate development of each site, where a more intense land use may be proposed by the developer of each site. The current concept has an assumed mix of unit sizes, and commercial / retail floorspace, which determines the car parking requirements. This may change as more detailed planning is undertaken for each development site (post-rezoning).

It has been assumed that non-residential land uses will be largely ancillary to the residential components of the development, with parking provided for tenants only. Traffic generation has been based on the parking supply for residential and non-residential uses, as determined by the quantity and type of residential units, and the floor area for non-residential uses.

Table 4.7 Adopted traffic generation rates

	Sample site – Charlestown
AM Peak Vehicle Trips per car space	0.37
PM Peak Vehicle Trips per car space	0.40
Daily Vehicle Trips per car space	4.18

Source: NSW RMS Guide to Traffic Generating Developments 2013 Update, Appendix B3

Table 4.8, overleaf, summarises the estimated traffic generation for each of the development sites.

4.5.1 Traffic distribution

The traffic generated by each of the development sites, as detailed in Table 4.8, was distributed throughout the study area shown in Figure 1-2. The distribution was weighted by existing traffic volume, such that areas of already high traffic volumes contributed to more of the traffic generated by the development sites than those areas with currently low traffic volume.

To reduce the potentially unrealistic number of short trips that this distribution could create, only the areas south of King Street, north of the Honeysuckle Drive / Hannell Street intersection and West of Stewart Avenue were considered to be origins or destinations for the development traffic.

Table 4.8 Traffic generation summary

Parcel	Residential Units					Non-residential		DCP Parking Requirements (number)	Traffic Generation per car space per peak hour				
	Studio	1-bed	2-bed	3-bed	Total	Office GFA m^2	Retail GLFA m^2		AM - Inbound	AM – Outbound	PM - Inbound	PM – Outbound	Daily (2-way)
1 / 16	40	70	70	20	200	935	700	236	17	70	66	28	986
3 / 18	25	43	43	12	123	570	430	146	11	43	41	18	610
4 / 19	11	20	20	5	56	245	185	67	5	20	27	19	282
6	11	19	19	5	54	240	180	64	5	19	18	8	268
8	11	20	20	6	57	250	190	67	5	20	19	8	280
9	9	16	16	4	45	200	150	53	4	16	15	6	222
20	10	17	17	5	49	225	170	59	4	17	17	7	247
12	15	27	27	8	77	345	260	90	7	27	25	11	376
Total	**132**	**231**	**231**	**66**	**660**	**3,010**	**2,265**	**782**	**58**	**231**	**219**	**94**	**3271**

5. Assessment methodology

5.1 Microsimulation traffic model

The *Newcastle Urban Transformation and Transport Program* microsimulation model has been utilised to analyse the land rezoning proposed by UrbanGrowth NSW. The model has been developed using the Paramics microsimulation modelling package (version 6.7.2) with additional functionality provided by the CeeJazz suite of Plugins.

The modelling and assessment methodology has been agreed between UGNSW, TfNSW, Roads and Maritime Services and Newcastle City Council.

5.1.1 Previous modelling

GHD developed the NUTTP microsimulation model for Transport for NSW (TfNSW) to assess the traffic-related impacts associated with the implementation of light rail through the Newcastle City Centre. The model was based on a microsimulation traffic model for the Newcastle City Centre developed by Bitzios Consulting in 2009. An extensive update of the 2009 Newcastle City Centre microsimulation model was undertaken by GHD for existing traffic conditions (based on traffic surveys undertaken by SkyHigh in June 2014, prior to the truncation of the heavy rail line), with a further update based on traffic surveys undertaken by SkyHigh in March 2015 (post heavy rail truncation). The updated model was calibrated and validated according to the methodology set out in the Roads and Maritime *Traffic Modelling Guidelines, 2013.*

This model was developed in collaboration between TfNSW, Roads and Maritime Services and Newcastle City Council.

Project model conditions

The Newcastle Urban Transformation is assumed to coincide with the opening of the Light Rail Network in 2018. Therefore the base conditions assumed for the traffic modelling included the current proposed light rail network and estimated 2018 traffic conditions. The Light Rail network includes several changes to the road network, as outlined in Section 3.1.1.

The Implementation of the Light Rail has an impact on several key transport systems within the Newcastle area, including the bus, cyclist and pedestrian networks. These are addressed in the REF for the Light Rail project, which includes a suite of mitigation measures agreed between TfNSW, Roads and Maritime Services and Newcastle City Council. These measures have been incorporated into the modelling for this project where appropriate.

Modifications to Future Demand

Previous modelling (pre-Gateway) assumed traffic growth to 2028 as informed by the Public Transport Project Model (as supplied by TfNSW). Council and RMS have requested that for this project the traffic generation from specific developments, which were not known at the pre-Gateway stage, be included in place of previous assumptions about growth. Changes from the previous modelling are summarised in Table 5.1.

Table 5.1 Specific Development Traffic Generation Assumptions

Location	Development type	Current Estimate						Previous Estimate net change		Proposed Modelled Change	
		AM new trips	PM new trips	AM displaced trips	PM displaced trips	AM net change	PM net change	AM	PM	AM	PM
Wickham	Residential / commercial	67	73	8	8	59	64	-117	-118	62	68
Honeysuckle Drive	Residential / commercial	151	163	176	176	-25	-13	0	0	0	0
King Street (west)	Hotel / aged care facility / commercial	56	73	21	22	35	51	9	39	35	51
Courthouse	Commercial	87	94	87	94	0	0	44	41	44	41
Gibson St	Car park	256	256	0	0	256	256	40	39	256	256
Foreshore	Car Park	57	57	0	0	57	57	5	3	57	57

Note that the at the time of preparation of this assessment, few details of proposed University of Newcastle development between Wright Lane and Honeysuckle Place were available. However it has been assumed that this development would, like the other recent university development in the CBD, provide minimal car parking and make use of the high frequency bus services in the area, as well as the future light rail. Therefore the traffic generating impacts of this development are expected to be small.

5.2 Screenline volumes

For the purpose of assessing changes in traffic volumes as a result of the proposed rezoning, two screenlines have been established, each crossing Honeysuckle Drive / Wharf Road, Hunter Street and King Street. Screenline 1 is west of Union Street, while Screenline 2 is west of Darby Street. These are shown in Figure 5-1.

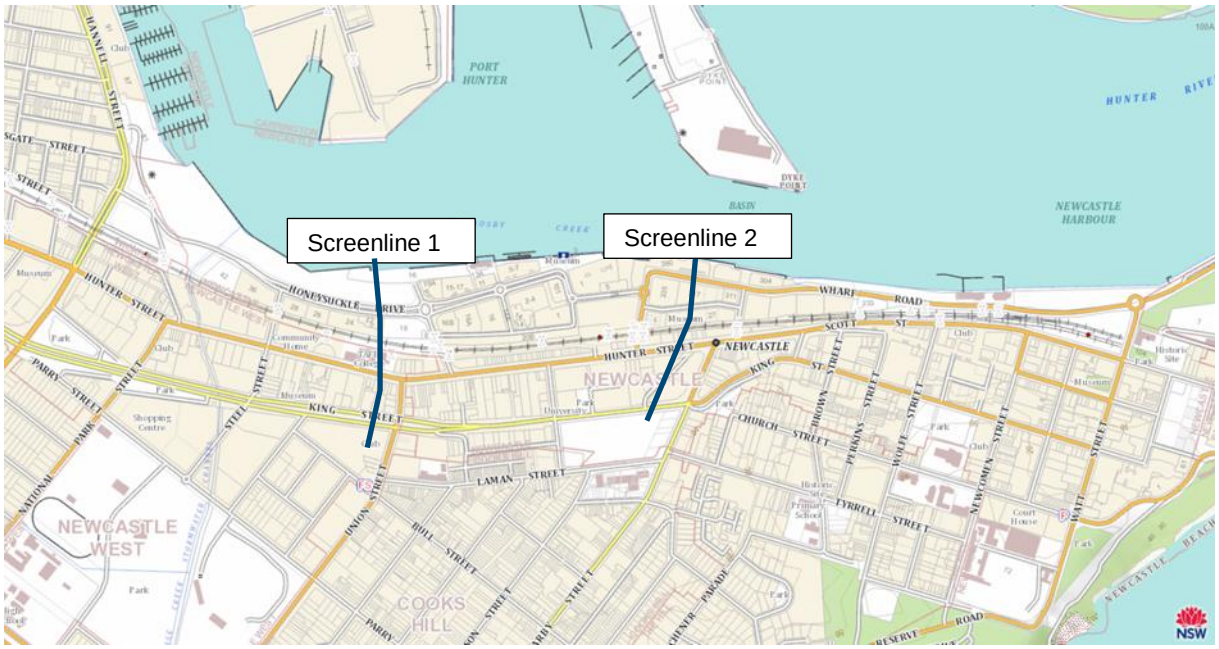


Figure 5-1 Screenline locations

Source: https://maps.six.nsw.gov.au/

5.3 Vehicle travel times

For the purpose of assessing changes in travel times as a result of the proposed rezoning, three routes through the network have been established, each on a major east/west route. Route 1 is vehicles travelling on Honeysuckle Drive, Route 2 is vehicles traveling on Hunter Street, while Route 3 is vehicles travelling on King Street. These are shown in Figure 5-2.

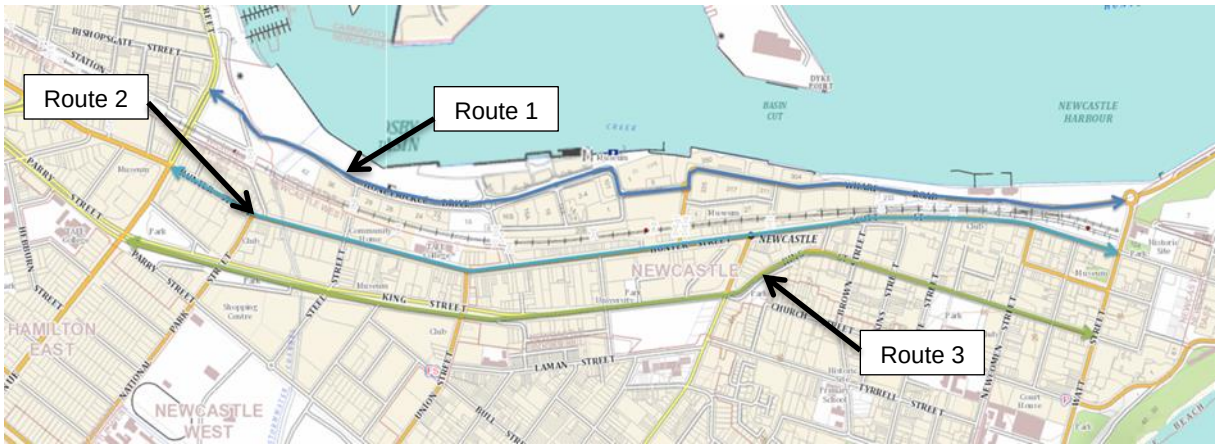


Figure 5-2 Travel route locations

Source: https://maps.six.nsw.gov.au/

5.4 Intersection performance

The assessment of intersection performance is based on criteria outlined in Table 5.2 as defined in the *Guide to Traffic Generating Developments* published by the NSW Roads and Maritime Services (RMS) in 2002. Intersection Levels of Service have been reported for the peak hour during the AM and PM peak periods (8 – 9 am and 5 – 6 pm).

Table 5.2 Intersection levels of service criteria for intersections

Level of service	Average delay per vehicle	Traffic signals and roundabouts	Give Way and Stop Signs
A	<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; Roundabouts will require other control mode	At capacity, requires other control mode
F	>70	Over capacity, unstable operation	Over capacity, unstable operation

Source: Guide to Traffic Generating Developments, NSW RTA (2002)

Intersections have been modelled using the SIDRA Intersection modelling software. Version 6.1 allows for the analysis of intersections in a network situation, where downstream effects of any queueing are taken into account.

5.5 Network performance

To complement the intersection performance measures detailed in Table 5.2 a measure of transport efficiency has been adopted from Austroads. Austroads provides typical level of service criteria as summarised in Table 5.3 based on travel efficiency. Level of service for motor vehicles can be measured in terms of speed for an urban street in addition to the average delay for intersections.

Table 5.3 Level of Service Criteria for urban streets

Level of Service	Urban Streets Travel speed as a percentage of free flow speed
A	> 85%
B	67 – 85%
C	50 – 67%
D	40 – 50%
E	30 – 40%
F	≤ 30%

Source: Austroads, 2013

Travel speeds on certain routes have been extracted from the Paramics microsimulation model.

6. Impact assessment

6.1 Road network impacts

General observations of the traffic network performance in the Paramics model did not show any significant decreases in performance within the road network as a result of the proposed rezoning. The observations indicated that the proposed rezoning caused minor localised increases in traffic activity, however these increases were not significant enough to cause any major issues or require additional mitigation measures.

6.1.1 Traffic volumes

Changes in peak hour traffic volumes on each screenline (refer Section 5.2) are shown in the following tables.

Table 6.1 2018 AM peak – Screenline 1 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	630	660	30	5%	410	460	50	12%
Hunter	640	650	10	2%	620	660	40	6%
King	1390	1420	30	2%	670	750	80	12%
Total	2660	2730	70	3%	1700	1870	170	10%

Table 6.2 2018 PM peak – Screenline 1 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	550	610	60	11%	680	720	40	6%
Hunter	520	550	30	6%	890	890	0	0%
King	1190	1220	30	3%	1140	1150	10	1%
Total	2260	2380	120	5%	2710	2760	50	2%

Table 6.3 2028 AM peak – Screenline 1 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	670	680	10	1%	420	480	60	14%
Hunter	710	770	60	8%	650	670	20	3%
King	1430	1480	50	3%	710	760	50	7%
Total	2810	2930	120	4%	1780	1910	130	7%

Table 6.4 2028 PM peak – Screenline 1 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	490	630	140	29%	720	740	20	3%
Hunter	520	530	10	2%	950	940	-10	-1%
King	1190	1220	30	3%	1330	1320	-10	-1%
Total	2200	2380	180	8%	3000	3000	0	0%

Table 6.5 2018 AM peak – Screenline 2 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	410	410	0	0%	60	60	0	0%
Hunter	430	490	60	14%	470	470	0	0%
King	740	780	40	5%	410	430	20	5%
Total	1580	1680	100	6%	940	960	20	2%

Table 6.6 2018 PM peak – Screenline 2 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	390	370	-20	-5%	80	90	10	12%
Hunter	570	570	0	0%	610	630	20	3%
King	670	650	-20	-3%	570	570	0	0%
Total	1630	1590	-40	-2%	1260	1290	30	2%

Table 6.7 2028 AM peak – Screenline 2 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	470	500	30	6%	60	60	0	0%
Hunter	450	550	100	22%	480	480	0	0%
King	760	770	10	1%	440	460	20	5%
Total	1680	1820	140	8%	980	1000	20	2%

Table 6.8 2028 PM peak – Screenline 2 volumes

Street	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
Honeysuckle	360	360	0	0%	80	80	0	0%
Hunter	560	590	30	5%	640	650	10	2%
King	680	670	-10	1%	630	640	10	2%
Total	1600	1620	20	1%	1350	1370	20	1%

These results show that changes in total traffic across each screenline are commensurate with the traffic generation from the proposed development sites. This analysis assumes that there isn't a significant volume of traffic switching from one route to another as a result of the additional traffic being added to the network.

6.1.2 Travel times

Changes in peak hour travel times on each route (refer Section 5.3) are shown in the following tables.

Table 6.9 2018 AM peak – Travel times

Route	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
1	03:15	03:17	0:02	1%	03:21	03:26	0:05	2%
2	04:54	05:02	0:08	3%	05:59	06:02	0:03	1%
3	04:53	04:52	-0:01	0%	06:51	07:51	1:00	15%

Table 6.10 2028 AM peak – Travel times

Route	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
1	03:17	03:19	0:02	1%	03:21	03:28	0:07	3%
2	04:59	05:17	0:18	6%	06:07	06:16	0:09	3%
3	06:07	05:54	-0:13	4%	07:10	08:16	1:06	15%

Table 6.11 2018 PM peak – Travel times

Route	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
1	03:29	03:30	-0:01	0%	04:06	04:35	0:29	12%
2	07:44	08:14	0:30	6%	05:57	05:58	0:01	0%
3	05:41	05:43	0:02	1%	06:10	06:13	0:03	1%

Table 6.12 2028 PM peak – Travel times

Route	Eastbound				Westbound			
	Base	With UGNSW	Change	% Change	Base	With UGNSW	Change	% Change
1	03:25	03:28	0:03	1%	04:50	04:26	-0:24	-8%
2	07:27	08:09	0:42	9%	06:08	06:27	0:19	5%
3	05:44	05:54	0:10	3%	07:44	08:34	0:50	11%

These results show that changes in travel times on each route, as a result of the increase in traffic generated by the proposed rezoning, are generally small. Analysing the efficiency of travel on these routes (see Section 5.5) the following table show that generally there is no

decrease in travel efficiency, with Levels of Service values remaining similar between base conditions and with the proposed rezoning.

Table 6.13 AM peak – Travel efficiency

Route	Eastbound				Westbound			
	2018		2028		2018		2028	
	Base	With UGNSW	Base	With UGNSW	Base	With UGNSW	Base	With UGNSW
1	92% [LoS A]	91% [LoS A]	91% [LoS A]	91% [LoS A]	90% [LoS A]	89% [LoS A]	90% [LoS A]	88% [LoS A]
2	63% [LoS C]	57% [LoS C]	63% [LoS C]	56% [LoS C]	52% [LoS C]	48% [LoS D]	47% [LoS D]	47% [LoS D]
3	66% [LoS C]	66% [LoS C]	49% [LoS D]	54% [LoS C]	46% [LoS D]	40% [LoS E]	42% [LoS D]	36% [LoS E]

Table 6.14 PM peak – Travel efficiency

Route	Eastbound				Westbound			
	2018		2028		2018		2028	
	Base	With UGNSW	Base	With UGNSW	Base	With UGNSW	Base	With UGNSW
1	88% [LoS A]	88% [LoS A]	89% [LoS A]	88% [LoS A]	71% [LoS B]	66% [LoS C]	64% [LoS C]	68% [LoS B]
2	39% [LoS E]	35% [LoS E]	40% [LoS E]	36% [LoS E]	52% [LoS C]	52% [LoS C]	47% [LoS D]	46% [LoS D]
3	55% [LoS C]	55% [LoS C]	55% [LoS C]	54% [LoS C]	49% [LoS D]	49% [LoS D]	40% [LoS D]	36% [LoS E]

6.1.3 Intersection operation

SIDRA Intersection software was used to review the individual intersection performance within the network. The results of the analyses are shown in the following tables.

Table 6.15 2028 AM peak – Intersection delay [level of service] (degree of saturation)

Intersection	Without UrbanGrowth Development Traffic	With UrbanGrowth Development Traffic
Stewart Avenue / Hunter Street	34 seconds [C] (0.74)	34 seconds [C] (0.74)
Stewart Avenue / King Street	50 seconds [D] (0.97)	50 seconds [D] (0.99)
Steel Street / Hunter Street	26 seconds [B] (0.43)	27 seconds [B] (0.48)
Steel Street / King Street	20 seconds [B] (0.72)	12 seconds [A] (0.78)
Union Street / Hunter Street	31 seconds [C] (0.49)	35 seconds [C] (0.53)
Union Street / King Street	50 seconds [D] (0.95)	58 seconds [E] (1.04)
Darby Street / Hunter Street	37 seconds [C] (0.89)	35 seconds [C] (0.89)
Darby Street / King Street	29 seconds [C] (0.73)	30 seconds [C] (0.74)

Table 6.16 2028 PM peak – Intersection delay [level of service] (degree of saturation)

Intersection	Without UrbanGrowth Development Traffic	With UrbanGrowth Development Traffic
Stewart Avenue / Hunter Street	31 seconds [C] (0.84)	40 seconds [C] (0.92)
Stewart Avenue / King Street	41 seconds [C] (0.93)	42 seconds [C] (0.92)
Steel Street / Hunter Street	35 seconds [C] (0.74)	35 seconds [C] (0.76)
Steel Street / King Street	28 seconds [B] (0.79)	28 seconds [B] (0.79)
Union Street / Hunter Street	26 seconds [B] (0.51)	26 seconds [B] (0.54)
Union Street / King Street	>70 seconds [F] (1.16)	>70 seconds [F] (1.20)
Darby Street / Hunter Street	34 seconds [C] (0.91)	51 seconds [D] (0.99)
Darby Street / King Street	35 seconds [C] (0.79)	37 seconds [C] (.83)

The results show that in most cases intersection performance remains generally steady with the inclusion of the proposed rezoning. It is noted that some of the variation in performance measures between scenarios is due to changes in signal phasing, and the resulting changes in relative capacity on each approach.

6.1.4 Local traffic impacts

Local areas will not be adversely impacted by the proposed rezoning, with the majority of traffic generated from the developments travelling to/from the major roads of Hunter Street, King Street, Union Street, Darby Street and Hannell Street.

6.2 Public transport

As discussed in Section 3.2, major changes to existing bus services in the CBD are proposed to coincide with the introduction of Light Rail. Changes will include bus route terminus locations, and changes to bus stops in Hunter Street.

Any changes to bus operations in the CBD are independent of, and are not required to facilitate, the proposed rezoning.

6.3 Pedestrians and cyclists

The proposed development sites will enhance the public open space surrounding each site, with retail land uses activating building frontages to provide increased opportunity for movement, recreation and service transactions.

The closure of the heavy rail service has allowed at-grade pedestrian access to be provided at several locations across the former rail corridor. Table 6.17 summarises the existing and proposed pedestrian infrastructure for movement between the Newcastle CBD, across Hunter Street / Scott Street, across the former heavy rail corridor, and across Honeysuckle Drive / Wharf Road to the waterfront.

Table 6.17 Pedestrian access between CBD and waterfront

Location	Hunter Street / Scott Street crossing	Former Rail Corridor Crossing	Honeysuckle Drive / Wharf Road crossing
Steel Street	Existing traffic signals	At-grade crossing of Light Rail	Uncontrolled crossing, pedestrian refuge in median.
Kuwami Place	No formal pedestrian provision	At-grade crossing at Light Rail stop	Uncontrolled crossing, pedestrian refuge in median.
Worth Place	New signalised intersection as part of Light Rail project	At-grade crossing of Light Rail	Uncontrolled crossing, pedestrian refuge in median.
Civic Link	New signalised crossing at Light Rail stop	Public open space	Pedestrian (zebra) crossings of Workshop Way.
Merewether Street	Existing traffic signals	Existing Merewether Street footpaths	Pedestrian (zebra) crossing of Workshop Way.
Argyle Street	Existing traffic signals at Darby Street	Public access through development site	Existing pedestrian (zebra) crossing with refuge island.
Perkins Street	TBC	Public open space	Existing pedestrian (zebra) crossing.
Wolfe Street	TBC	Public open space	Existing pedestrian (zebra) crossing to be relocated to Market Street.
Market Street	New signalised crossing at Light Rail stop	Public open space	Relocated pedestrian (zebra) crossing.
Newcomen Street	TBC	Public open space	Pedestrian (zebra) crossings at Market Street and west of Watt Street.
Watt Street	Existing traffic signals	Existing Watt Street footpaths	Existing pedestrian (zebra) crossing east of Watt Street.

Civic Link will be a particular focus of pedestrian connectivity, with pathways connecting between Hunter Street and the foreshore. A light rail stop is proposed for Hunter Street adjacent to Civic Link, with a signalised pedestrian crossing linking the footpath with the light rail platforms.

Footpaths would be maintained alongside existing roadways.

The proposed rezoning would have no impact on existing bicycle infrastructure including on-road bike lanes and off-road pathways.

6.4 Parking

The proposed rezoning will not directly impact on any existing off-street public parking. However, two existing off-street parking areas are on land adjacent to the rezoning that is also likely to be redeveloped (Parcels 16-19). There are currently 189 spaces off Wrights Lane, with a mixture of 2 hour, 4 hour and 8 hour restrictions (pay and display).

The Newcastle Transport Program Parking Strategy (see Section 3.4) considered the implications of the removal of these spaces in its assessment. The Wrights Lane parking areas represent 16% of the total number of spaces to be removed in the near future as a result of the Light Rail project and various development sites.

The Parking Strategy concludes that the overall net loss of parking supply, including the 189 spaces affected by this proposal, is manageable in the context of broader objectives of parking demand management and increased public transport use.

7. Conclusions

This study has examined the traffic implications of the proposed rezoning of the previous heavy rail corridor through the Newcastle CBD.

The proposed rezoning would provide for several mixed-use sites, as well as sites for public recreation. For the purpose of this assessment the rezoning application includes the assumed potential for some 440 residential units, and 4,040 m^2 Gross Floor Area of non-residential land use (most likely office and/or retail). Development on three adjacent and related sites, which do not form part of the rezoning application, has also been considered in this assessment.

Key findings of the assessment include:

- The proposed rezoning would generate up to an additional 3,300 vehicle movements (2-way) each day across all the development sites. This is expected to be an overestimate of actual generation, with a high mode share to public and active transport expected due to the locations of the development sites relative to light rail, bus services and the Newcastle CBD and Honeysuckle activity areas.
- Traffic modelling indicates that for forecast peak hour traffic conditions in 2018 and 2028, the additional traffic generated by the rezoning will not have a significant impact on the operation of the road network. The mitigation measures proposed as part of the light rail project will be sufficient to manage the changes in traffic conditions that are expected.
- On-site parking would be provided on each development site in accordance with the requirements of the Newcastle Development Control Plan 2012. The DCP allows for variation in parking provision for reasons including access to public transport, and a reduction in parking supply may be considered at the Development Application stage for each site.
- A Parking Strategy, developed by TfNSW, has considered the cumulative impacts of the Light Rail project, this current proposal and various developments sites on public parking supply. A net loss of 407 spaces is expected, which would increase overall peak occupancy to 81% with current demand levels. The Strategy recommends demand management, rather than demand satisfaction, as the most appropriate approach into the future. The Parking Strategy concludes that the overall net loss of parking supply, including the 189 spaces affected by this proposal, is manageable in the context of broader objectives of parking demand management and increased public transport use.
- The proposal would maintain and enhance pedestrian connectivity between the CBD and the waterfront. The proposed development sites will enhance the public open space surrounding each site, with retail land uses activating building frontages to provide increased opportunity for movement, recreation and service transactions.

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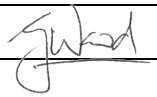
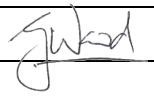
4	T. Bickerstaff	G. Wood		G. Wood		23/03/2017

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