

# Newcastle Light Rail Extension Strategic Business Case

Summary Report

This report has been prepared by Transport for NSW and is a summary of the Newcastle Light Rail Extension Strategic Business Case (V0.95) prepared by Corview.

# Contents

<b>1</b>	<b>Executive Summary</b>	<b>1</b>
1.1	Greater Newcastle Future Transport Plan	1
1.2	Newcastle Light Rail Stage 1	2
1.3	Greater Newcastle	2
1.4	Newcastle Light Rail Strategic Business Case	2
1.5	Recommended next steps	3
<b>2</b>	<b>Introduction</b>	<b>5</b>
2.1	Global and regional significance of the Greater Newcastle	5
2.2	Prioritised corridors	7
2.3	Purpose	7
2.4	Project vision and objectives	8
2.5	Study Area	8
<b>3</b>	<b>Alignment to Government Priorities</b>	<b>10</b>
3.1	Strategic Business Case land use planning and transport context	10
3.2	Alignment to Government Priorities	14
3.3	Federal Strategic Policy Context	16
3.4	NSW Strategic Policy Context	16
3.5	Local Government Strategic Policy Context	18
<b>4</b>	<b>Need for Investment</b>	<b>21</b>
4.1	The overarching need to enable a competitive and attractive city	21
4.2	Need to define and reshape Greater Newcastle	23
4.3	Need to improve network visibility and reflect demand	25
4.4	Need to manage future growth and deliver infill housing	28
4.5	Need to promote economic connectivity and tourism development	33
<b>5</b>	<b>Options assessment</b>	<b>35</b>
5.1	Overview	35
5.2	Corridor selection process	36
<b>6</b>	<b>Corridor Options Definition</b>	<b>39</b>
6.1	Overview	39
6.2	The role of Light Rail	40
6.3	Light rail service and infrastructure assumptions	40
6.4	Scope/overview of Four Alignment	41
6.5	Depot	46
6.6	Operations/Rolling Stock	46
<b>7</b>	<b>Economic Appraisal</b>	<b>47</b>
7.1	Economic Appraisal Framework	47

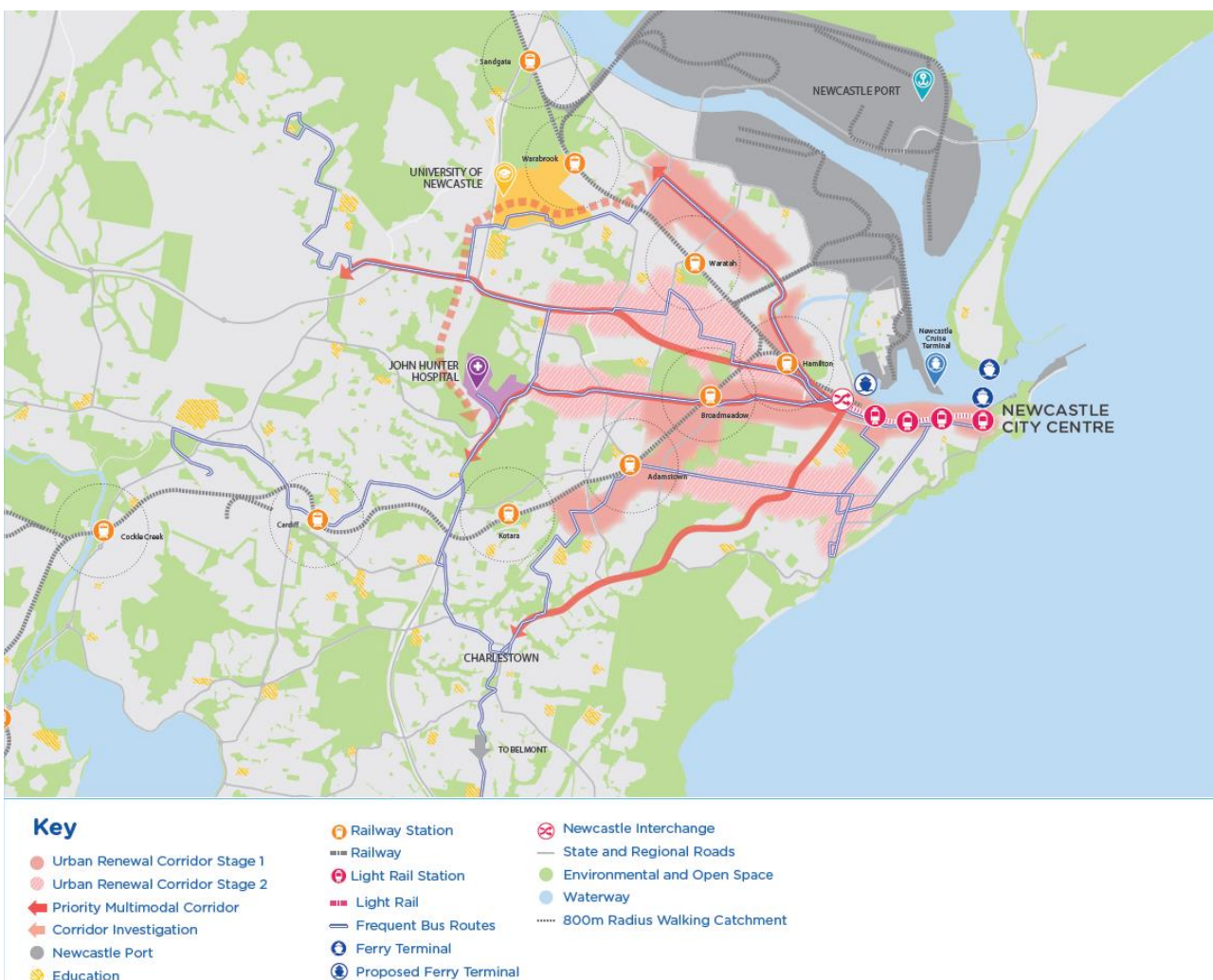
7.2	Benefit framework and link to the need for investment	47
7.3	Transport Modelling and Patronage	48
7.4	Cost Benefit Analysis	49
7.5	Assessment of Qualitative Benefits	50
<b>8</b>	<b>Financial analysis and affordability</b>	<b>52</b>
8.1	Overview	52
8.2	Financial methodology	52
8.3	Key financial appraisal assumptions	52
8.4	Project Costs	53
8.5	Project Revenues	53
<b>9</b>	<b>Corridor Assessment Framework Results</b>	<b>54</b>
9.1	Overview	54
9.2	Results by Corridor	54
9.3	Preferred Corridor for Future Extension	59
<b>10</b>	<b>Conclusion and next steps</b>	<b>60</b>

# 1 Executive Summary

## 1.1 Greater Newcastle Future Transport Plan

The Greater Newcastle Future Transport Plan identifies extending Newcastle light rail as a 0-10 year initiative for investigation. The Plan identifies four priority corridors below:

- Newcastle Interchange to Broadmeadow/Broadmeadow to John Hunter Hospital.
- Newcastle Interchange to Wallsend.
- Newcastle Interchange to Mayfield.
- Newcastle Interchange to Charlestown.



Source: Greater Newcastle Metropolitan Plan 2036, p41

The four priority corridors were shortlisted from seventeen corridors investigated across Greater Newcastle and its strategic centres for investment in priority public transport over the next 10 years. Corridors investigated included connections to Newcastle Airport, University of Newcastle, John Hunter Hospital, Broadmeadow as well as other key destinations.

The Plan identifies introducing bus priority measures in the short and medium term can increase journey speed and reliability delivering more rapid bus services with potential for light rail in the long term depending on demand. For customers, this will result in improved connectivity between Greater Newcastle's centres and increased accessibility to opportunities like jobs, health care, education and sports facilities.

This Report provides a summary of the Strategic Business Case (SBC) investigations of extensions to Newcastle light rail.

## **1.2 Newcastle Light Rail Stage 1**

Newcastle Light Rail Stage 1 (the Project) was opened in February 2019, which is a key part of the Revitalising Newcastle project delivered by Transport for NSW. The high capacity, frequent and reliable service operates along 2.7km route with 6 stops from Newcastle Interchange in Wickham to Newcastle Beach in the east end, connecting key activity precincts and opening up great urban renewal opportunities.

The Project has already delivered catalytic change and re-shaped Newcastle City Centre, enhanced the public domain around the civic, entertainment and tourism precincts, connected Honeysuckle with the commercial core and catalysed investment - including at the City Campus of Newcastle University.

Stage 1's focus on connecting and revitalising the Newcastle City Centre and waterfront has paved the way to extend the light rail system to encourage growth in surrounding precincts. An SBC is the next step in investigating public transport access improvements in Greater Newcastle, and assesses the suitability of extending light rail along four shortlisted transport corridors to allow Greater Newcastle to reach its full strategic and economic potential.

## **1.3 Greater Newcastle**

Greater Newcastle is regional Australia's global gateway<sup>1</sup>, the second largest city in NSW, and is the key metropolitan hub in the prosperous Hunter Region. The Hunter Region is Australia's largest regional economy<sup>2</sup> and drives 28% of regional NSW's total economic productivity. The population of Greater Newcastle is growing, especially in the residential areas of Broadmeadow, Adamstown, Kotara and Charlestown and Glendale. By 2036, 117,000 new residents will call Greater Newcastle home, and it is projected to grow to around 760,000 by 2056, making it home to more people than the state of Tasmania or the Australian Capital Territory. The Greater Newcastle economy is also diversifying from its historical industrial uses and reliance on coal exports to a more knowledge and service-based economy.

There is a compelling need to continue to invest and grow Greater Newcastle as a competitive and attractive city. The NSW Government recognises the region's potential and is investing into growing existing and encouraging new strategic centres, lifestyle precincts and specialist employment industries.

## **1.4 Newcastle Light Rail Strategic Business Case**

TfNSW has undertaken investigations to prepare a draft Strategic Business Case to extend Newcastle light rail. These investigations have included engagement with key stakeholders including

---

<sup>1</sup> NSW Government, 2018, *The Port of Newcastle – Australia's largest east coast port*, Source:<https://www.investregional.nsw.gov.au/news/the-port-of-newcastle-australias-largest-east-coast-port/>, Accessed: 5 November 2018  
<sup>2</sup> Department of Planning and Environment, 2018, *Hunter Regional Plan*, Source:<https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/Hunter/Hunter-regional-plan/The-leading-regional-economy-in-Australia>, Accessed 29 October 2018

Newcastle City Council, Lake Macquarie City Council, Transport Newcastle (Keolis Downer), Department of Planning and Environment, Hunter and Central Coast Development Corporation, Health Infrastructure and Roads and Maritime Authority.

The investigations defined a preferred transport corridor consistent with the evaluation criteria from previous route evaluation frameworks for recent light rail and heavy rail frameworks within TfNSW.

This concluded that the Newcastle City to John Hunter Hospital via Broadmeadow option is the most suitable corridor for further assessment and development in the next Project stage.

The investigations concluded that the John Hunter Hospital corridor:

- Facilitates development of the Broadmeadow Urban Renewal and Entertainment Precinct, and the John Hunter Hospital redevelopment.
- Has the highest baseline employment growth of 1.15% per annum growth (compounded), significantly greater than the Project Study Area (0.88%), without taking into account potential uplift by the Broadmeadow and John Hunter Hospital precincts.
- Supports existing development precincts. The corridor also links, and potentially fast-tracks the development of, 14,146 total new infill housing capacity.
- Supports the urgent need for public transport connectivity to the John Hunter Hospital, and has the highest projected ridership, peak loadings and transport benefits.
- Is the best performing corridor on economic evaluation results.

The corridor assessment results, in particular the economic appraisal, highlight that there is no urgent need to extend Newcastle light rail.

Newcastle City Centre is undergoing land use and precinct transformation, enabled by the Project and this transformation may still take several years to realise. The need for investment to infill housing and precinct development, may not eventuate in the shorter term (less than 10 years). There are significant merits in providing public transport connectivity between Newcastle City Centre, Broadmeadow and John Hunter Hospital precincts. Further work is required to refine the preferred land use outcomes along the preferred corridor and capture additional benefits while ensuring the focus of renewal remains on Newcastle CBD for the meantime.

A logical first extension of light rail to John Hunter Hospital is to the Broadmeadow to support urban renewal precinct enabling its transformation.

There is opportunity to implement bus solutions in the shorter term prior to a light rail extension being considered for the John Hunter Hospital via Broadmeadow corridor. Dedicated bus corridors have the potential to be converted to light rail corridors in the future. This investment in public transport will deliver early community benefits and support planned growth.

## **1.5 Recommended next steps**

- Inform the stakeholders and community on the outcome of the Newcastle Light Rail Extension Strategic Business Case investigations.
- Continue to monitor challenges and opportunities over the short term to inform the timing of further detailed investigations and update of draft Strategic Business Case with particular consideration to the following key inputs:

- Changes in population and employment growth in Greater Newcastle, particular along the preferred corridor.
- Broadmeadow Sports and Education urban renewal precinct
- John Hunter Hospital redevelopment
- Newcastle Inner City Bypass
- Newcastle Bus Interchange
- Patronage on Newcastle light rail stage 1
- Changes in public transport
- Continue to deliver the other public transport improvements identified in the Greater Newcastle Future Transport Plan
  - 0-10 year committed projects include new train intercity fleet and Road improvements.
  - 0-10 year initiatives for investigation include Rapid Bus Package, Bus Headstart, Faster rail and On-demand.



## 2 Introduction

### Summary

- The population of Greater Newcastle is growing, especially in the residential areas of Broadmeadow, Adamstown, Kotara and Charlestown and Glendale.
- The Greater Newcastle economy is diversifying from its historical industrial uses and reliance on coal exports to a more knowledge and service-based economy.
- To support Greater Newcastle's role as one of NSW's key Global Gateway Cities, its transport network needs to shift towards a more metropolitan style transport network. Greater Newcastle's globally competitive, regionally significant and city-shaping assets also need connecting.
- Stage 1's focus on connecting and revitalising the Newcastle City Centre and waterfront has set the foundation to extend the light rail system to encourage growth in surrounding precincts in the future.
- This Summary Report is the next step in investigating public transport access improvements in Greater Newcastle, and assesses the suitability of extending light rail along four shortlisted transport corridors over the medium to long term.

### 2.1 Global and regional significance of the Greater Newcastle

Greater Newcastle is regional Australia's global gateway<sup>3</sup>, the second largest city in NSW, and is the key metropolitan hub in the prosperous Hunter Region. The Hunter Region is Australia's largest regional economy<sup>4</sup>, drives 28% of regional NSW's total economic productivity, and has a higher economic output than the Northern Territory, Tasmania and the Australian Capital Territory.<sup>5</sup>

Greater Newcastle's population is growing. By 2036, 117,000 new residents will call Greater Newcastle home. Up to 2036, infill housing is targeted to account for 60% of all new dwelling growth, with the strongest population growth forecast to occur in the Newcastle City Centre and the residential areas of Broadmeadow, Adamstown, Kotara and Charlestown and Glendale.

The economy of Greater Newcastle and the Lower Hunter is diversifying. Its historical industrial economy is expanding to knowledge, creative and service-based industries. Defence's contribution to the regional economy is also growing.<sup>6</sup> Defence programs such as Joint Strike Fighter and Land 121 will contribute to the economy of Greater Newcastle, engaging the manufacturing, electronics and professional services industries.

<sup>3</sup> Regional NSW, *The Port of Newcastle – Australia's largest east coast port*, Source: <https://www.investregional.nsw.gov.au/news/the-port-of-newcastle-australias-largest-east-coast-port/>, Accessed 5 November 2018

<sup>4</sup> Department of Planning & Environment, *Hunter Regional Plan*, Source: <https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/Hunter/Hunter-regional-plan/The-leading-regional-economy-in-Australia> <https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/Hunter/Hunter-regional-plan/The-leading-regional-economy-in-Australia>, Accessed: 5 November 2018

<sup>5</sup> Department of Planning & Environment, *Hunter Regional Plan*, Source: <https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/Hunter/Hunter-regional-plan/The-leading-regional-economy-in-Australia> <https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/Hunter/Hunter-regional-plan/The-leading-regional-economy-in-Australia>, Accessed: 5 November 2018

<sup>6</sup> [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0011/98624/NSW-Strong-smart-and-connected-defence-strategy.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0011/98624/NSW-Strong-smart-and-connected-defence-strategy.pdf)

The Port of Newcastle is the world's biggest coal exporter. In 2016, 96% of the port's overall trade was in coal<sup>7</sup>, which was 62% of NSW total export volumes of coal.<sup>8</sup> The government is considering strategies to actively diversify exports and create a resilient regional economy<sup>9</sup>. This includes opening the region to tourism through a new cruise terminal<sup>10</sup>, and investing in Newcastle Airport to meet increasing business travellers, tourists and other air passengers.<sup>11</sup>

The NSW Government recognises that the region is well placed to benefit from macroeconomic and geo-economic trends, such as a growing population and strategic connectivity to the Asia-Pacific region.<sup>12</sup> The Government is investing into Greater Newcastle as a nationally significant city, by growing existing and encouraging new strategic centres, lifestyle precincts and specialist employment centres.

Some 160km north of Sydney, Greater Newcastle is a favourite weekend getaway, with access to the world-class Hunter Valley wineries, beaches at Greater Newcastle and Port Stephens, and world, state and local significant heritage sites such as the Barrington Top rainforest and the Historic Newcastle city centre. Important Aboriginal heritage sites are also in the region, with the Awakakal and Worimi peoples acknowledged as the traditional custodians of the land and waters of Greater Newcastle.

The Hunter received 3.6m domestic overnight visitors in 2017, representing 16.3% of all domestic visitors to regional NSW.<sup>13</sup> In 2015/16, 10 cruise ships, or some 14,000 passengers, docked into Greater Newcastle – this number will almost double to 18 ships in 2017/18.<sup>14</sup> Tourism's contribution to Greater Newcastle's economy will continue to grow.

Greater Newcastle is also home to both regional and city-scale assets which are key trip generators. In 2017, the John Hunter Hospital serviced over 900,000 people, had 3,408 full-time equivalent staff and an expenditure budget of over 600m.<sup>15</sup> Stage 2 of the NSW Government's \$18m<sup>16</sup> John Hunter Hospital renovated Neonatal Intensive Care Unit (NICU) also opened in mid-2018.

The Hunter Sports & Entertainment Precinct, under the management of Venues NSW, is a world class sporting facility that hosts both domestic and international matches, including Asian Cup matches and Grand Master Hockey World Cup.<sup>17</sup>

Greater Newcastle's role as one of NSW's key Global Gateway Cities is not currently supported by a regional or city-wide, coherent transport network. Its globally competitive, regionally significant and regional and city-shaping assets are not well connected.

---

<sup>7</sup> Financial Times, 2017, *World's biggest coal port looks to life after fossil fuels*, Source:<https://www.ft.com/content/e1453830-e2f4-11e7-97e2-916d4fbac0da>, Accessed 20 October 2018

<sup>8</sup>Transport for NSW, 2018, *Greater Newcastle Future Transport Plan*, Source:[https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater\\_Newcastle\\_Future](https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater_Newcastle_Future)

<sup>9</sup> Financial Times, 2017, *World's biggest coal port looks to life after fossil fuels*, Source:<https://www.ft.com/content/e1453830-e2f4-11e7-97e2-916d4fbac0da>, Accessed 20 October 2018

<sup>10</sup> Transport for NSW, 2018, *Greater Newcastle Future Transport Plan*, Source:[https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater\\_Newcastle\\_Future](https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater_Newcastle_Future)

<sup>11</sup> Newcastle Airport, 2018, *2036 Newcastle Airport Vision*, Source:<https://www.newcastleairport.com.au/corporate/about/masterplan>

<sup>12</sup> Department of Planning and Environment, 2018, *Hunter Regional Plan*, Source:<https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/Hunter/Hunter-regional-plan/The-leading-regional-economy-in-Australia>, Accessed 29 October 2018

<sup>13</sup> Transport for NSW, 2018, *Greater Newcastle Future Transport Plan*, Source:[https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater\\_Newcastle\\_Future](https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater_Newcastle_Future), Accessed 20 October 2018

<sup>14</sup> Transport for NSW, 2018, *Greater Newcastle Future Transport Plan*, Source:[https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater\\_Newcastle\\_Future](https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Greater_Newcastle_Future)

<sup>15</sup> Hunter New England Local Health District, *Hunter New England Population Health*, Source:[www.hnehealth.nsw.gov.au/hneph/Pages/HNE-Population-Health.aspx](http://www.hnehealth.nsw.gov.au/hneph/Pages/HNE-Population-Health.aspx), Accessed 5 November 2018

<sup>16</sup> Estimated total cost according to <https://www.budget.nsw.gov.au/my-budget>

<sup>17</sup> Newcastle Herald, *Novocastrians deserve a world-class precinct*, Source:<https://www.theherald.com.au/story/5378751/novocastrians-deserve-world-class-precinct/>, Accessed: 20 October 2018

Greater Newcastle's future transport network needs to support its changing population and employment trends, customer needs and choices, as well as reinforce its growing regional and global economic importance.

"After a successful period of economic restructure, increased investment and enhanced lifestyle opportunities, Greater Newcastle is emerging as one of Australia's most dynamic and vibrant metropolitan cities".

### ***Greater Newcastle Metropolitan Plan 2036***

## **2.2 Prioritised corridors**

- In November 2017, TfNSW commissioned the Newcastle Transport Network Plan (NTNP) in response to increasing demand for travel within the region.
  - The NTNP had multiple deliverables. Deliverables 1 and 2 identified 18 corridors to support and complement Stage 1.
  - These corridors were chosen to provide customers with modern transport options and unlock key corridors for future urban development.
  - The NTNP shortlisted the 18 into four corridors for further investigation:
    - Newcastle Interchange to Broadmeadow/Broadmeadow to John Hunter Hospital.
    - Newcastle Interchange to Wallsend.
    - Newcastle Interchange to Mayfield.
    - Newcastle Interchange to Charlestown.
- In March 2018, the TfNSW *Greater Newcastle Future Transport Plan* (Future Transport Plan) gave an overarching strategic transport network vision, guiding future transport planning for Greater Newcastle up to 2056.
- In September 2018, DP&E implemented the vision for a revitalised Greater Newcastle through the *Greater Newcastle Metropolitan Plan* (Metro Plan).
  - The Metro Plan proposed four key urban renewal corridors, prioritised based on their development feasibility and potential to be supported by public transport improvements in the short term.
  - The Metro Plan proposed investigations into light rail extensions within priority multi-modal corridors.
  - The Metro Plan found that although light rail can expand labour markets, link disconnected areas and unlock new land, it needed support from intensified land use and increases in housing and jobs in the metro core.

## **2.3 Purpose**

This Summary Report is the next step in improving public transport access in Greater Newcastle. Out of the four shortlisted corridors, this Summary Report will assess the suitability of a light rail extension in the medium to long term for one and/or multiple corridors.

## 2.4 Project vision and objectives

The Project vision and objectives reflect the values of the Metro Plan and Future Transport Plan.

**Vision:** *To support Greater Newcastle as a dynamic and entrepreneurial economy and lifestyle city, with a customer centric, multi-modal network that further enables and activates Greater Newcastle.*

**Table 1** Project objectives

Objective	Statement
<b>Support a new economy</b>	Support workforce and education opportunities for the new economy
<b>Enhance the environment</b>	Enhance environment, amenity and resilience for quality of life
<b>Open opportunity</b>	Support housing close to jobs and services
<b>Improve access</b>	Provide multi-modal connectivity to jobs, services and recreation

The Project objectives align with the strategic planning and strategic transport context as summarised in Table 2.

**Table 2** Newcastle Light Rail Extension Business Case Objective Alignment

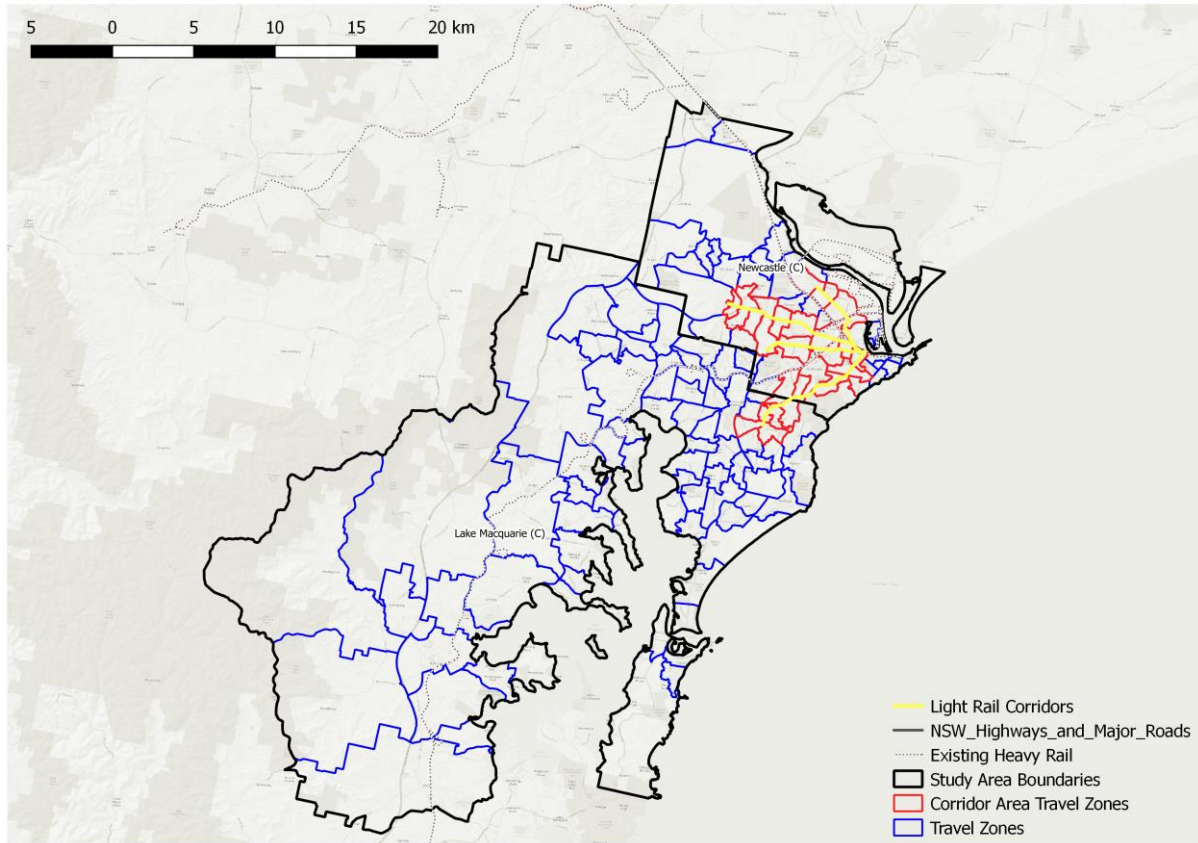
Objectives of this SBC	Strategic Planning Objectives 'Metro Plan'	Strategic Transport Objectives 'Future Transport Plan'
<b>Support a new economy</b>	Create a workforce skilled and ready for the new economy	Supporting centres and creating economic development through transport services
<b>Enhance the environment</b>	Enhance environment, amenity and resilience for quality of life	Activate land-use and environment to help create better places
<b>Open opportunity</b>	Enable housing close to jobs and services	Accessibility and opportunity to employment and services
<b>Improve access</b>	Improve connections to jobs, services and recreation	Connect a growing Greater Newcastle to employment centres and recreational events

## 2.5 Study Area

The Project Study Area includes all of the Newcastle and Lake Macquarie Local Government Areas (LGAs), and is also known as 'Inner Greater Newcastle'.

The Project Study Area in Figure 1 includes four prioritised transport corridor study areas, made up of individual travel zones (TZs) (marked in red). The Project Study Area definition is consistent with the 'Metro Core' (the 'middle ring') defined in the Metro Plan, with an addition of areas in the South West of Lake Macquarie Local Government Area (LGA).

**Figure 1** The Newcastle Light Rail Extension Project Study Area



Source: Corview, 2018



# 3 Alignment to Government Priorities

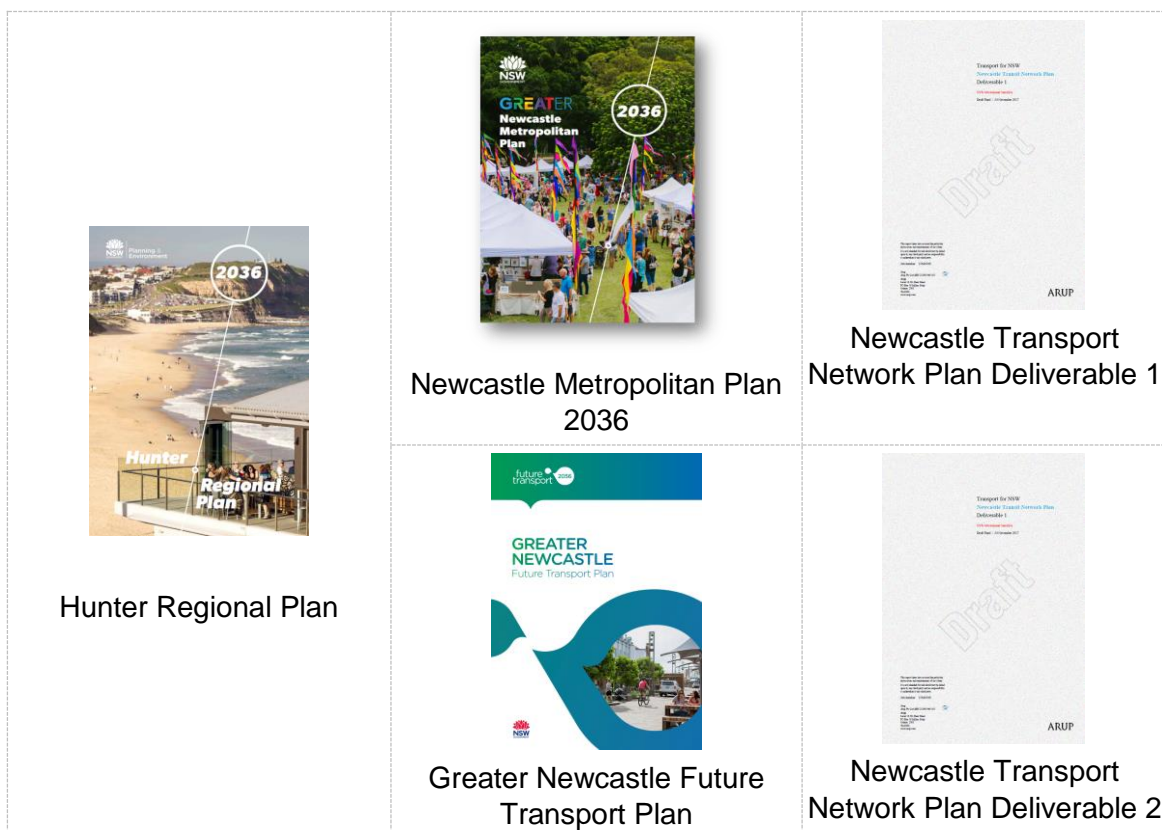
## Summary

- The Greater Newcastle Metropolitan Plan 2036, Greater Newcastle Future Transport Plan and Newcastle Transport Network Plan are the main land use planning and transport context guiding the SBC.
- The SBC aligns to and delivers on policies, strategies and plans at all levels of government.

### 3.1 Strategic Business Case land use planning and transport context

This SBC is consistent with the strategic planning and transport documents in Figure 2. These documents evaluate developing multi-modal corridors in Greater Newcastle.

**Figure 2** Strategic planning and transport context



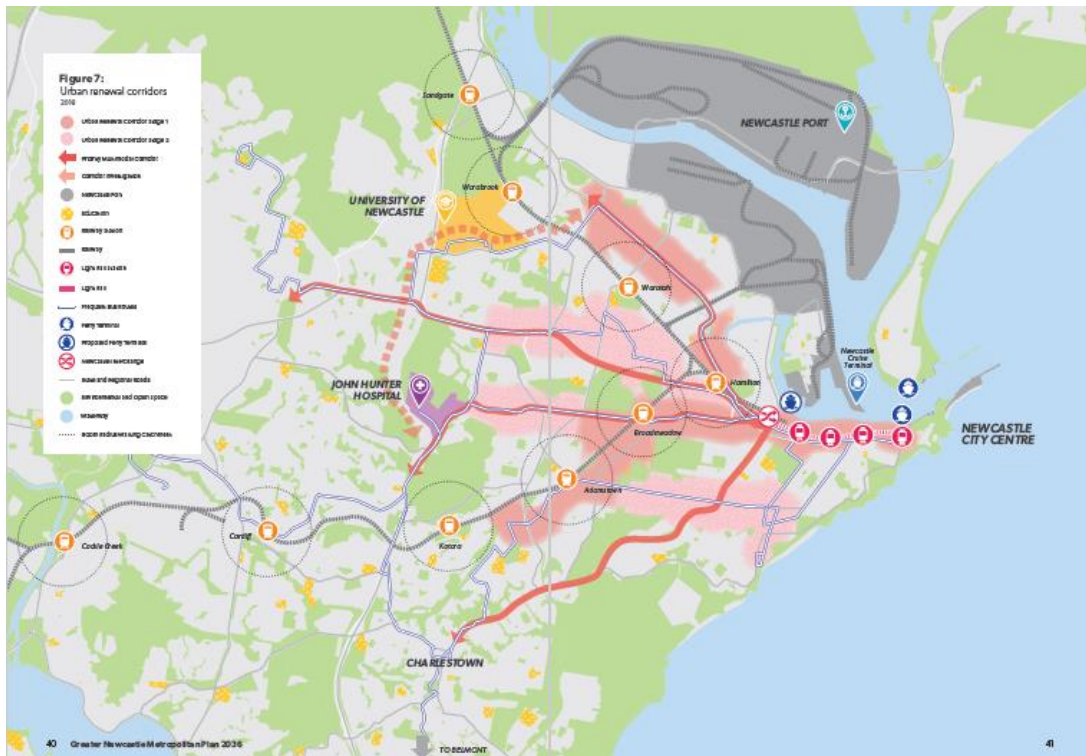
The Greater Newcastle Metropolitan Plan 2036 and the Newcastle Transport Network Plan are the main land use planning and transport context guiding the SBC.

#### 3.1.2 Greater Newcastle Metropolitan Plan

The strategic planning framework guiding the growth and development of Greater Newcastle is the Metro Plan. The plan identified the four priority multi-modal corridors (Figure 3) that are evaluated as part of the Strategic Merit Test in Chapter 4: Mode Assessment and Corridor Evaluation Framework.

The Metro Plan also prioritises the urban renewal corridors into two stages, as well as connections to major education/employment nodes, including the John Hunter Hospital.

**Figure 3** Urban Renewal Corridors Identified in the Metro Plan



Source: Greater Newcastle Metropolitan Plan 2036 (p.41)

The Metro Plan outlines four key outcomes, which collectively contain 23 strategies to deliver on the outcomes. The Project is aligned with seven of these strategies.

**Table 3** Alignment to Greater Newcastle Metropolitan Plan

Strategy	Alignment
<b>Outcome 1: Create a workforce skilled and ready for the new economy</b>	
<b>Strategy 4</b> - Grow health precincts and connect the health network	<ul style="list-style-type: none"> <li>The Metro Plan states the Local Health District will finalise its plans to grow the John Hunter Health Precinct and connect the region's health network, whilst progressing plans to develop the new Maitland Hospital.</li> </ul>
<b>Strategy 6</b> - Promote tourism, major events and sporting teams on the national and international stage	<ul style="list-style-type: none"> <li>The NSW Government will promote Greater Newcastle for its high amenity, natural environment, heritage and lifestyle.</li> <li>The Metro Plan recognises existing iconic tourism destinations, such as Newcastle City Centre and the Macdonald Jones Stadium, as areas for additional tourism infrastructure (e.g. accommodation, transport connections and packages of events and activities).</li> <li>The Metro Plan vision is to have larger and more frequent festivals and events, supported by easier access to transport options.</li> </ul>

Strategy	Alignment
<p><b>Strategy 9</b> – Plan for jobs closer to homes in the metro frame</p>	<ul style="list-style-type: none"> <li>• Greater Newcastle has several well-established strategic centres which could grow and become important residential, employment and entertainment precincts.</li> <li>• Increasing job supply within and near the emerging precincts will help meet the <i>Hunter Regional Plan 2056</i> goals, and reduce work related travel and congestion across the metropolitan area.</li> <li>• Planning for jobs closer to homes becomes vital as the surrounding population grows, especially in the metro frame.</li> </ul>
<p><b>Outcome 2: Enhance environment, amenity and resilience for quality of life</b></p>	
<p><b>Strategy 10</b> - Create better buildings and great places</p>	<ul style="list-style-type: none"> <li>• The Metro Plan identified that Greater Newcastle’s heritage is key to its cultural economy. Regeneration of heritage assets through adaptive re-use will deliver unique and exciting places, and opportunities for investment and jobs.</li> <li>• Adaptively-reusing heritage buildings will also help to retain the distinctiveness of Greater Newcastle’s neighbourhoods and celebrate their history and character.</li> </ul>
<p><b>Outcome 3: Enable housing close to jobs and services</b></p>	
<p><b>Strategy 16</b> - Prioritise the delivery of infill housing opportunities within existing urban areas</p>	<ul style="list-style-type: none"> <li>• The Metro Plan identified that there is enough land zoned for housing in Greater Newcastle to cater for a metropolitan population of at least 1.2 million people.</li> <li>• In the Newcastle City Centre and the metro core, it is anticipated that ongoing demand will drive urban renewal to provide different housing types close to open space and parks that are accessible to public transport.</li> <li>• The Metro Plan envisioned that Greater Newcastle will become a network of connected places, linking to each other and their surrounding communities and developing as mixed-use neighbourhoods that offer housing choice and other services.</li> </ul>
<p><b>Strategy 17</b> - Unlock housing supply through infrastructure coordination and delivery</p>	<ul style="list-style-type: none"> <li>• The Metro Plan identifies housing release areas that will be supported by infrastructure planning and delivery, including the Hunter Special Infrastructure Contribution Plan.</li> <li>• The NSW Government will review how these areas are prioritised each year through the Urban Development Program, in consultation with industry, councils and infrastructure providers.</li> </ul>
<p><b>Outcome 4: Improve connections to jobs, services and recreation</b></p>	
<p><b>Strategy 20</b> Integrate land use and transport planning</p>	<ul style="list-style-type: none"> <li>• The Metro Plan identified that coordinating land use and transport is critical to the success of Greater Newcastle.</li> <li>• The Metro Plan identified that the Newcastle Interchange and Light Rail from Wickham to Pacific Park, plus the establishment of Newcastle Transport as the operator of an integrated public transport system, provides the basis for future transport improvements.</li> </ul>



### 3.1.3 Greater Newcastle Future Transport Plan

The Greater Newcastle Future Transport Plan (Future Transport Plan) guides Newcastle’s strategic transport context. The Future Transport Plan was coordinated with the Metro Plan and supports TfNSW’s Future Transport Strategy 2056.

The Future Transport Plan seeks to identify the best transport outcome for 2056, with multi-modal connectivity at its base. The four light rail corridors investigated in this SBC are the shortlisted priority public transport corridors in the Future Transport Plan. The Future Transport Plan shortlisted the corridors based on their:

- Ability to connect emerging employment hubs and population centres.
- Existing public transport accessibility to major employment hubs.
- Daily trip demand between strategic centres.

The Future Transport Plan articulates the transport vision for Greater Newcastle through four customer focused outcomes that are directly related to this SBC.

**Table 4** Greater Newcastle Future Transport Plan outcomes

Outcomes	
<p><b>Outcome 1 -</b> Supporting centres and enabling economic development with appropriate transport services/infrastructure</p>	<ul style="list-style-type: none"> <li>• Greater Newcastle’s importance will significantly increase over the 40 years as a Global Gateway City, due to its:               <ul style="list-style-type: none"> <li>– Catchment of over 1 million people.</li> <li>– Diversifying economy.</li> <li>– Growing urban renewal opportunities.</li> </ul> </li> <li>• Transport has an important part to play in supporting Greater Newcastle as a Global Gateway City, its success and competitiveness into the future.</li> <li>• Improving transport connections to, from and within Greater Newcastle is critical for it to realise its potential as Australia’s newest and emerging economic and lifestyle city. The Hunter region, including Greater Newcastle, is critical to the state’s economic growth, with one third of the NSW freight task moving through the Hunter region.</li> </ul>
<p><b>Outcome 2 -</b> Movement and Place Framework</p>	<ul style="list-style-type: none"> <li>• The movement and place framework aims to balance the interests of different road users through classifying layered street environments.</li> <li>• The classification then determines the design principles that should be implemented to support the street environments.</li> <li>• The movement and place framework recognises the role of transport in place making. Transport infrastructure can transform the public domain, activate centres and unlock new commercial and housing developments, renewing existing neighbourhoods and spaces.</li> <li>• Expanding the passenger network and services in Greater Newcastle will enable more people to access employment, services and cultural and recreational activities.</li> </ul>

Outcomes	
<b>Outcome 3 -</b> Accessibility to employment and services	<ul style="list-style-type: none"> <li>• The NSW Government recognises the importance of delivering high quality transport services to all customers.</li> <li>• The continued expansion of the passenger network and services in Greater Newcastle will enable more people to access employment, services and cultural and recreational activities.</li> </ul>
<b>Outcome 4 -</b> Responding to changes in land use, population and demand	<ul style="list-style-type: none"> <li>• Over the next 40 years, forecasts show that Greater Newcastle’s population will primarily increase and densify in areas within 10km of the Newcastle city centre.</li> <li>• The Future Transport Plan addresses the need to provide a transport network that supports these changing land uses, matching services, span of hours and frequencies to demand.</li> </ul>

### 3.2 Alignment to Government Priorities

The Federal and NSW Governments recognise the importance of broadening the economic strength and liveability of Greater Newcastle. The importance of providing additional transport capacity to, from and within Newcastle CBD is being increasingly recognised at all levels of government.

This desire to increase sustainability, improve equity and shape Greater Newcastle is reflected in the key plans at each level of government (in Figure 4). The remainder of this chapter shows how the Project objectives deliver on federal, state and local government priorities.

**Figure 4** Relevant Australian and NSW Government policies and strategies



## 3.3 Federal Strategic Policy Context

### 3.3.1 Smart Cities Plan

The *Smart Cities Plan*<sup>18</sup> sets out the Australian Government's vision for the future development of Australia's metropolitan and regional cities.

The *Smart Cities Plan* seeks to address the need for infrastructure to unlock economic benefits for cities. This is relevant to Greater Newcastle where a 20% population increase is expected in 2036, which will generate demand for a more efficient and equitable transport system.

#### Alignment with the Project

This Project seeks to respond to the challenge of embracing new technology in Greater Newcastle. The Project also seeks to meet the broader economic and city objectives of Greater Newcastle, including accessibility and jobs.

### 3.3.2 Australian Infrastructure Plan

Infrastructure Australia's *Australian Infrastructure Plan*<sup>19</sup> sets out a vision to address current and future infrastructure gaps. The Plan outlines many major themes to improve the prosperity of the nation:

- Productive cities and productive regions.
- Efficient infrastructure markets.
- Sustainable and equitable infrastructure.

#### Alignment with the Project

The Project will help deliver new housing to address population growth. It will also provide more equitable access and connections between housing and jobs.

## 3.4 NSW Strategic Policy Context

The Project's alignment to the Greater Newcastle Metropolitan Plan and Greater Newcastle Future Transport Plan is defined in Section 3.1.2.

### 3.4.1 Hunter Regional Plan

The Hunter Regional Plan provides an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions.

#### Alignment with the Project

The Project objectives directly align with the following Hunter Regional Plan goals:

- Strengthen the region's economic resilience, protect its well-established economic and employment bases and build on its existing strengths to foster greater market and industry diversification.

<sup>18</sup> Department of Prime Minister and Cabinet, *Smart Cities Plan*, 2016

<sup>19</sup> Infrastructure Australia, *Australian Infrastructure Plan*, February 2016

- Implement effective planning and design in order to protect the environment and build greater resilience to natural hazards and climate change.
- Maintain characteristic traits/diverse communities.

### 3.4.2 NSW Premier and State Priorities

The actions and priorities of the NSW Government are reinforced by *State Priorities*<sup>20</sup>. There are 30 priorities – 12 Premier Priorities and 18 State Priorities.

#### Alignment with the Project

The Project will help grow Greater Newcastle and aligns with the following Premier priorities: creating jobs, delivering infrastructure, improving government services, keeping our environment clear, and making housing more affordable.

The Project will also contribute to the delivery of the following State priorities: make NSW the easiest state to start a business, encouraging business investment, boosting apprenticeships, accelerate major project assessment, increasing housing supply, and maintain or improve reliability of public transport services.

### 3.4.3 Future Transport Strategy 2056

In March 2018, TfNSW released the *Future Transport Strategy 2056*. The Strategy sets the vision, strategic directions and customer outcomes, and is supported by infrastructure and services plans to deliver service and infrastructure initiatives across the state.

Future Transport also sets out issue-specific and place-based plans (including Greater Newcastle) which will be developed with land use agencies to ensure the transport system can effectively serve new growth areas.

#### Alignment with the Project

The Project objectives align with the following outcomes and strategic goals for Future Transport Strategy 2056:

- Convenient and responsive to customer needs.
- Successful Places: sustaining and enhancing the liveability of our places.
- Growing the Economy: Connecting people and places in the growing regions.
- Safely, efficiently and reliably moving people and goods.
- Accessible services for all customers.
- Sustainability: Makes the best use of available resources and assets.

### 3.4.4 State Infrastructure Strategy 2018-2038 Building Momentum

The Strategy recommends reforms, policies and projects that respond to NSW's changing economic, social, technological and environmental outlook and build on the benefits already delivered by its existing infrastructure program.

#### Alignment with the Project

Strategic planning for the Project directly aligns to the following strategic directions:

<sup>20</sup> NSW Government, 2018, *Premier's Priorities*, Source: <https://www.nsw.gov.au/improving-nsw/premiers-priorities>, Accessed: 25 October 2018

- Improving integration of land and infrastructure planning, ensuring capital investment plans are linked to and keep pace with land use plans for housing and jobs in priority locations.
- Planning an infrastructure program that represents the best possible investment and use of public funds, including better communicating the Government's intentions so that the business community can invest with confidence.

### 3.4.5 TfNSW Corporate Plan

The Corporate Plan describes TfNSW's vision for 2021 and identifies the State's priority areas. The Plan aims to deliver the infrastructure and services NSW needs by engaging with the government, industry and the community to develop a clear strategy for the future.

#### Alignment with the Project

The Project objectives directly align with the following themes and aims:

- Transforming Transport: The Project aligns with the priority to deliver the infrastructure and services NSW needs.
- Delivering every day: The Project aligns with the priority to enable seamless movement for places.

## 3.5 Local Government Strategic Policy Context

### 3.5.1 Newcastle City Council Community Strategic Plan

The Newcastle City Council Community Strategic Plan is a shared community vision to inform actions over the next 10 years.

#### Alignment with the Project

The Project objectives directly align with the following themes and aims:

- Plans for a transport network that provides connectivity and convenience to jobs, services and recreation.
- The importance of vibrant, active environments in promoting people's health, happiness and wellbeing.
- Emphasis placed on Greater Newcastle becoming a smart and innovative city that attracts people to live and work as well as provides housing close to jobs and services.

### 3.5.2 Newcastle Local Planning Strategy

The Local Planning Strategy is a comprehensive land use strategy to guide the future growth and development of Newcastle to 2030 and beyond. The Strategy implements the land use directions from the Newcastle 2030 Community Strategic Plan.

The Strategy underpins the Newcastle Local Environmental Plan (LEP) 2012 providing a land use planning platform to move towards a smarter, more liveable and sustainable Newcastle.

#### Alignment with the Project

The Project objectives directly align with the following themes and aims of the LPS:

- Effective and integrated public transport.
- Protected and Enhanced Environment as well as Vibrant and Activated Public Places.
- Smart and Innovative City.

### 3.5.3 Newcastle Transport Strategy

The Newcastle Transport Strategy guides Newcastle City Council's transport-related decisions and actions to contribute to, within the limits of its roles and responsibilities, the objectives of the Newcastle Community Strategic Plan.

#### Alignment with the Project

The Project objectives directly align with the following themes and aims of the Newcastle Transport Strategy:

- Connected City Transport: networks and services will be well connected and convenient. Walking, cycling and public transport will be viable options for the majority of trips.
- Protected and Enhanced Environment: The city's unique environment will be understood, maintained and protected.
- Vibrant and Activated Public Places: Creating a city of great public places and neighbourhoods promoting people's health, happiness and wellbeing.

### 3.5.4 Newcastle Smart City Strategy 2017 – 2021

The Strategy is a collaborative strategic planning document that guides Council, their stakeholders and partners towards a smart and innovative future. All three levels of government were consulted in the development of the Newcastle Smart City Strategy, including the community, educational and research providers and business and industry sectors.

#### Alignment with the Project

The Project objectives directly align with the following themes and aims:

- Identify collective vision and principles to guide Newcastle as a smart and innovative city.
- Identify strategic themes and actions for enabling Newcastle as a smart and innovative city.
- Review, collate and integrate existing work from a variety of sources that is relevant to Newcastle and the Hunter Region as a smart innovative city.
- Engage with key partners, stakeholders and the general community.
- Identify relationships with existing and upcoming revitalisation and renewal projects.

### 3.5.5 Economic Development Strategy

Through the Economic Development Strategy, Newcastle City Council aims to implement its community vision, as described in the Newcastle Community Strategic Plan.

It seeks to achieve this by advocating for the community, ensuring appropriate and integrated strategic and statutory planning documents, working with other tiers of government to promote major infrastructure needs and taking a lead in the visitor economy including events attraction and sponsorship.

#### Alignment with the Project

The Project objectives directly align with the following strategies:

- Recognise and strengthen Newcastle's role as the regional capital and hub for industry, education, health, business, personal, and tourism, port and logistics services.
- Work with businesses, community and government to facilitate the development of key infrastructure to facilitate business performance.

- Revitalise the city centre and local precincts through support of existing businesses and industries. Facilitate the generation of new sustainable job opportunities. Seek to maintain major regional industries that are linked to national and international markets.
- Encourage innovation in business, research activities, education and creative industries.
- Work with the tourism sector and industry associations to further develop Newcastle as a visitor and event destination.

### **3.5.6 Draft Lake Macquarie 2050 Strategy**

The Strategy has seven directions guiding local planning up to 2050. The Strategy objectives include increasing activity around, and access to local centres, creating a high-quality, high amenity public domain and shifting a dependence on motor vehicles to public transport and active transport services.

#### **Alignment with the Project**

The Project will help deliver transport choice, including a mode shift away from private vehicles, and connect and create high-quality, high-amenity public spaces – particularly around stop locations. The Project will help increase the percentage and choice of dwellings, particularly around stop locations.



# 4 Need for Investment

## Summary

- There is a compelling need to grow Greater Newcastle as a competitive and attractive city. An extension will leverage on Stage 1's success, providing the next phase of city shaping for Greater Newcastle with major benefits to the community, NSW and Australia.
- **Need to reshape Greater Newcastle:** Greater Newcastle's current transport network needs to be renewed and enhanced to reflect Greater Newcastle's significance as a city and its strategic direction to transform into a globally competitive economic centre. Extending light rail to a preferred corridor will help define Inner Newcastle as the Metro Core, catalyse change and help transform Greater Newcastle.
- **Need to improve network visibility and reflect demand:** There is insufficient public transport connectivity between Greater Newcastle's strategic centres (e.g. infill housing, sporting, business, health clusters). There is a strong need for public transport infrastructure to connect multiple transport modes (e.g. buses, light rail, heavy rail), establish permanent and higher order public transport services, provide a clear signal for development and investment on a particular corridor, and support mode share targeted identified in the Greater Newcastle Future Transport Plan.
- **Need to manage future growth:** As Greater Newcastle's population and workforce continue to grow, it is critical that its transport network infrastructure reflects this growth. Achieving infill growth targets requires careful planning and significant infrastructure and amenity upgrades in established urban areas. This growth needs to be supported through substantial investment into public transport so that infill developments are amenable and offer an attractive environment to enhance Greater Newcastle's competitive offerings.
- **Need to promote economic connectivity and tourism:** The economy of Greater Newcastle and the broader Lower Hunter is transitioning into a highly diverse economy with an emerging focus on knowledge intensive industries, including tourism, health, sports and entertainment, and defence. The public transport network needs to shift towards a metropolitan style public transport network to support connectivity between economic, social, cultural and tourism hubs.

## 4.1 The overarching need to enable a competitive and attractive city

The NSW Government's vision to shape Greater Newcastle into a modern, attractive and globally competitive city is driving investigations into prioritising public transport corridors. Achieving this vision is essential to the future strength and competitiveness of Greater Newcastle.

This vision has guided the Project objectives of transitioning the economy, aligning housing with employment growth and growing the city's competitive edge. To allow Greater Newcastle to reach its full strategic and economic potential, it is critical the transport network improves the City's attractiveness and strengthens its competitive offerings.

The benefits of investing into the transport network extend beyond the Greater Newcastle Metro Core have State and National significance. The *State of Australian Cities Report (2014-15)* from the Australian Department of Infrastructure and Regional Development notes this importance.

‘It is in our cities that the overwhelming majority of jobs are located and where the most new jobs are being created. The economic output of our major cities has grown, and their national importance remains extremely high. However, alongside that growth there is more demand on transport systems in Australia than ever before.’

*State of Australian Cities Report 2014/15 p1*

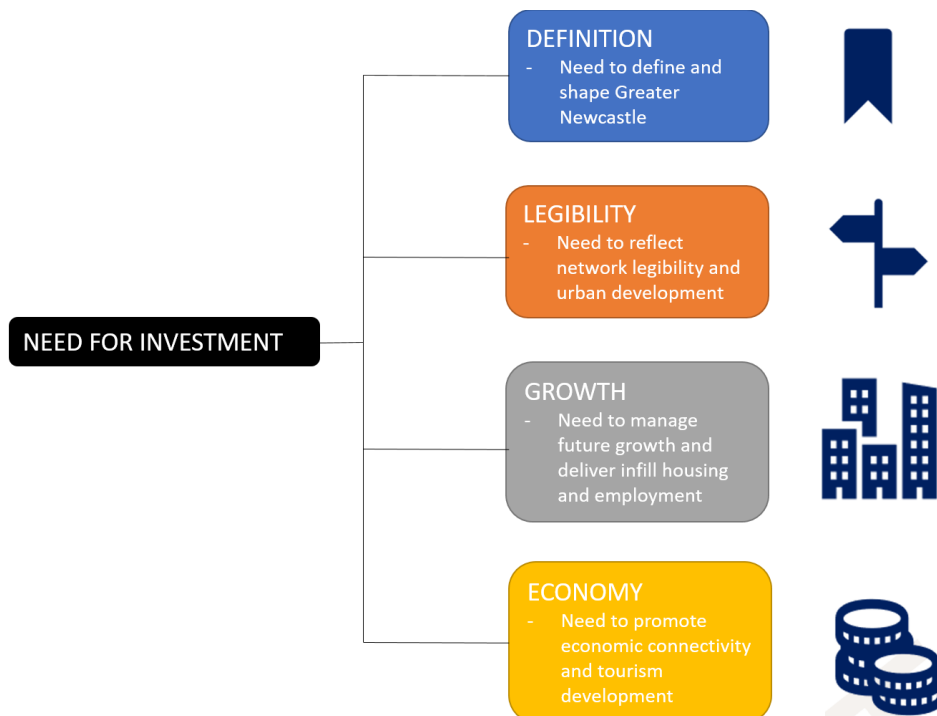
Stage 1 of the Project has already delivered catalytic change and re-shaped the Newcastle City Centre, including the Newcastle Interchange at Wickham, enhanced the public domain around the civic, entertainment and tourism precincts, connected Honeysuckle with the commercial core and encouraged investment including the City Campus of Newcastle University. This development equates to approximately \$2 billion worth of private development projects, and the highest crane count in Greater Newcastle on record.<sup>21</sup>

The need to invest into four priority corridors is defined in the multi-modal corridor prioritisation process outlined in the NTNP. The corridor prioritisation is further identified in the Greater Newcastle Metropolitan Plan and the Greater Newcastle Future Transport Plan.

The Project team will continue to evaluate the need to invest into the four corridors, using the following themes (in Figure 5):

- The need to define and shape Greater Newcastle.
- The need to improve network visibility and reflect demand.
- The need to manage future growth.
- The need to promote economic connectivity and tourism.

**Figure 5** Key components of the Need for Investment



<sup>21</sup> UrbanDeveloper, 2018, Revitalising Newcastle: behind the City's billion-dollar boom, available at <https://theurbandevolver.com/articles/revitalising-newcastle-behind-the-citys-billion-dollar-boom>

## **4.2 Need to define and reshape Greater Newcastle**

As Greater Newcastle transitions into a knowledge intensive and globally competitive economic centre, it also needs to transition its transport network.

The existing transport network provides a varying mix of modes and frequencies to centres based on historical settlement patterns and economic structure. It does not reflect the current or future Greater Newcastle centre structure, or settlement patterns.

When defined correctly, the metropolitan structure will:

- Create a connected polycentric structure.
- Encourage further clustering of industries.
- Link key economic, cultural, education, health and tourism centres to a vibrant city centre.

Prioritising investment into multi-modal corridors will showcase the strategic significance of Greater Newcastle and help define it as a city. It will also define a boundary between the metropolitan area (i.e. Metro Core as per the Metropolitan and Future Transport Plans) and Greater Newcastle.

### **4.2.1 Geographic hierarchy of Greater Newcastle**

The geographic hierarchy of Greater Newcastle is defined in the Metro Plan into three radial zones (see Figure 6):

- The Metro Heart.
- Metro Core.
- Metro Frame.

The three radial zones are critical in their intra and inter zone connectivity.

**Figure 6** Metro Greater Newcastle Metropolitan Plan Elements Shaping Greater Newcastle



Source: Greater Newcastle Metropolitan Plan 2036, p12

## Metro Heart

The Metro Heart is the functional city centre and the contiguous study area for this Project. The Metro heart has the following characteristics:

- Newcastle City Centre is at the heart of Greater Newcastle. It extends from the coastline at Nobbys Head to the emerging commercial hub at the Newcastle transport interchange at Wickham. From the closing of the steelworks and earthquakes in the 1980s, through the cycles of the mining industry, Newcastle City Centre has consistently evolved.
- Educational investment and the influx of new creative businesses into sought-after urban areas will encourage entrepreneurship and help to create a vibrant and diverse culture at the metro heart.

The Metro Heart is clearly delineated as the City Centre. This delineation is supported by a highly visible and city shaping light rail (i.e. Newcastle Light Rail Stage 1). It is connected to centres in the Metro Core and Metro Frame through a mix of metro bus, regional bus, road and heavy rail connections. The connection point to most of these other modes is at Newcastle Interchange.

Development and investment in new economic hubs, including the University of Newcastle's City Campus, is reflective of a defined Metro Heart. The renewal and revitalisation underway in the Metro Heart underlines the potential for similar outcomes for the Metro Core.

## Metro Core

The Metro Core sits east of the Pacific Motorway and is bound by the blue edges of the Harbour, the northern shores of Lake Macquarie and the Pacific Ocean. The Metro Core has the following qualities:

- People living in the Metro Core enjoy a cosmopolitan lifestyle focused around strong local communities, jobs and services, with a range of recreational opportunities in parks and reserves between the coast and adjoining hinterland.
- With nearly two-thirds of Greater Newcastle's homes and jobs, the Metro Core is positioned for improved integrated transport services through intensification of activity.
- Many residents live within 30-minutes of their work place or centres providing services for their daily needs. The Metro Core is currently predominantly serviced by buses. More transport options to these centres, including cycle paths, buses and trains will bring these places closer together.

The transport network that connects centres within the Metro Core includes bus and ferry services operated by Newcastle Transport, as well as heavy rail between Newcastle Interchange and routes to the south west and North West in the Metro Frame run by Hunter Rail.

### 4.2.2 Redefining Greater Newcastle: the need for transport to reflect the emerging metropolitan structure

The emerging metropolitan structure of Greater Newcastle includes a contained and well-defined city centre, extending to a metro area, which flows to an outer set of suburbs and towns in the Lower Hunter. The Metro Core holds the key to the city's future of urban infill and employment opportunities, as infill options in the metro heart will gradually evaporate (see Figure 6).

Visible transport connections between the Metro Heart and the Metro Core are currently uneven and impacted by inconsistent and poor interchanges between transport modes. The visibility of defined transport corridors which link the Metro Heart with key economic and employment anchors, including the John Hunter Hospital, Charlestown and Callaghan Education Precincts, is unclear.

Prioritising multi-modal corridors will help to develop, define and shape the Metro Core for Greater Newcastle. The Metro Heart and Metro Core are where the critical economic agglomeration benefits are realised and where increasingly knowledge intensive industries will cluster.

## 4.3 Need to improve network visibility and reflect demand

The City's existing settlement, density and metropolitan planning framework are not reflected by a city-wide coherent transport network.

A visible connection between the City Centre (Metro Heart) and secondary economic and employment hubs is not well defined, or based on land use significance. The transport corridors which provide these links are not serviced by an effective modal hierarchy, but are serviced by a legacy mode split between heavy rail and bus services.

There have been significant developments in Greater Newcastle's public transport network and wayfinding in the last five years. This includes constructing Stage 1 of Newcastle Light Rail, re-ordering the regional rail network to connect at Newcastle Interchange and revising the bus network planning as part of the Keolis Downer Contract for Newcastle Transport from 2017. In conjunction with Stage 1, the bus network has been revised to better connect the new light rail with heavy rail at the interchange. Additionally, high frequency bus services (every 15 minutes) have been introduced to Greater Newcastle in January 2018 on key corridors.

Total population growth in the Project Study Area is forecast to increase by 28% over the next 40 years, based on the most recent projections from TfNSW’s Transport Performance Analytics (TPA). Of the component of the Project Study Area that the Newcastle LGA comprises, forecast growth projections are higher, at 34% over the same period.

With a target of 60% infill, at least 65,000 new residents will be accommodated in the existing footprint of the Project Study Area by 2056. This will significantly increase travel demand on the existing network, especially around Metro Core, and drive the need for housing, employment and sporting/cultural institutions to be accessible and visible to one another.

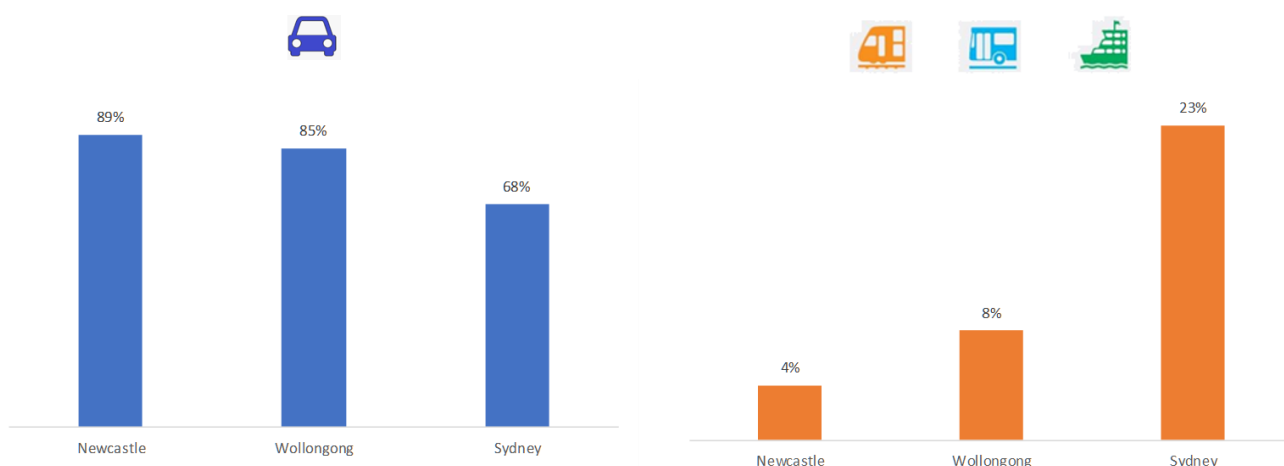
### 4.3.1 Current travel behaviour

Greater Newcastle’s current travel behaviours reflect the network choice, visibility and travel requirements of the resident population using the existing network.

#### Public transport use and mode share

Private vehicles are the predominant mode of travel in Greater Newcastle, with very high levels of car use. Private vehicle trips accounted for the vast majority of work travel within the Hunter region. Vehicle drivers and vehicle passengers combined made up 89% of trips to work, which is higher than Wollongong (85%). Further details on mode share comparisons are provided in Figure 7.

**Figure 7** Mode Share in Newcastle in comparison to Wollongong and Sydney



Without intervention, Greater Newcastle will see increased congestion on the road network, increased travel times and reduced speed and reliability. Greater Newcastle will see a continued need to deliver new parking spaces in economic hubs, limiting the opportunity for urban renewal.

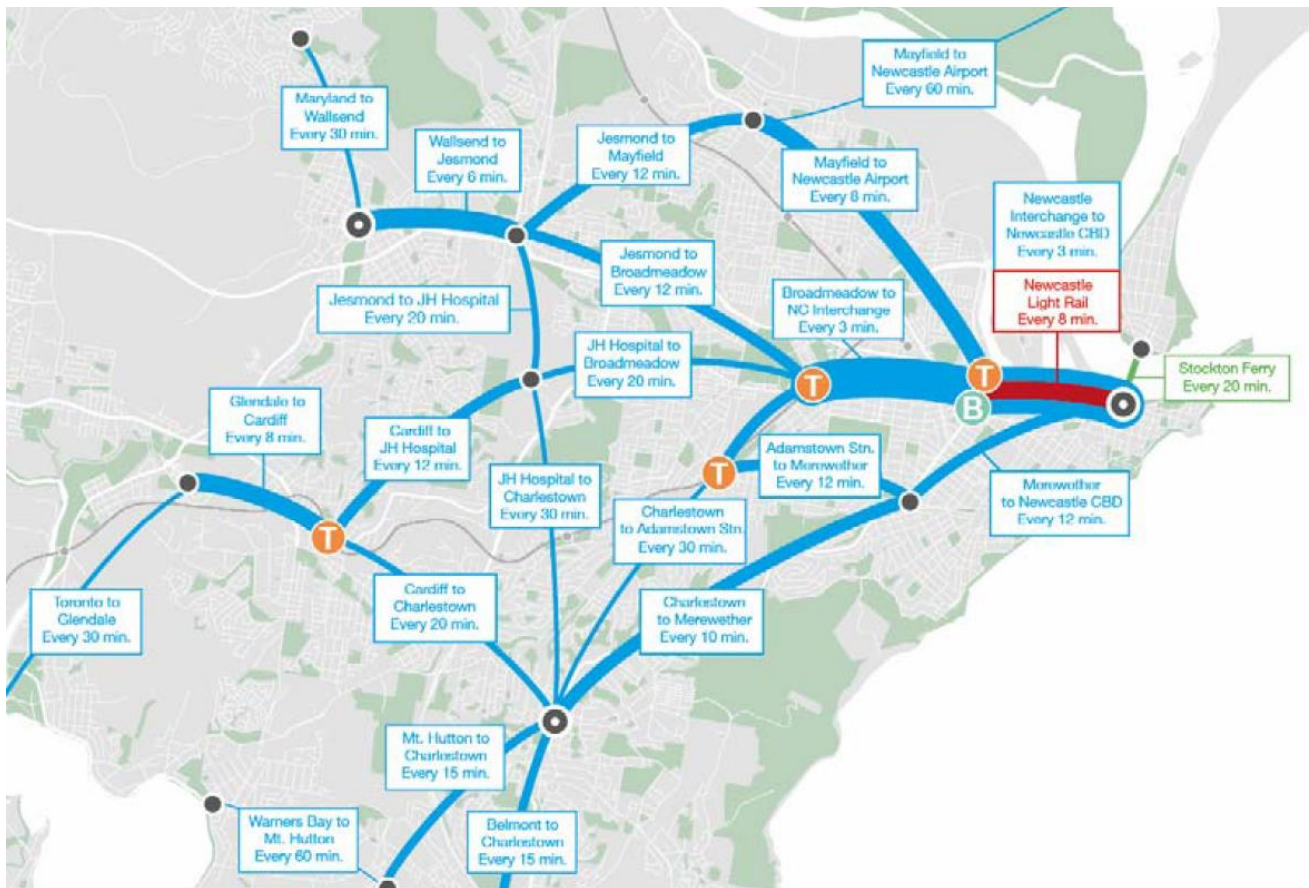
#### Travel generators and destinations

Key travel generators in Greater Newcastle are predominantly clustered around the city centre and waterfront (both the beach and port side), and the key strategic centres. Some of the existing key travel generators in the city centre include the beaches, commercial core, schools, TAFEs, University of Newcastle and the Port of Newcastle. Generators in the Metro Core are more dispersed but notable along key movement corridors (as shown in Figure 8).

Many of the generators in the Metro Core that connect to the Metro Heart align with the prioritised multi-modal corridors.



**Figure 8 Major Trip Generators**



Note: The thickness of the lines reflects the trip frequency and it is not a straight indication of demand. The trip frequency between Broadmeadow (and Newcastle metro heart) to John Hunter Hospital is every 20 minutes. This does not provide an enablement to the current employment cluster nor the future proposed health hub at John Hunter Hospital. Source: Transport for NSW

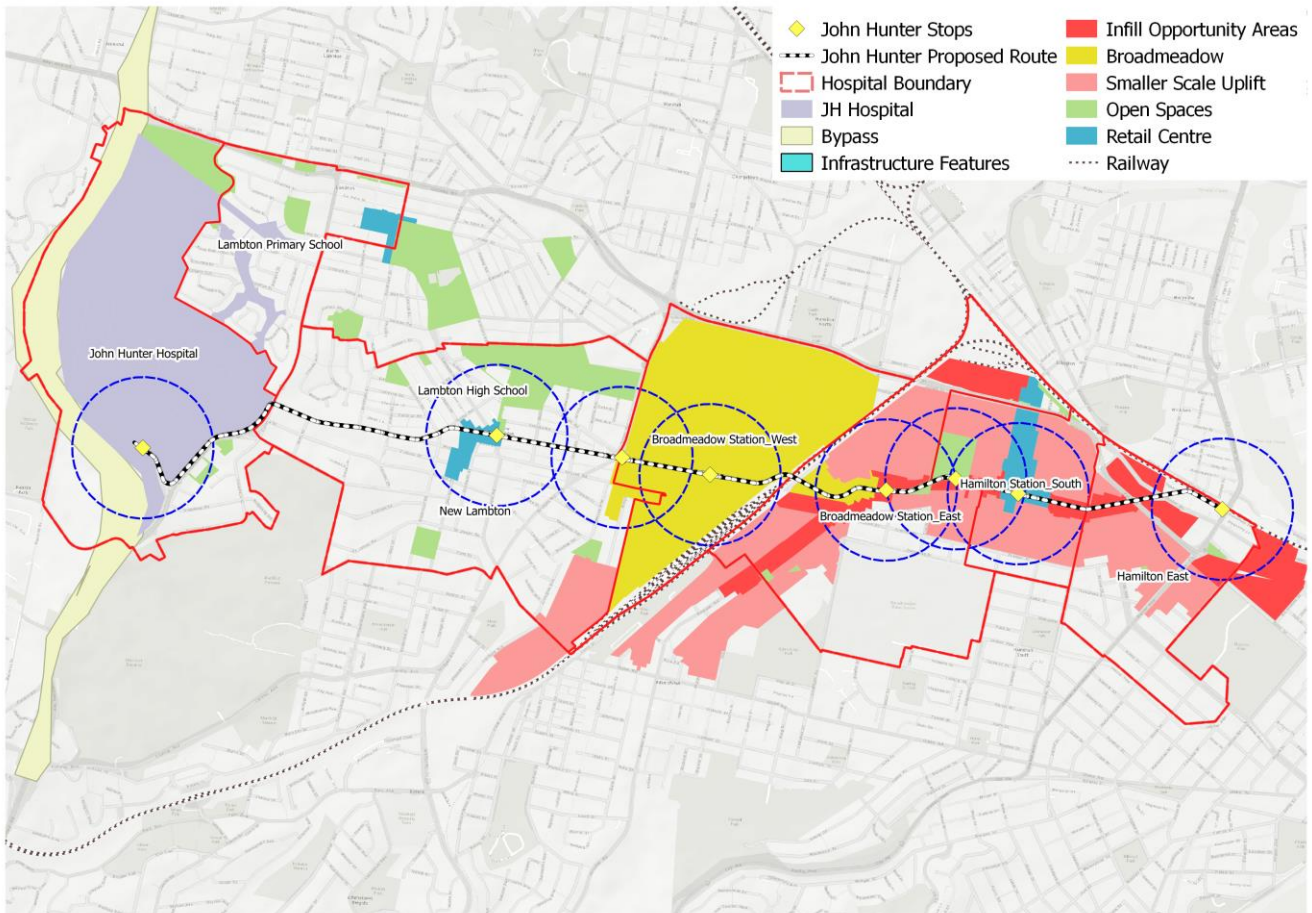
### 4.3.2 Providing network legibility

The current travel behaviour and demand, as well as key connectors and destinations, reflect corridor trip generators. Presently, the travel demand does not have modal hierarchy or promote a visible connection between centres on linear corridors.

There are few clearly connected corridors between urban renewal precincts along Greater Newcastle's corridors. For example, the John Hunter Hospital Corridor has several significant urban renewal precincts along it, but not a clear corridor along the possible path of a multi-modal prioritisation corridor. The connection between new infill housing, sporting, business, health clusters to each other and the Metro Heart is unrealised in the current corridor configuration.

While bus services provide a suitable level of frequency, multi-modal prioritisation through building physical infrastructure would help establish permanent, higher order services directly for the John Hunter Corridor, providing a clear signal to directly develop and invest on a particular corridor. It would provide a legible delineation from any other corridor serviced by a regular bus network.

**Figure 9** John Hunter Corridor opportunities



Source: Corview, 2018

### 4.3.3 Supporting public transport mode share

Greater Newcastle's public transport network has already shown improvements to the number of people using public transport. As this model continues to develop, along with a more extensive public transport network, Greater Newcastle could achieve significant increases in the portion of trips taken by bus, train, light rail, ferry and on demand services.

The Greater Newcastle Future Transport Plan has a public transport mode share target of 7.55% by 2056 from the 2011-16 average of 3.2% (based on Household Travel Survey). Without investment in public transport, it is unlikely that this public transport mode share target will be met.

## 4.4 Need to manage future growth and deliver infill housing

As Greater Newcastle's population and workforce grow over the next 40 years, it is critical that the transport network infrastructure evolves and reflects settlement patterns increasingly in infill catalyst areas.

The Metropolitan and Future Transport Plans state that the best opportunity to deliver growth is through synchronising the development of infill opportunities with a high frequency and visible transport service. The Metropolitan and Future Transport Plans identify the four corridors in this SBC as options for multi-modal prioritisation.

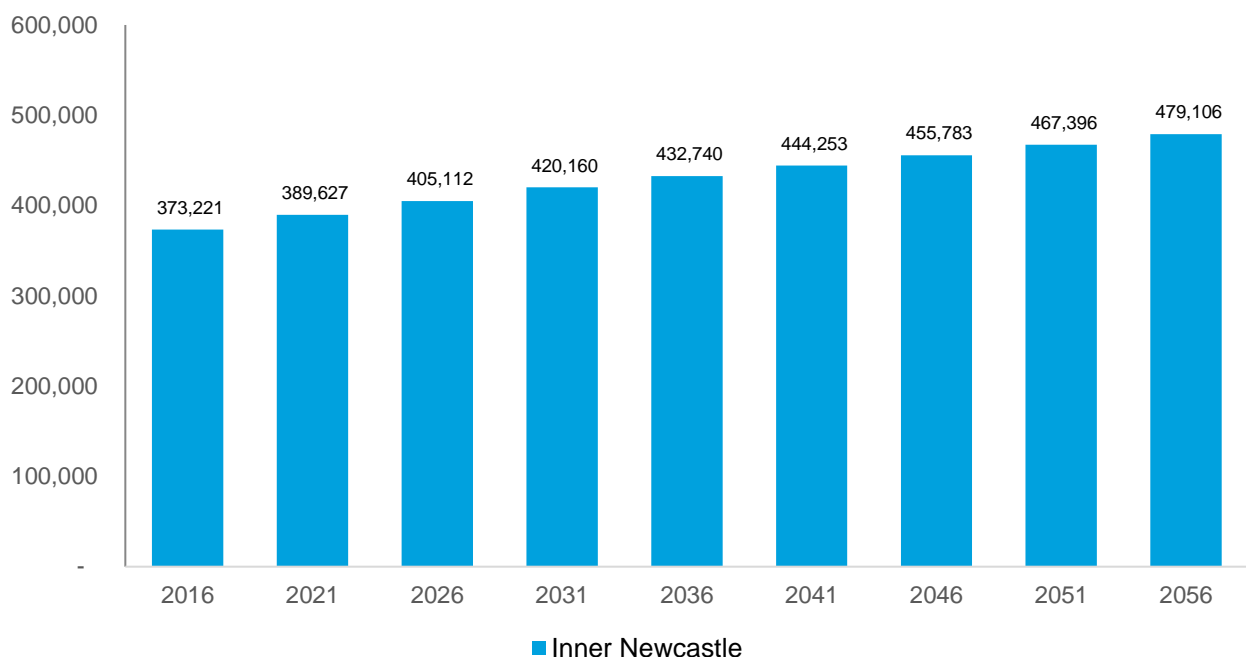


### 4.4.1 Projected growth

Greater Newcastle is growing. The population is forecast to increase by 20%, or 117,000 new residents, in the 20 years to 2036. The Project study area is forecast an additional 59,000 new residents in the same period (or 15% increase) almost all of which will be accommodated in infill housing.

The projected growth is even higher in the Newcastle LGA at 21%. As shown in Figure 10, the growth is forecast to continue well beyond 2036. A 40-year projected growth in the Project Study Area of 105,000 new residents is the equivalent to adding a population twice the size of Maitland or Dubbo over the next 40 years.

**Figure 10** Projected Population Growth (Inner Newcastle) 2016-2056



Source: Transport for NSW - TPA16 Population and Dwelling Projections

With infill housing target to comprise 60% of new population growth by 2036, there is a requirement to deliver 30,500 dwellings in the established urban areas. In the longer term, there is a need to deliver almost 65,000 new dwellings in the existing areas. This has significant impacts on planning for public transport corridors as well as getting the best value out of the network to support infill housing.

The opportunities to accommodate infill are in the remaining industrial brownfield areas in the Metro Heart. Once these opportunities are exhausted, new infill areas will be required in established urban areas along key movement corridors. Specifically, the Metro Plan designates 11 catalyst areas, most of which are connected to the Metro Heart and other key centres in travel demand corridors.

### 4.4.2 Supporting growth in the right areas

Achieving infill growth targets of 60% requires careful planning and significant infrastructure and amenity upgrades in established urban areas. This growth can only be achieved through substantial investment into public transport to ensure the infill is amenable and offers an attractive environment to enhance Greater Newcastle competitive offerings.

Unlike Sydney and Melbourne, Greater Newcastle has an over-supply of growth potential areas. Without adequate planning and supporting infrastructure investment, infill growth may spread thinly

over a large geographic area (in various brownfield sites across Greater Newcastle). Investing into prioritised corridors will help to cluster industry and coordinate employment and residential growth.

### 4.4.3 Creating and consolidating precincts

The 11 major urban renewal catalyst areas outlined in the Metro Plan are critical to successfully meeting the 60% infill development target and accommodating Greater Newcastle's growth. These include major opportunity areas which would benefit from multi-modal transport prioritisation, including creating benefits beyond population and employment growth.

#### Broadmeadow Sports and Entertainment Precinct

Broadmeadow Sports and Entertainment Precinct is a catalyst precinct of regional significance, even beyond the Hunter Region. It is a key priority urban renewal precinct.<sup>22</sup> It has regional level sporting and entertainment assets and is one of the largest urban renewal precincts in the Hunter. Its significance is comparable on a regional scale to that of Olympic Park in Sydney - it also has an integrated interface and is close to established urban areas and services.

The precinct directly connects into two of the four multi-modal prioritisation corridors. It has a dwelling target of 1,500 new dwellings and 550 new jobs over the next 20 years. Its significance is emphasised by both its urban renewal potential and its key economic and tourism assets.

Broadmeadow is comprised of several individual development and renewal sub-precincts outlined in Figure 11. These individual assets include:

- Hunter Stadium (McDonald Jones Stadium) – is the anchor for the Sports and Entertainment Precinct. Its capacity and ability now and in the future to hold significant events means it is driving nearby tourism, sports and health precincts.
- Broadmeadow Heavy Rail Station – is the key connection point to the XPT network serving the North Coast, Central Coast and Sydney. It is also likely where potential faster rail connection points will be delivered into Greater Newcastle.
- Nine ways intersection – effectively demarcates the transition between the inner-city suburbs of Greater Newcastle and the connection with the Metropolitan Area.

For this strategically located precinct to fulfil its renewal potential, it requires a significant transport network intervention.

---

<sup>22</sup> <https://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/greater-newcastle-metropolitan-plan-2018.ashx>

**Figure 11** Broadmeadow Sports and Entertainment Precinct



Source: Greater Newcastle Metropolitan Plan

### John Hunter Hospital Precinct

John Hunter Hospital (in Figure 12) is acknowledged as one of the largest employment growth hubs in the Project Study Area, outside of the metro heart. It is forecast to host an additional 1,700 new jobs by 2036 as it transitions from a health cluster to a fully integrated health innovation hub, with a substantially larger research focus and broader health reach.

It services as a major employment centre and the significance of its connectivity and success as a health hub goes well beyond its precinct boundary. The transition of Greater Newcastle's economy to a service and knowledge economy is underpinned by the success of generators, including the John Hunter Precinct. Its connection with the future Newcastle Inner City Bypass further highlights its strategic importance.

However, the containment of the Hospital and its potential growth is problematic. The permeability of the corridor and visible connection with other strategic centres including Broadmeadow, Newcastle Interchange and the city centre are not visible. Multi-modal prioritisation is critical in delivering a strong link and connection between key generators and the Hospital.

**Figure 12** John Hunter Hospital Precinct



Source: Greater Newcastle Metropolitan Plan

#### **4.4.4 Using transport as the amenity catalyst**

Delivering urban renewal precincts will increase the city's competitive offer and strengthen Greater Newcastle and the Hunter. Urban renewal precincts offer opportunities to meet future population and employment growth, whilst improving the overall amenity of Greater Newcastle. New transport infrastructure, specifically multi-modal public transport corridors and light rail, is best placed to help deliver these precincts.

High frequency and reliable transport connections to local services have demonstrated their ability to initiate and accelerate urban renewal. Examples of this include Sydney Metro, Sydney's Northern Beaches B-Line and light rail systems in Canberra, Greater Newcastle and the Gold Coast. For Greater Newcastle, urban renewal precincts can reach their potential and deliver value to the city's competitive offer through investing in a transport mode that enhances amenity.

## 4.5 Need to promote economic connectivity and tourism development

The economies of Newcastle and the broader Lower Hunter are diversifying with an emerging focus on knowledge intensive industries. The economy retains a significant industrial base, but is moving away from its historic heavy reliance on heavy industry, such as coal mining and steel production.

This changing economy will change the spatial distribution and dynamics of employment. The clustering of jobs around strategic centres and hubs, and the connection between these hubs and the city, is creating new economic corridors.

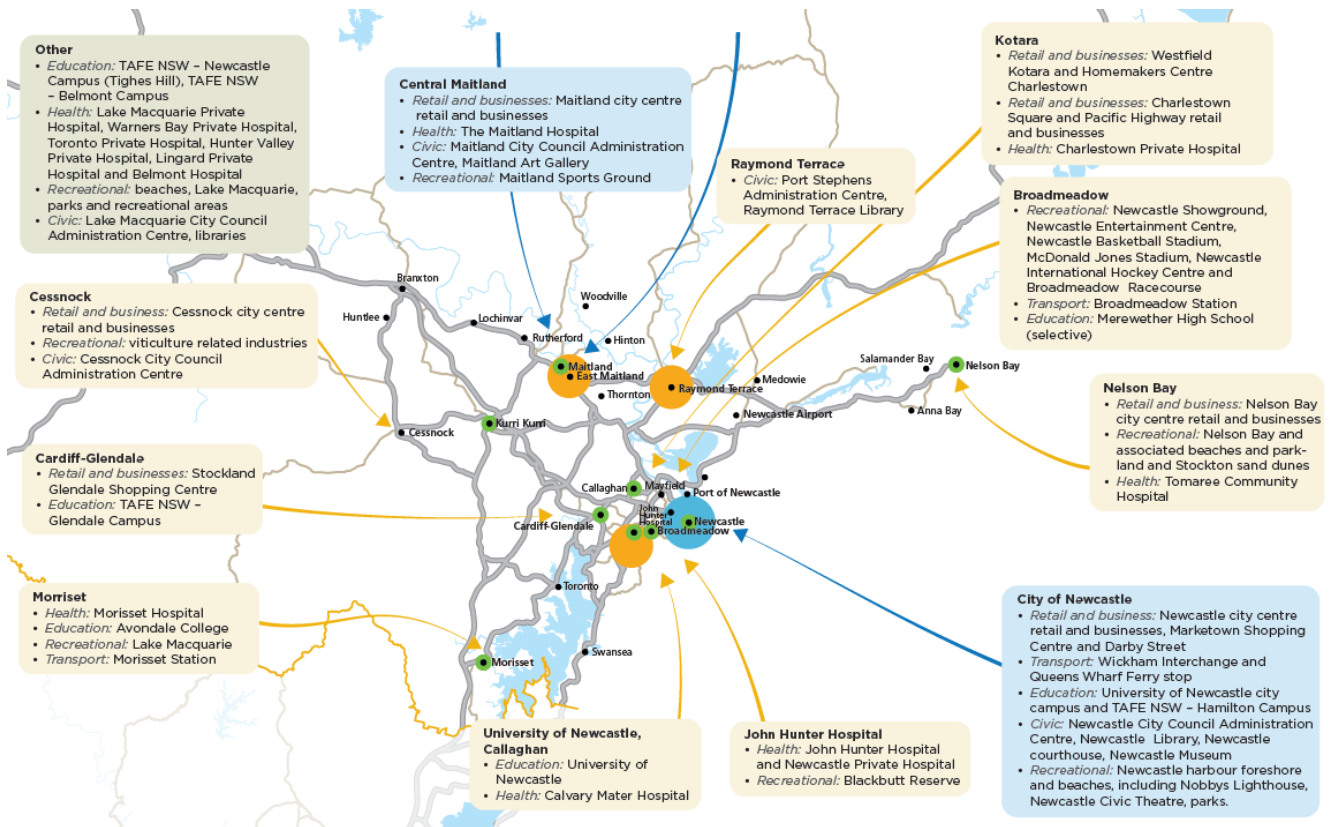
Greater Newcastle currently has a dispersed spread of economic and employment generators. The key generators include:

- Health and Medical around John Hunter Hospital.
- Education around the University of Newcastle and TAFE split between the City Centre, Callaghan and Mayfield.
- Ongoing Industrial and Port Activity at Kooragang Island, Mayfield, Black Hill and Broadmeadow.
- Entertainment, Sport and Culture focussed around Broadmeadow Stadium Precinct.
- Increasing commercial service, business, arts and education in the City Centre, incorporating waterside development in Honeysuckle.
- Retail clusters around Charlestown, Kotara and the CBD.
- Further distant clusters of Defence at Williamtown, Mining and Agri-tourism/ Viticulture around Cessnock and thoroughbred racing at Scone and surrounds.

These demand drivers are reflected in Figure 13 from the Greater Newcastle Future Transport Plan.



**Figure 13 Economic Demand Drivers**



Source: Greater Newcastle Future Transport Plan

Cultural and sporting events and infrastructure reflect a city’s ability to attract temporary visitors and permanent residents. Expectations for Greater Newcastle’s sporting and cultural offers are increasing, reflecting the growing status of the City.

Multi-modal connectivity along the key corridors would significantly improve the wayfinding between and awareness of major cultural and sporting assets. This includes visible connections between the Sports and Entertainment Precinct, Newcastle Interchange, Newcastle Cruise Port and Sydney, inbound connection points from the Lower Hunter, Central Coast and Sydney.

The ability to connect multiple current centres and catalyst precincts through a major transport intervention would likely have a significant impact on concentrating employment density through indirect incentivisation.<sup>23</sup> Corridors with a high number of current and future potential employment centres are likely to benefit even more through this incentivised agglomeration.

<sup>23</sup> Committee for Sydney and PWC (2017), The geography of time, mapping Sydney’s effective job and service density.

# 5 Options assessment

## Summary

- This chapter outlines the Corridor Assessment Framework.
- The November 2017 Newcastle Transit Network Plan (NTNP) Deliverable 1 identified the Project need, including defining a Project vision, land use changes, urban renewal opportunities and travel behaviours in Greater Newcastle. The NTNP identified 18 corridors to support and complement Stage 1 of the Project.
- In April 2018, Stage 2 of the NTNP, using a multi-criteria appraisal and sensitivity testing, reduced the 18 corridors to 5 priority corridors for further investigation. The five corridors were:
  - Newcastle City to Broadmeadow
  - Broadmeadow to John Hunter Hospital
  - Newcastle City to Mayfield
  - Newcastle City to Wallsend
  - Newcastle City to Charlestown.
- TfNSW later combined the Newcastle City to Broadmeadow and Broadmeadow to John Hunter Hospital into one corridor, resulting in four corridors for investigation.
- In November 2018, the Project Control Group (PCG) endorsed the Corridor Assessment Framework, and the evaluation criteria for the qualitative Strategic Merit Test (SMT) and quantitative Multi-criteria Analysis (MCA). The results of the SMT and MCA are in Chapter 8.

## 5.1 Overview

Chapter 5 describes how the Corridor Evaluation Framework evaluates a preferred transport corridor for the next phase of Project development.

The four corridors identified in this Strategic Business Case include existing road corridors which may require significant modification to accommodate modal change. As identified in the NTNP, the key constraints for these corridors include:

- **Dispersed settlement patterns:** A lower density polycentric development pattern can make it difficult to provide attractive, fast, reliable and frequent public transport services. This can mean a higher dependency on private vehicles and increasing congestion on key roads and corridors throughout Greater Newcastle.
- **Culture of high car use and dependency:** Compared to Wollongong and Sydney, Greater Newcastle features a high share of trips by car (89%), and a very low share of trips by public transport.
- **Car parking availability:** The ease of parking in the Newcastle City Centre and centres supports the use of private vehicles travelling to the City Centre. Car parking is well provided for across Inner Newcastle which competes with public transport.

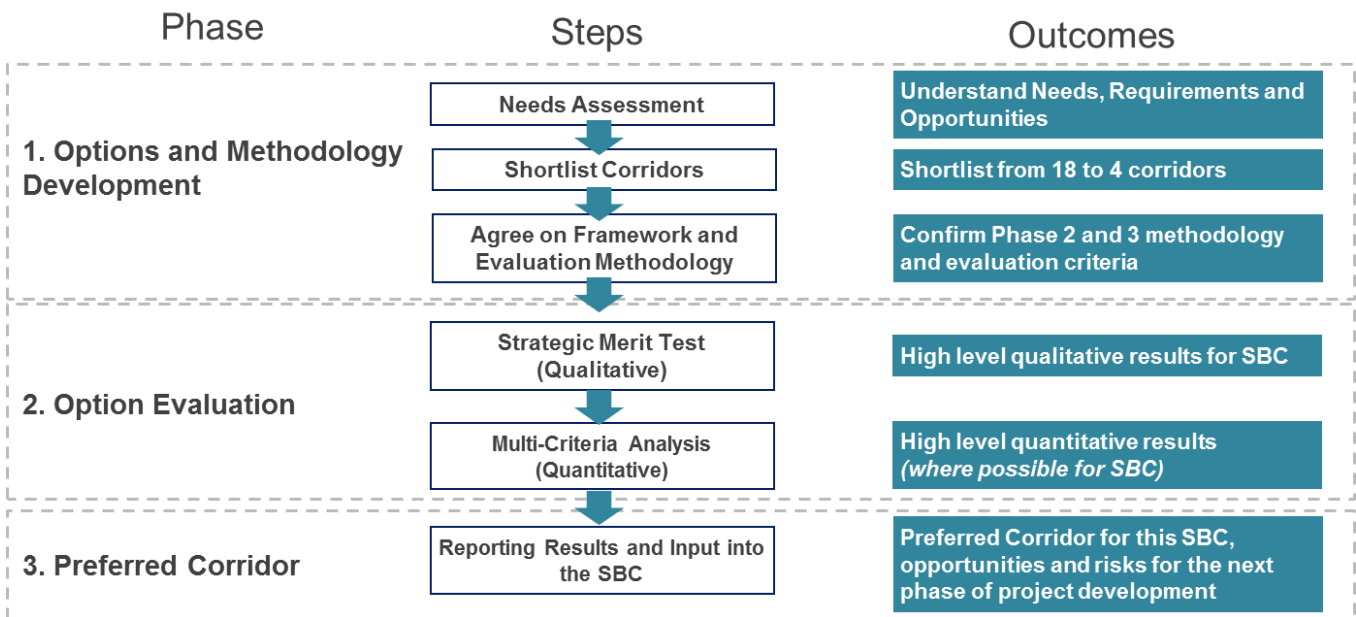
- **Low levels of walking and cycling:** Low mode share of walking and cycling for journey to work trips within the Newcastle Area. Although a strong trend in recreational cycling exists around the Newcastle City Centre.
- **Bus service limitations:** The existing bus network provides extensive coverage, but at the expense of consolidated frequencies on major corridors. Many existing bus routes operate on low service frequencies, often hourly or less.
- **Rail service limitations:** Frequency and speed constraints of the intercity rail service between Newcastle, the Central Coast and Sydney mean train remains uncompetitive with private vehicles. The freight rail task, which shares the rail line, is continuing to grow which competes with passenger services.

## 5.2 Corridor selection process

### 5.2.1 Method

The Project team used a three-step Corridor Assessment Framework (the Framework) to identify a preferred transport corridor. The Framework is consistent with the evaluation criteria from previous route options evaluation framework’s for recent light rail and heavy rail frameworks within TfNSW.

**Figure 14** Newcastle Light Rail Extension - Corridor Assessment Framework



Source: Transport for NSW

### 5.2.2 Phase 1 – Options and methodology development (the longlist)

#### Needs assessment

The 2017 NTNP identified the Project need, including defining a Project vision, land use changes, urban renewal opportunities and travel behaviours in Greater Newcastle. The NTNP identified 18 corridors to support and complement Stage 1 of Newcastle Light Rail.



## Shortlist corridors

The 2018 NTNP, using a multi-criteria appraisal and sensitivity testing, reduced the 18 corridors to five priority corridors for further investigation. The five corridors were:

- Newcastle City to Broadmeadow.
- Broadmeadow to John Hunter Hospital.
- Newcastle City to Mayfield.
- Newcastle City to Wallsend.
- Newcastle City to Charlestown.

TfNSW later combined the Newcastle City to Broadmeadow and Broadmeadow to John Hunter Hospital into one corridor, resulting in a total of four corridors for investigation.

## Framework and evaluation methodology

In November 2018, the Project Control Group (PCG) endorsed the Corridor Assessment Framework included in Figure 14, and the evaluation criteria for Phase 2 and 3 (i.e. the qualitative SMT and quantitative MCA criteria).

### Criteria

Nine evaluation criteria were identified and used for corridor evaluation in the Framework. The criteria are consistent and aligned with the Project Objectives. These are defined in Table 5.

**Table 5** Corridor assessment framework criteria and sub criteria

	Criteria	Sub-Criteria
1	Support workforce and education opportunities and precincts	<ul style="list-style-type: none"> <li>• Employment and productivity growth</li> <li>• Supporting education and business precincts</li> </ul>
2	Support delivery of an enhanced environment, amenity and resilience for quality of life	<ul style="list-style-type: none"> <li>• Place making and urban renewal opportunities</li> <li>• Supporting entertainment, retail and other precincts</li> <li>• Supporting exiting development precincts and opening new catchments</li> </ul>
3	Support housing close to jobs and services	<ul style="list-style-type: none"> <li>• Population and housing growth</li> </ul>
4	Transport outcomes and connectivity	<ul style="list-style-type: none"> <li>• LR travel times</li> <li>• Public transport user benefits</li> <li>• Mode shift</li> <li>• Integration with other public transport modes</li> <li>• Road network</li> <li>• Population, employment and major activity catchment serviced</li> </ul>

	Criteria	Sub-Criteria
5	Alignment with Government Priorities	<ul style="list-style-type: none"> <li>• Premiers Priorities</li> <li>• State Priorities</li> <li>• Future Transport 2056</li> <li>• Relevant Greater Newcastle planning and transport strategies</li> </ul>
6	Deliverability and Risk	<ul style="list-style-type: none"> <li>• Scope and constructability</li> <li>• Property impacts</li> <li>• Transport network impacts during construction</li> <li>• Environmental and planning</li> <li>• Risk</li> </ul>
7	Affordability	<ul style="list-style-type: none"> <li>• Capital expenditure</li> <li>• Operating and maintenance cost</li> <li>• Farebox revenue</li> <li>• Potential value sharing opportunities</li> <li>• Potential funding</li> </ul>
8	Stakeholder support	<ul style="list-style-type: none"> <li>• Stakeholder support</li> <li>• Community support</li> </ul>
9	Economic Feasibility (MCA only)	<ul style="list-style-type: none"> <li>• Economic appraisal results</li> </ul>

### 5.2.3 Phase 2 – Option Evaluation

#### Strategic Merit Test and Multi-Criteria Analysis

In 2018, the Project team assessed the shortlisted corridors within a SMT and MCA. The four corridors were:

- Newcastle City to John Hunter Hospital, via Broadmeadow.
- Newcastle City to Mayfield.
- Newcastle City to Wallsend.
- Newcastle City to Charlestown

The successive chapters will appraise the four corridors based on the evaluation criteria, concluding with a summary of the results in Chapter 9 of this SBC.

### 5.2.4 Phase 3 – Preferred Corridor/s

The findings from the MCA will inform the decision-making on prioritising short to medium term infrastructure spending for public transport in Greater Newcastle, and specifically into services along the preferred corridor.

# 6 Corridor Options Definition

## Summary

- The light rail services have been defined to follow the operating patterns and design of Stage 1 of the Project.
- This Chapter explores the option of building a light rail in each of the four corridors:
  - **Newcastle City to John Hunter Hospital Corridor:** This corridor connects the Newcastle City Centre with the John Hunter Hospital. The corridor services communities in Hamilton, Broadmeadow, New Lambton Heights and New Lambton with the potential to also connect with the Broadmeadow station.
  - **Newcastle City to Mayfield Corridor:** The alignment exits Newcastle Interchange on to Hunter Street. The corridor services communities in Tighes Hill, Islington and Mayfield. It travels in the centre of the road along Hunter Street and over the railway overbridge on to the Pacific Highway. The alignment is centre running on the Pacific Highway towards the Newcastle TAFE.
  - **Newcastle City to Wallsend Corridor:** Running along Donald Street, Griffiths Road and Newcastle Road to connect the Newcastle City Centre with the terminus in Wallsend. The corridor provides access to the Newcastle Entertainment Centre, MacDonald Jones Stadium and shopping centres in Jesmond and Wallsend. The corridor services communities in Wallsend, Hamilton, Islington, Lambton and Jesmond.
  - **Newcastle City to Charlestown Corridor:** The corridor runs south along Gordon Avenue through Hamilton South to the Pacific Highway. The corridor connects Newcastle Interchange to communities along the route in Hamilton South, Merewether, Merewether Heights, Adamstown Heights, Highfields and Charlestown. The corridor also services Charlestown Square shopping centre.
- This chapter also defines the operations/rolling stock for the purpose of the corridor assessment (i.e. MCA).

## 6.1 Overview

This chapter outlines the systems and infrastructure requirements for a light rail corridor between Newcastle Interchange and:

- John Hunter Hospital
- Mayfield
- Wallsend
- Charlestown.

## 6.2 The role of Light Rail

Any extension to Stage 1 of the Project will need to continue the success of legible place-making infrastructure, support Newcastle's expanded economy and connect housing to jobs, services and recreation. Light rail may create positive and wider accessibility impacts such as connectivity for pedestrians and cyclists through enhanced footpaths, shared paths, crossing points and links to and from city centre's to the outer precincts.

## 6.3 Light rail service and infrastructure assumptions

The Project team has assumed the same operational assumptions as Stage 1.<sup>24</sup> The key operational and design assumptions are:

- Operational assumptions:
  - Stage 1 and the proposed Stage 2 to operate as one line.
  - The total span of operational hours is 5am to 1am, 365 days each year:
    - 7.5-minute frequency between core hours of 7 am and 7 pm and during special events
    - 15-minute frequency outside of core hours (including weekends and public holidays)
    - Event services as required to support access to Broadmeadow
  - Light Rail frequency, vehicles and operation are as Stage 1:
    - Light Rail Vehicles (LRVs) to be the same as Stage 1 (33m long and approximately 200 person capacity).
  - The maximum speed of the light rail track alignment can match the highway speed.
- Design assumptions:
  - No impact on the highways when the light rail track alignment is located on the side of the road.
  - A road lane has been taken as 3.5m and a shared footpath has been taken as 2.5m. These widths are consistent with RMS Guidelines.
  - The Newcastle Interchange track level is 2.460m.
  - Single track terminus for all options and 8-minute turnaround time at the depot.
  - 2 spare LRTs required as part of the fleet.

### Staging considerations

As part of the feasibility investigation, potential staging options have been considered for each corridor. A staged delivery approach can have several benefits, including:

- Targeting high priority areas.
- Integration with key urban renewal projects underway.
- Delay potential high cost infrastructure options not required in the short term.

---

<sup>24</sup> NLRE v1.10 Dec 2015

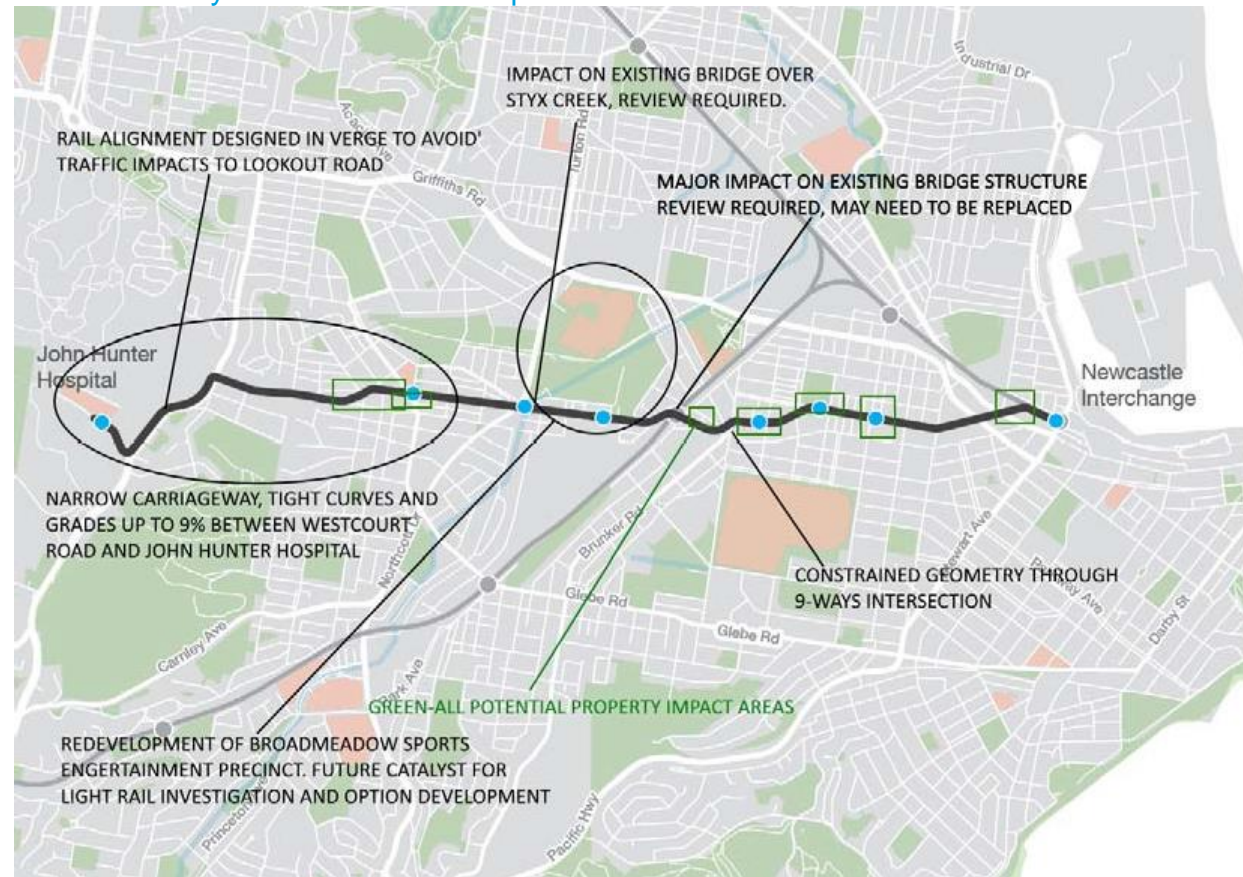
The Project team will need to justify each stage of the light rail. Each stage would need to integrate with the transport system, benefit the community and be technically feasible.

## **6.4 Scope/overview of Four Alignment**

This section defines and describes each of the transport corridors, including length, stops, staging, and design opportunities.



## Newcastle City to John Hunter Hospital Corridor



**Corridor benefits:** This corridor connects the Newcastle City Centre with the John Hunter Hospital. The corridor services communities in Hamilton, Broadmeadow, New Lambton Heights and New Lambton with the potential to also connect with into Broadmeadow station. The corridor also provides potential connections to the Broadmeadow Sports and Entertainment precinct.

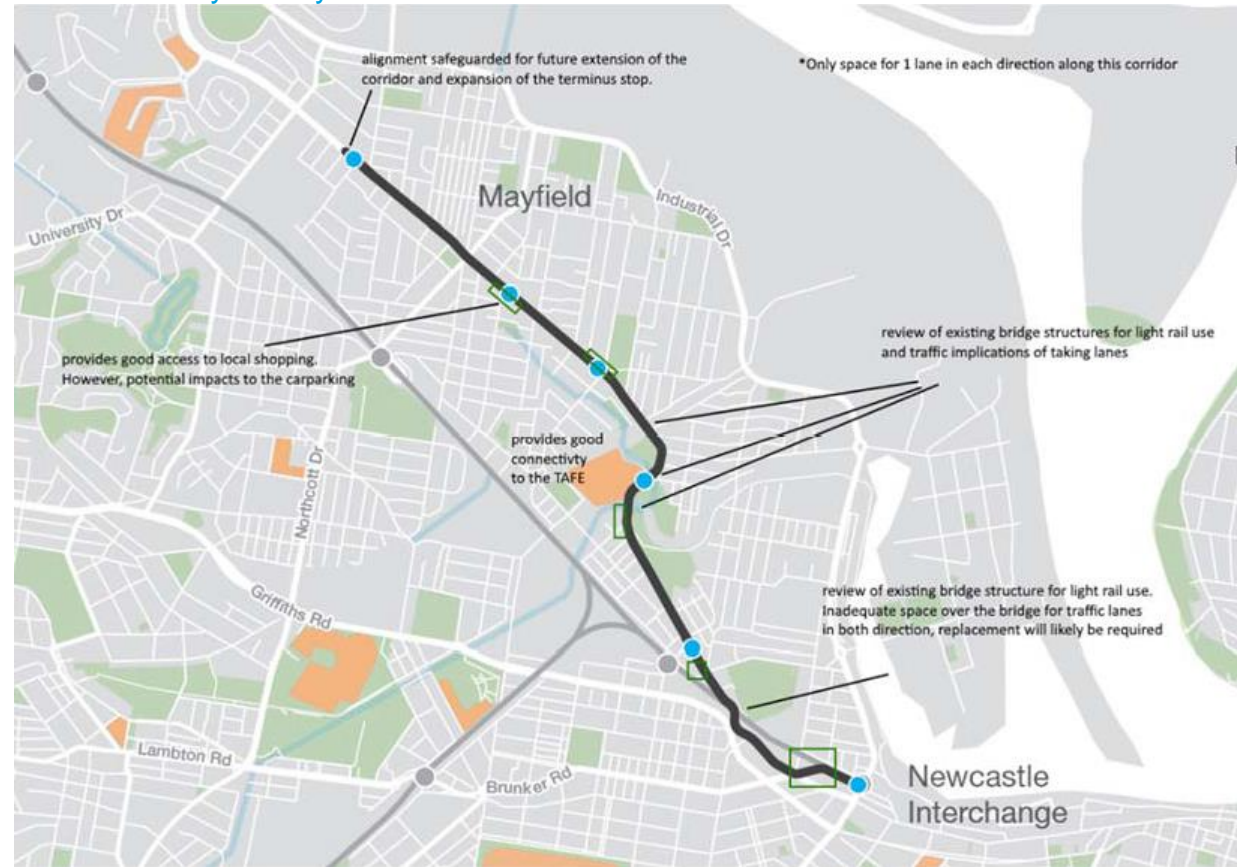
<b>Total journey time:</b>	30 minutes
<b>Length:</b>	6.656km
<b>Number of stops:</b>	7
<b>Number of major structures:</b>	2 Bridges
<b>Number of LRVs required:</b>	6 LRVs in addition to Stage 1 LRVs (6 LRVs)
<b>Key complexities:</b>	Structural adequacy of bridges, property impacts, high grades

**Design overview:** The alignment exits Newcastle Interchange on to the centre of Tudor Street. It passes through a complex 9-way intersection and over the existing rail overbridge near Broadmeadow station. The alignment continues straight onto Lambton Road and passes through a major intersection with Turton Road on the way to New Lambton. The alignment is centre running and continues onto Russell Road. It travels along the narrow Russell Road corridor up to the intersection with Lookout Road. The alignment turns left at the intersection into the median north of Lookout Road and travels along and up to the entrance at John Hunter Hospital. At the entrance, the alignment curves right and travels down towards the main front entrance of the hospital where the terminus is located.

Features	Details
Opportunities	<ul style="list-style-type: none"> <li>Investigate the full impact on the roads and adjacent properties through alignment optimisation.</li> <li>Reduce property impact through further study into Newcastle – Tudor street section.</li> <li>Dedicated bridge for light rail track over the railway at Broadmeadow station may reduce road traffic impacts.</li> <li>Integrate with proposed redevelopment of Broadmeadow Sports and Entertainment Precinct.</li> <li>Investigate use of catenary technology for steeper grades at the end of the corridor.</li> <li>Optimise stop locations.</li> </ul>
Assumptions and constraints	<ul style="list-style-type: none"> <li>Potential issues with grades that will require further review.</li> <li>Structural adequacy of bridges along the corridor to support light rail is not determined.</li> <li>Existing road reserve in several places is insufficient to accommodate light rail and traffic. Without significant widening, it may reduce road capacity at intersections.</li> <li>Impact on property is expected along the alignment to accommodate both light rail and traffic.</li> <li>Potential closure of Russell Road and resulting vehicular traffic/ property impacts</li> <li>Use of the existing over rail bridge at Broadmeadow is a potential construction risk</li> </ul>
Staging	<ul style="list-style-type: none"> <li>A large proportion of the constraints are after New Lambton (i.e. the excessive grades and narrow road corridor).</li> <li>Two possible staging options were identified, Broadmeadow and New Lambton.</li> <li>As a connection with Broadmeadow would align with the existing heavy rail corridor, and would not connect with the proposed redevelopment of the Broadmeadow Entertainment Precinct, the Project team investigated staging the connection between Newcastle Interchange and New Lambton as Stage 1 of the John Hunter Corridor.</li> <li>A terminus adjacent to Wests Leagues Club at 246 Lambton Road and 84 Tauranga Road was selected as a likely staging point. This location has a challenging rail design, due to the upward sloping vertical grade of Lambton Road and the downward sloping grade of the two lots.</li> </ul>
Integrated transport	<ul style="list-style-type: none"> <li>Integrate with connecting buses at key interchanges (Broadmeadow, New Lambton and JHH)</li> </ul>
Potential stop location and design	<ul style="list-style-type: none"> <li><b>Beaumont Street:</b> Provides access to local Islington town centre.</li> <li><b>Steel Street:</b> Accessibility to Gregson Park.</li> <li><b>Blackall Street:</b> Proximity to Broadmeadow rail station.</li> <li><b>Hunter School of the Performing Arts:</b> Provides access to the school.</li> <li><b>Turton Road:</b> Proximity to the Broadmeadow Sports and Entertainment Precinct.</li> <li><b>Tauranga Road:</b> Accessibility to Wests New Lambton club and the local New Lambton town centre.</li> <li><b>John Hunter Hospital:</b> Good potential terminus with accessibility to the hospital.</li> </ul>
Traffic impacts	<ul style="list-style-type: none"> <li>Impact at constrained nine-way intersection</li> </ul>
Major structures	<ul style="list-style-type: none"> <li>Bridge over the railway at Broadmeadow station</li> <li>Bridge over Styx Creek.</li> </ul>



## Newcastle City to Mayfield Corridor



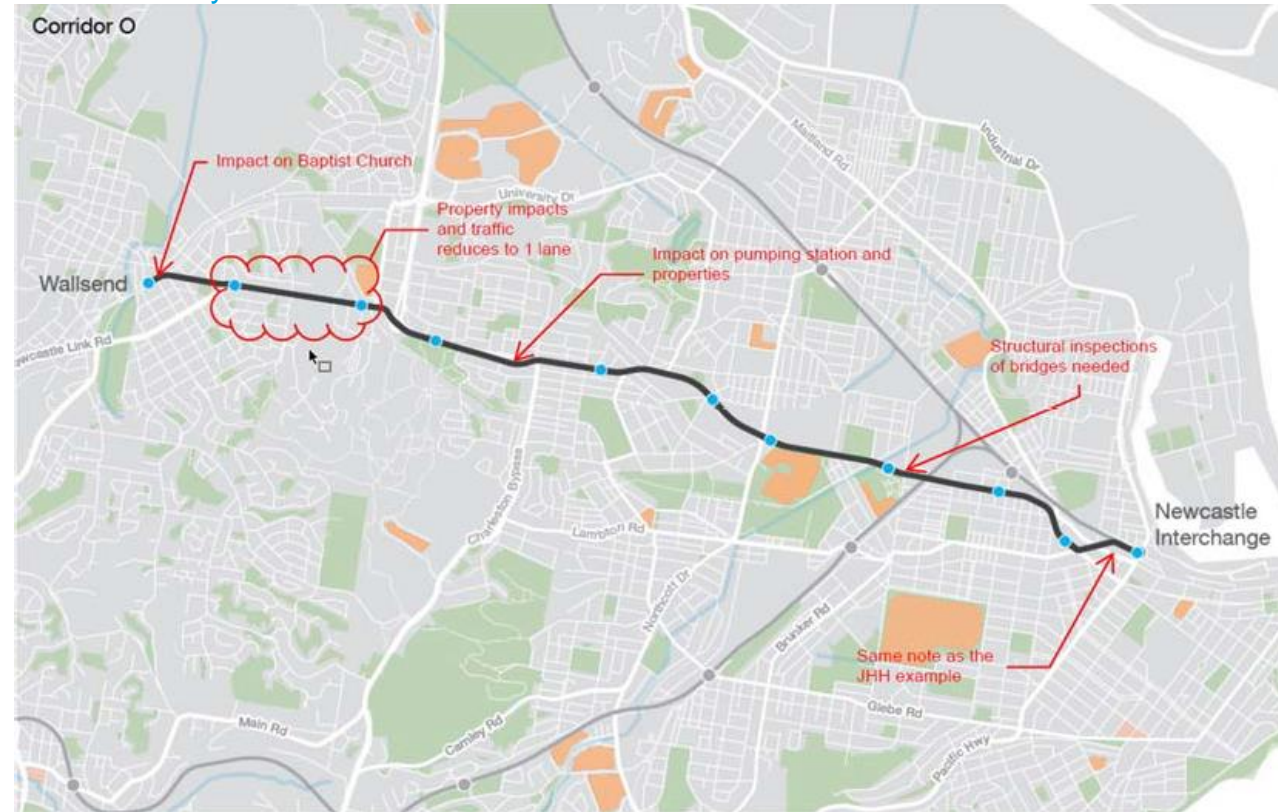
**Corridor benefits:** Proposed to run north along the Pacific Highway and connect residential precincts in the Mayfield and Mayfield West area to local shopping districts, TAFE NSW Newcastle and the Newcastle City Centre.

<b>Total journey time:</b>	25 minutes
<b>Length:</b>	5.083km
<b>Number of stops:</b>	5
<b>Number of major structures:</b>	4 Bridges
<b>Number of LRVs required:</b>	4 LRVs in addition to Stage 1 LRVs (6 LRVs)
<b>Key complexities:</b>	Structural adequacy of bridges, property impacts, insufficient road reserve

**Design overview:** The alignment exits Newcastle Interchange on to Hunter Street. It travels in the centre of the road along Hunter Street and over the railway overbridge on to the Pacific Highway. The alignment is centre running on the Pacific Highway towards the Newcastle TAFE. From the intersections at Hubbard Street and Bryant Street, the alignment shifts to the east to reduce traffic impacts outside the TAFE and to use available green space to the east. The alignment crosses two bridges in this area over Styx Creek and Throsby Creek. The alignment returns to centre running on the Pacific Highway at Bryant Street, passing the rail overbridge and onto the terminus at Mayfield.

Features	Details
Opportunities	<ul style="list-style-type: none"> <li>Investigate the full impact on roads and adjacent properties through design optimisation.</li> <li>Potential extension to University of Newcastle and communities in Mayfield West and Warabrook.</li> <li>Further optimise stop locations and the integration with existing bus services.</li> </ul>
Assumptions and constraints	<ul style="list-style-type: none"> <li>Potential issues of width on structures and adjoining property.</li> <li>Structural adequacy of existing bridges to support light rail track is not determined.</li> <li>Existing road reserve in several places is not sufficient to accommodate light rail and traffic. The Project may reduce road capacity at intersections without significant street widening.</li> <li>There are significant property impacts leaving the Newcastle Interchange.</li> <li>Properties to the north of Stop 3, between Silsoe Street and Fawcett Street are potentially impacted.</li> <li>Rail alignment moves southward to accommodate wide track centres for island platform at Stop 4. The Woolworths carpark and property on the corner of Valencia St are potentially impacted.</li> </ul>
Staging	<ul style="list-style-type: none"> <li>Staging options where considered at: <ul style="list-style-type: none"> <li>Newcastle TAFE on Maitland Road.</li> <li>Adjacent the Woolworths on Maitland Road.</li> </ul> </li> <li>Neither option is suitable for staging due to insufficient generated significant trip demand, minimal patronage and they do not provide substantial land use benefits.</li> </ul>
Integrated transport	<ul style="list-style-type: none"> <li>Will support flow of Pacific Highway by easing traffic impacts adjacent to the TAFE.</li> <li>Only enough space for one general traffic lane in each direction along the corridor.</li> </ul>
Potential stop location and design	<ul style="list-style-type: none"> <li><b>Beaumont Street:</b> Provides access to local Islington town centre.</li> <li><b>Tighes Terrace:</b> Adjacent to Newcastle TAFE, a major potential trip generator.</li> <li><b>Silsoe Street:</b> Accessibility to local recreational facilities of Dangar Park, Mayfield Swimming Centre and Bowling Club.</li> <li><b>Woolworths Mayfield:</b> Accessibility to local Mayfield town centre and potential to utilise car park space.</li> <li><b>Frith Street</b></li> </ul>
Traffic impact	<ul style="list-style-type: none"> <li>Potential impacts to car park at Mayfield shopping district, Selma Street, Albert Street, Beaumont Street, Hubbard Street, Elizabeth Street, Ingall Street, Silsoe Street, Church Street, Valencia Street, Hanbury and potentially Maude Street.</li> </ul>
Major structures required	<ul style="list-style-type: none"> <li>Bridge over Railway Line.</li> <li>Bridge over Throsby Creek.</li> <li>Bridge over Styx Creek.</li> <li>Bridge over Railway Line.</li> </ul>

## Newcastle City to Wallsend Corridor



**Corridor benefits:** Running along Donald Street, Griffiths Road and Newcastle Road to connect the Newcastle City Centre with the terminus in Wallsend. The corridor provides access to the Newcastle Entertainment Centre, MacDonald Jones Stadium and shopping centres in Jesmond and Wallsend. The corridor also connects communities along the route in Hamilton North, Waratah, North Lambton and Jesmond.

<b>Total journey time:</b>	37 minutes
<b>Length:</b>	9.050km
<b>Number of stops:</b>	10
<b>Number of major structures:</b>	2 Bridges
<b>Number of LRVs required:</b>	7 LRVs in addition to Stage 1 LRVs (6 LRVs)
<b>Key complexities:</b>	Structural adequacy of bridges, property impacts, high grades

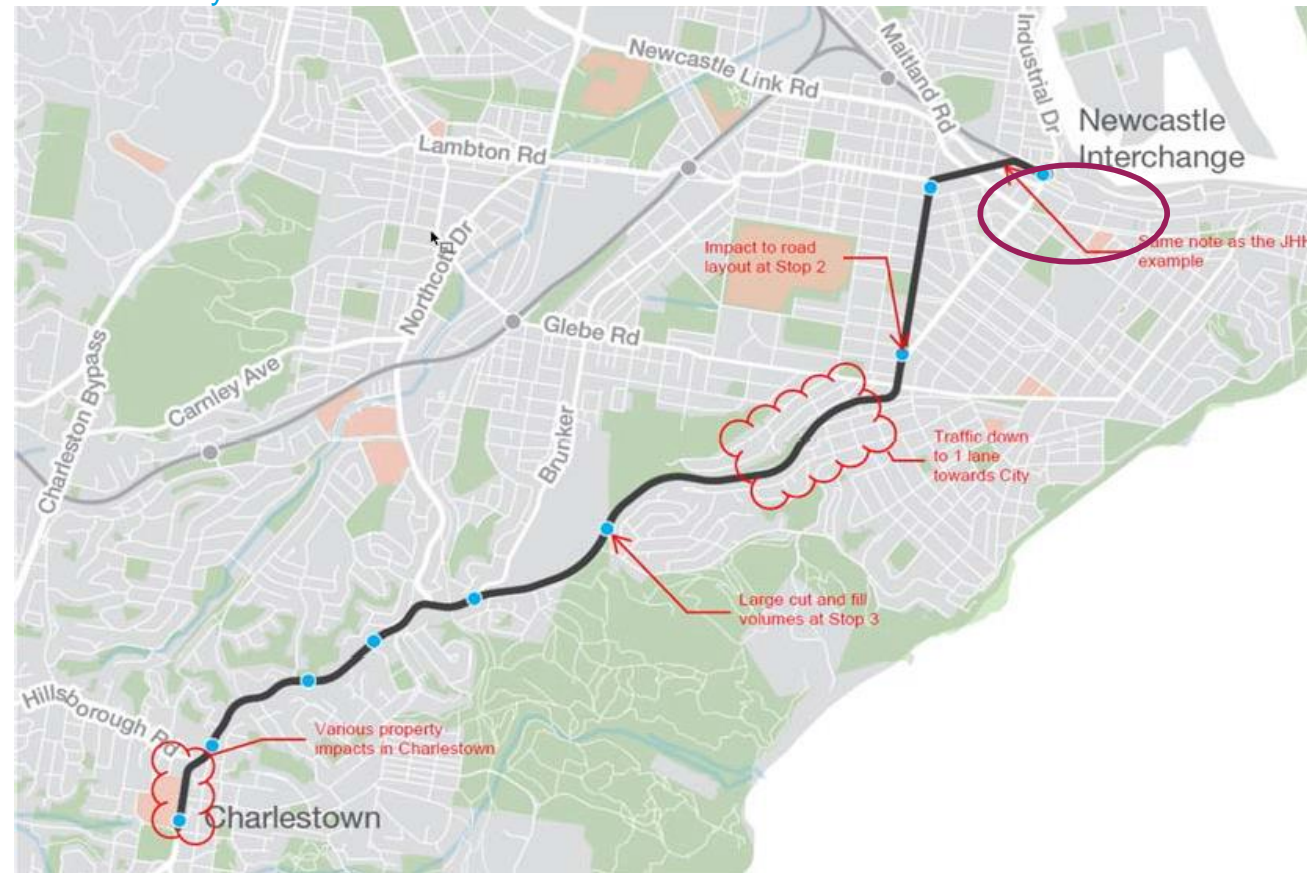
**Design overview:** The alignment exits Newcastle Interchange onto Tudor Street. It then turns right on to Parry Street and straight through the intersection with Selma Street.

The alignment continues centre running on Donald Street and crosses the heavy rail and Styx Creek via two bridges. The alignment continues in the centre of the road past the Turton Road intersection. Between Turton Road and Kahibah Road, the road corridor diverges but the rail alignment follows the eastbound road lanes. After Kahibah Road, the alignment is centre running until Dent Street. The road corridor again diverges before converging again at Robinson Avenue. The alignment continues through the roundabout at Main Road and in the centre of the road until the roundabout at Thomas Street. It continues through this roundabout and continues on to Wallsend Shopping Centre. At the shopping centre, it turns left on to the carpark adjacent to Cowper Street where the terminus is located.

Features	Details
Opportunities	<ul style="list-style-type: none"> <li>• Reduce property impact through further study into Newcastle.</li> <li>• Investigate the full impact to roads and adjacent properties through alignment optimisation.</li> <li>• Investigate the possibility of using wired LRT technology to negotiate the steeper grades.</li> <li>• Optimise stop locations to avoid steep grades and vertical curves.</li> <li>• Relocate terminus to opposite side of the road to avoid impacting the Baptist Church.</li> </ul>
Assumptions and constraints	<ul style="list-style-type: none"> <li>• Potential issues with grades that will require further design review.</li> <li>• Structural adequacy of bridges along the corridor to support light rail is not determined.</li> <li>• Impact on the capacity of the road network along the alignment (Newcastle Road and M1).</li> <li>• Impact on property is expected along the alignment to accommodate both light rail and traffic.</li> </ul>
Staging	<ul style="list-style-type: none"> <li>• Staging options where considered at: <ul style="list-style-type: none"> <li>– Broadmeadow adjacent to John Hunter Stadium, and</li> <li>– A staged delivery of light rail at Broadmeadow would allow for a connection with the proposed Broadmeadow Sports and Entertainment precinct and would provide access for local residents in the city's north and Hamilton. Jesmond shops form a key mixed-use precinct and would provide an option for staged delivery of the light rail along Newcastle Road. Staging to this location would remove impact on the existing roundabout that provides access to the M1.</li> </ul> </li> </ul>
Integrated transport	<ul style="list-style-type: none"> <li>• Will need to integrate with main corridor to support flow of traffic</li> </ul>
Potential stop location and design	<ul style="list-style-type: none"> <li>• <b>Parry Street:</b> Provides access to local Islington town centre.</li> <li>• <b>Bennett Street:</b> Accessibility to local Hamilton town centre.</li> <li>• <b>Newcastle Showground:</b> Ability to cater for events at the Showground and the Farmers Market</li> <li>• <b>Turton Road:</b> Accessibility to McDonald Jones Stadium and the wider Broadmeadow Sports and Entertainment Precinct.</li> <li>• <b>Kahibah Road:</b> Accessibility to adjacent industrial and residential areas in Lambton and Waratah.</li> <li>• <b>Ulan Road</b></li> <li>• <b>Jesmond Park:</b> Accessibility to the adjacent Jesmond Park and surrounding residential areas</li> <li>• <b>Chalmers Road:</b> Proximity to Jesmond Shopping Centre</li> <li>• <b>Thomas Street:</b> Accessibility to residential areas in Wallsend</li> <li>• <b>Wallsend Shopping Centre:</b> A good potential terminus location with a large local shopping centre and town centre</li> </ul>
Traffic impacts	<ul style="list-style-type: none"> <li>• Potential impacts to car parking at Mayfield shopping district</li> </ul>
Major structures required	<ul style="list-style-type: none"> <li>• Bridge over Railway.</li> <li>• Bridge over Styx Creek.</li> </ul>



## Newcastle City to Charlestown



**Corridor benefits:** The corridor runs south along Gordon Avenue through Hamilton South to the Pacific Highway. The corridor connects Newcastle Interchange to communities along the route in Hamilton South, Merewether, Merewether Heights, Adamstown Heights, Highfields and Charlestown.

<b>Total journey time:</b>	34 minutes
<b>Length:</b>	8.672km
<b>Number of stops:</b>	8
<b>Number of major structures:</b>	n/a
<b>Number of LRVs required:</b>	7 LRVs in addition to Stage 1 LRVs (6 LRVs)
<b>Key complexities:</b>	Property impacts, high grades, interface with Pacific Hwy

**Design overview:** The alignment exits Newcastle Interchange on to the centre of Tudor Street and continues along Tudor Street before turning left on to Gordon Avenue. It travels along the centre of Gordon Avenue and straight on to City Road. The alignment then travels along City Road, shifting into the verge north of the road corridor after Alice Street. The alignment continues in the verge until the Brunker Road intersection. At this point, the alignment returns to the centre of the road and then continues along the road corridor to Charlestown. The alignment terminates at the intersection of the Pacific Highway and Frederick Street.

Features	Details
Opportunities	<ul style="list-style-type: none"> <li>Investigate the full impact on the roads and adjacent properties through alignment optimisation.</li> <li>Reduce property impact through further study into Newcastle – Tudor street section.</li> <li>Reduce impact on the Pacific Highway by crossing light rail track to side of road when highway speeds are over 70kph.</li> <li>Optimise stop locations.</li> <li>Consider lateral movement of the alignment to improve cut and fill when not located in the road corridor (e.g. around Stop 3).</li> <li>Add additional road/turning lanes at the south end of Gordon Avenue before the intersection with Glebe Road.</li> </ul>
Assumptions and constraints	<ul style="list-style-type: none"> <li>Alignment runs adjacent to the Pacific Highway, significant impact on the capacity and operations of the road corridor.</li> <li>Property impact is expected in various sections along the alignment to accommodate both light rail and traffic.</li> </ul>
Staging	<ul style="list-style-type: none"> <li>Staging options were considered adjacent to Gordon Avenue and Glebe Road.</li> <li>The Project team found that this option did not provide enough benefit with only two additional stops. Staging options along the Pacific Highway were not seen as feasible.</li> </ul>
Integrated transport	<ul style="list-style-type: none"> <li>Will need to integrate with City Road to support flow of traffic</li> </ul>
Potential stop location and design	<ul style="list-style-type: none"> <li><b>Gordon Avenue:</b> Serves the inner-city area, access to schools, shops and local green space.</li> <li><b>Pulver Street:</b> Serves the inner-city area, access to schools, shops and local green space. Connection to local bus services.</li> <li><b>Scenic Drive:</b> Accessibility to adjacent residential areas.</li> <li><b>Brunker Road:</b> Accessibility to adjacent residential areas.</li> <li><b>George Street:</b> Accessibility to adjacent residential areas.</li> <li><b>Madison Drive:</b> Accessibility to adjacent residential areas.</li> <li><b>Ida Street:</b> Accessibility to adjacent Hoyts and potential for urban renewal.</li> </ul>
Traffic impacts	<ul style="list-style-type: none"> <li>Potential impact on City Road where traffic narrows down to 1 lane towards city</li> </ul>
Major structures	<ul style="list-style-type: none"> <li>Bridge over the railway at Broadmeadow station.</li> <li>Bridge over Styx Creek.</li> </ul>

## 6.5 Depot

The design of a light rail depot must respond to a complex, and interdependent set of requirements. The design of a depot requires detailed planning and development, however at a high-level there are several key characteristics. Though not an exhaustive list, these characteristics will help identify potential sites for further investigation. The characteristics are:

- Site position.
- Access.
- Size and shape of the land.
- Potential environment factors (grade, typology, environmental issues).
- Land ownership.

The current Stage 1 light rail depot is at capacity and cannot accommodate any additional LRVs as part of the future extension. The preference is that any new facility also provides capacity for the existing LRVs. This would allow the current Newcastle City Centre site to be redeveloped in the future. As such, a 14 LRV facility has been allowed for by this Project. As a guide, the existing Gold Coast Light Rail Depot has been used for the size and layout.

## 6.6 Operations/Rolling Stock

### 6.6.1 Fleet Size

The investigation has calculated fleet size assuming a 7.5-minute maximum service frequency and an 8-minute turnaround time at the terminus. In addition, it is assumed that 2 spare LRVs will be required. Table 6 shows the fleet size for each corridor.

**Table 6** Corridor Fleet Size

Corridor	Total Fleet Size *	Stage 2 requirements
John Hunter Hospital	12 LRVs (10+2)	6 additional LRVs
Mayfield	10 LRVs (8+2)	4 additional LRVs
Wallsend	13 LRVs (11+2)	7 additional LRVs
Charlestown	13 LRVs (11+2)	7 additional LRVs

*\* Note: this calculation assumes that the Stage 2 extension is delivered in a timeframe that is consistent with the design life of the Stage 1 LRVs.*

Source: Arup, 2018, NLRE Feasibility Report

# 7 Economic Appraisal

## Summary

- The economic assessment provides relative economic merits of corridors as part of the corridor assessment (Multi-Criteria Analysis).
- The economic assessment identifies that none of the four options has a Benefit Cost Ratio (BCR) above one. This is mainly a result of low-cost savings to bus operations, low public transport benefits and significant (dis)benefits to car users based on current assumed alignment.
- There are significant wider economic benefits, especially in improved job density, infrastructure delivery savings and land use benefits, including property price uplift potential. These benefits were not quantified for input into the Multi-Criteria Analysis at this time.

The economic appraisal framework applied in this SBC is consistent with the NSW Department of Finance's *Economic Appraisal Guidelines TPP 07-5*.

This chapter addresses the following areas:

- The economic appraisal framework which has been adopted for this Project including the method of economic evaluation, assumptions, limitations and the base case.
- The benefit assessment framework and links to the Project need.
- The assessment of quantifiable and non-quantifiable economic benefits.
- The cost benefits analysis, sensitivity analysis and summary of each option.

## 7.1 Economic Appraisal Framework

### 7.1.1 Assumptions

The economic assumptions adopted for the assessment are in line with TfNSW (July 2018), *NSW Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives* and transport modelling using the Public Transport Project Model (PTPM).

### 7.1.2 Base Case

The economic appraisal measures benefits and disbenefits as a deviation from the base case. The base case assumes that no new light rail or heavy rail projects are undertaken in Greater Newcastle until after 2054.

Buses are assumed to operate on similar schedules and routes to those they operate on now. No other infrastructure or transport developments that significantly change transport patterns are assumed to take place in the economic model.

## 7.2 Benefit framework and link to the need for investment

The primary benefits considered in the economic analysis include:

- **Public transport user benefits** - public transport users will have an improved transport experience, through a combination of shorter travel times, better comfort, lower costs or improved transitions
- **Car user benefits** - car users will experience a change in their travel times and patterns from light rail options.
- **Environmental benefits** - each transport option generates negative environmental externalities, from emissions from bus and car exhaust to carbon emissions from coal burnt to generate the electricity to run the light rail, to noise and dust pollution.
- **Savings in bus operating costs** - the light rail options will remove buses from the network and save costs.
- **Residual asset value** - this represents the remaining value of the transport infrastructure, including the light rail rolling stock.
- **Property uplift and transaction activity benefits (not quantified)** – directly attributable uplift to the unimproved capital value of property within a certain catchment area. This includes the uplift and resultant transaction activity in real estate generated as a result.
- **Place making and urban renewal benefits (not quantified)** - investment in public domain and community infrastructure which would otherwise not happen as a result of the base case.

### 7.3 Transport Modelling and Patronage

One of the major impacts expected from each of the options is a change in travel patterns and associated costs over the base case. These impacts were estimated using the PTPM. PTPM is based on observed travel patterns for a base year and extrapolated based on population and employment growth. The transport modelling undertaken in late 2018 used the forecast patronage for Newcastle light rail stage 1. The patronage, since opening in February 2019, is still evolving with variations due to growth and seasonality.

The outputs of the PTPM include changes in travel kilometres by mode and purpose, travel times, and trip numbers. These outputs inform the economic analysis.

**Table 7** Patronage by corridor

Corridor (to Pacific Park)	Length (km)	Weekday Patronage	Weekday Patronage by km
John Hunter Hospital	8.6	3,090	359
Mayfield	7.6	2,237	294
Wallsend	11.6	3,744	323
Charlestown	11.2	3,651	326

*Note: Daily patronage results are based on volume expansion factors used in TfNSW guidelines. SGS, 2018, Economic and Financial Appraisal of Newcastle Light Rail Extension Options*



## 7.4 Cost Benefit Analysis

The Cost Benefit Analysis (CBA) considers the total costs against total benefits to derive a net present value (NPV) and Benefit Cost Ratio (BCR). The BCR is the ratio of the present value of benefits to the present value of costs. A Discounted Cash Flow (DCF) model has been developed that details the costs and benefits discussed above for each option relative to the base case.

Of the four options considered, the corridor extended to John Hunter Hospital returns the highest BCR and total benefits of \$66.7 million when discounted at 7 percent per annum.

This is largely driven by the bus operating cost savings and relatively low car user disbenefits compared to other options. The car user disbenefits are largely driven by the reduced road capacity along the corridors. However, it is noted that:

- Greater Newcastle has a low public transport mode share - therefore benefits are likely to be low when compared to the disbenefits to car users.
- No detailed refinement to road and background bus network has been undertaken, due to the level of design at this time.
- Light rail services and stop locations have not been optimised to minimise car user impacts.
- No densification in land use has been assumed in the demand modelling at this point in time, which would have otherwise driven up the light rail patronage and lowered the car usage share, thereby reducing the car user disbenefits.

### 7.4.1 Assessment of Options

The CBA shows that none of the Project corridor options have a BCR above 1.0.

#### **John Hunter Corridor**

The John Hunter Corridor is the only option which returns a positive BCR (based on the 7% discount rate).

This is largely driven by the bus operating cost savings and relatively low car user disbenefits compared to other options. The low car user (dis)benefits are reflective of the fact the corridor does not serve as a movement corridor in the same way the other three corridors do at this point in time.

#### **Mayfield Corridor**

The Mayfield Corridor results in the lowest capital costs while its car user disbenefits are comparatively low. It does however has minimal bus operating cost savings and low public transport user benefits.

The low bus operating cost savings are due to lower bus frequency on the corridor in comparison to other corridors. There are less disbenefits on car users as the corridor is 4-6 lanes wide and therefore the reduction in road availability shows a lessened impact when compared with other corridors.

#### **Wallsend Corridor**

The Wallsend Corridor option has the greatest total costs, in addition to significant car user disbenefits. The corridor results in the largest public transport benefits across all options, aided by its longer corridor length and therefore larger benefit capture area.

However, Wallsend option has a large car user disbenefits due to its role as an essential traffic corridor between the Western Suburbs of Newcastle, Maitland, Cessnock to inner Newcastle, a

primary connector to the M1 motorway to Sydney and the Hunter Expressway, which connects with the New England Highway.

### **Charlestown Corridor**

The Charlestown Corridor is similarly impacted by high car user (dis)benefits, moderate public transport benefits and bus operating saving benefits. It is a major north/south corridor which connects Eastern Lake Macquarie and the southern suburbs to inner Newcastle. The bus operating cost savings are lower as a result of less frequency than the John Hunter Corridor Option.

## **7.5 Assessment of Qualitative Benefits**

Qualitative benefits refer to those which have not been monetised, yet still are likely to have an economic impact on the Project's capital expenditure.

### **7.5.1 Property Uplift and Transaction Activity**

Light rail has the potential to act as a catalyst in improving property values beyond normal market-wide increases (deviation from the base case). The relationship between light rail investment and property price increases has been pronounced during the planning and design phase post announcement, especially in catchments close to, but not in immediate proximity to Light Rail corridor.<sup>25</sup>

There is also case study evidence of a secondary spike 1-2 years after becoming operational.

A secondary impact is the potential for value capture mechanisms being successfully implemented to derive direct financial benefits. This has been applied in the case of transport and rail projects in Australia, including Gold Coast Light Rail.<sup>26</sup>

Based on significant property stimulation generated in Stage 1, there is likely to be significant indirect economic benefit in the form of property transaction activity. The benefit would be derived from the increased economic stimulation beyond normal levels of activity and uplift, with attributable transaction activity in real estate markets.

For this Project, the impacts are likely to vary significantly based on each corridor.

### **7.5.2 Place making and urban renewal benefits**

A flow-on benefit from increased investment in transit-oriented development is place making and urban renewal benefits. These can be realised and directly attributed to light rail.

Light rail is a significant catalyst in improving the place making and public domain. Multiple light rail projects globally, as well as in Australia, including Gold Coast Light Rail, have helped deliver additional investment in property development, public domain improvements and private market investment. It is likely that based on the transformational scale of the Project Stage 2, there would be significant place making and urban renewal benefits across each corridor.

### **7.5.3 Construction and Local Business Impacts**

Nearly all transport projects have some level of dis-benefits to local businesses and local economic trading as a result of disruption during the construction phase. This is caused primarily either by

---

<sup>25</sup> McIntosh, James, Trubka, Roman, & Hendricks, Ben. 2016. Transit and Urban Renewal Value Creation. Tech. rept. Luti Consulting

<sup>26</sup> Murray, C (2016) University of Queensland, Land value uplift from light rail.

impact on access, shut-down periods, impacts on pedestrian mobility, reduced or removed parking and in some cases compulsory acquisition.

The estimated quantified impact on the local economy would be considered in the next Project stage. All corridors are likely to be impacted by disruption during the construction period.

# 8 Financial analysis and affordability

## Summary:

- The financial and cost assessment provides inputs to the economic assessment and the relative financial merits of corridors forms part of the corridor assessment (Multi-Criteria Analysis).
- Based on the assumed alignments for corridor comparison, the estimated capital cost of each project option is between approximately \$900m to \$1.5 billion.
- At a corridor level per kilometre of track, the Charlestown Route is the least expensive, whilst the John Hunter and Broadmeadow route is most-costly. However, assessing the total whole of life costs in for each option including revenue, the preferred option (John Hunter Corridor) has the lowest Net Present Cost (NPC).

## 8.1 Overview

This chapter includes an overview of the assumptions in the financial model and the total cost summary (capital costs and operating expenditure) for each corridor.

This chapter also considers the high-level cash flow and financing requirements of the preferred corridor option.

## 8.2 Financial methodology

The financial appraisal assessed projected Project revenues to meet its financial obligations as measured by the NPV of its cash flows. All revenues and expenditures resulting from the Project are taken into account. This calculation is used to evaluate the financial viability of a proposed project.

Financial appraisals differ from economic appraisals in the scope of their investigation, the range of impacts analysed and the methodology used. A financial appraisal views investment decisions from the perspective of the organisation undertaking the investment. It therefore measures only the direct cash flow effects of an organisation's investment proposal.

## 8.3 Key financial appraisal assumptions

The following key assumptions are applied to the financial modelling for each of the four corridors:

- The project timeline is the same as that used for the economic assessment; i.e. construction from 2020 – 2024 and operation from 2025 – 2054.
- The Public Transport Project Model (PTPM) produces outputs in 2017, 2026 and 2036. This means that it is not possible to estimate any change in farebox revenue during the construction period.
- Delivery strategy - All stages will be delivered under separate contracts.
- The existing depot will be relocated at a site that to be determined. The new depot's capacity would be large enough to house all LRVs including existing vehicles servicing Stage 1.

- For the Strategic Business Case estimate all four routes start from the same location, adjoining the completed Stage 1 project.
- No allowance has been included for property acquisitions for the depot or any other properties along the route.

## **8.4 Project Costs**

The Project costs first incorporate the capital expenditure costs (CAPEX). This covers all costs for the delivery of the project including design and construction. They next consider the operating expenditure (OPEX), which factors in the cost of operating and maintaining the infrastructure over the nominal lifespan of the Project (i.e. 30 years).

### **Delivery Phase cost analysis**

For the purposes of CBA, the construction costs are modelled exclusive of the Project contingency as per requirements in the appraisal guidelines. The construction costs show that the John Hunter Hospital Corridor is the most-costly corridor option based on a cost/km, while the Mayfield Corridor option is the least costly.

## **8.5 Project Revenues**

### **8.5.1 Incremental net revenue to government**

The main potential improvement to cashflow is an improvement in farebox revenue, as the light rail encourages more people to take public transport than drive.

This information is drawn from modelling outputs from the PTPM model, which estimates the increase in farebox revenue in 2016 dollars in 2026 and 2036. These were inflated to nominal dollars using a growth rate in farebox revenue of 2.7%, in line with the assumption used in the financial appraisal of the Stage 1 Project.

### **8.5.2 Value Capture and Betterment Levy**

Potential revenue generation from capturing value through sale transaction as a result directly attributable unimproved capital value (UCV) has not been considered at this stage. The same applies to potential implementation of a betterment levy. This would be considered in a final alignment option where the known catchment area could be assessed for total potential capture mechanisms.

# 9 Corridor Assessment Framework Results

## Summary

- The MCA concludes that the Newcastle City to John Hunter Hospital via Broadmeadow corridor is most suitable to become the next stage for Project extension. However, the MCA results, especially the economic assessment and travel demand, highlight that there is no urgent need for an immediate Project extension.
- The economic results also indicate the potential impact of light rail to the existing road capacity (i.e. taking away road capacity for light rail development will increase congestion along the corridor). Further alignment optimisation, for example, using additional road capacity within the corridor, may help to improve viability of a light rail solution.
- The MCA results highlight that there are strategic merits to extend Stage 1 of the Project, but there are several key prerequisites to reach a BCR above 1:
  - Further definition and investigation work in the next phase of Project definition to confirm the Project costs and reduce impacts to existing road capacity.
  - Further land use planning (undertaken by Newcastle City Council with other relevant planning authorities and stakeholders) to enable land use changes and prioritisation of strategic corridors and catalyst areas.
  - More detailed, precinct-based land use modelling to inform the timing of land use benefits from the Newcastle Light Rail extension.
  - Gradual shift in travel pattern and land use to build the foundation for mode shift from car-based to public-transport based travel.
- The technical assessments highlighted that there are technical difficulties (i.e. gradient issues) to implement the light rail section between New Lambton and John Hunter Hospital.

## 9.1 Overview

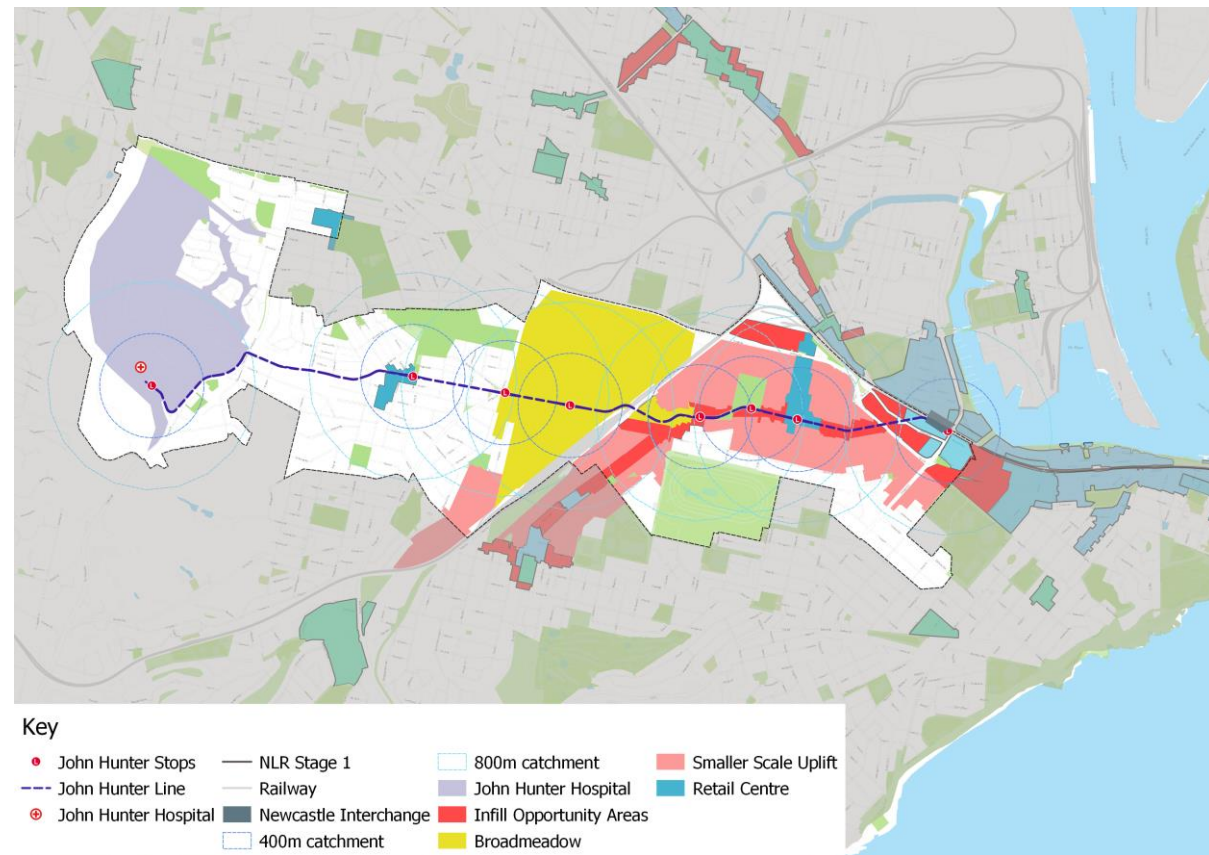
This chapter summarises the SMT and MCA assessment findings. The findings from the MCA and SBC will help prioritise spending on public transport along the four corridors assessed. TfNSW will continue to develop business cases to justify transport investments to further develop the preferred corridor/s.

## 9.2 Results by Corridor

This section highlights the MCA results by corridor.



Figure 15 John Hunter Hospital Corridor



Source: Corview, 2018

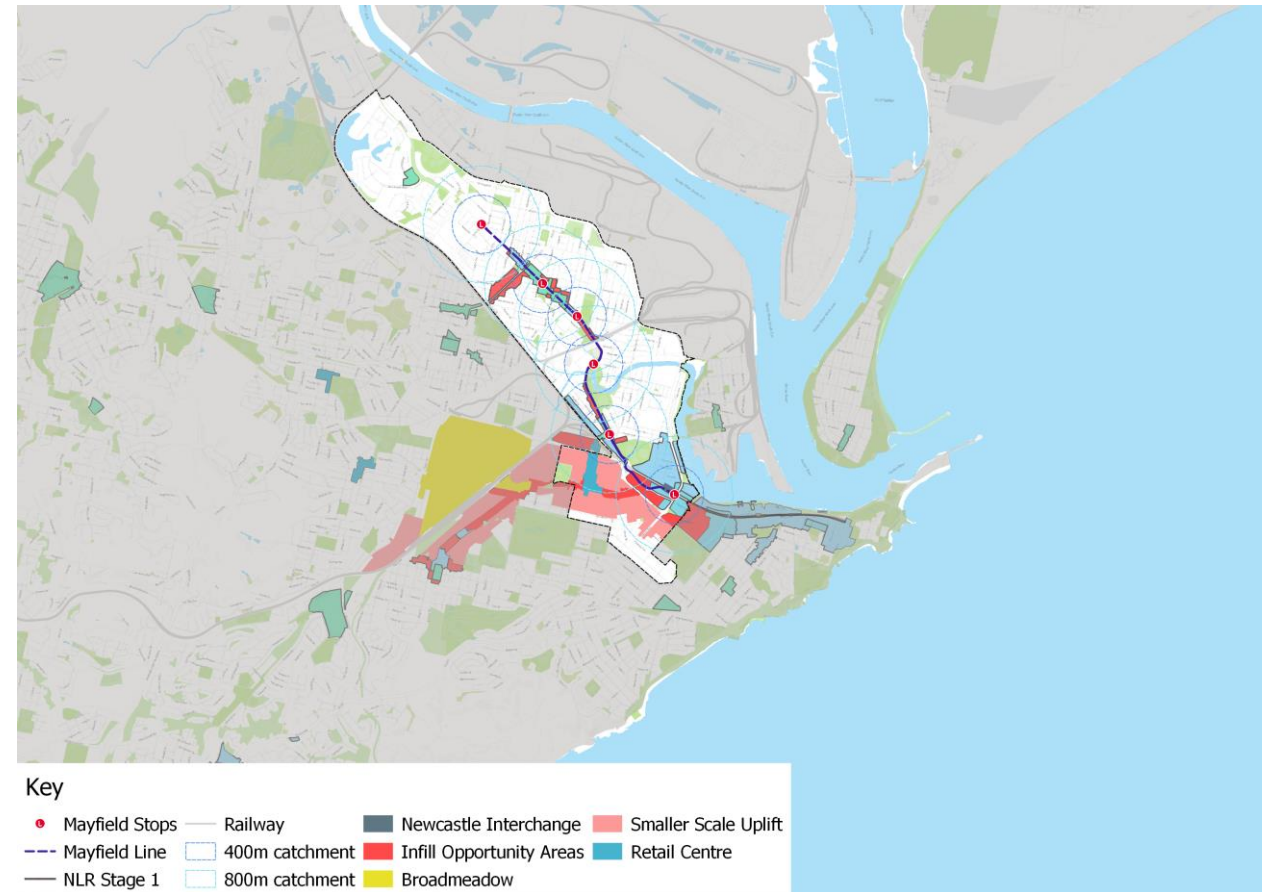
**Corridor benefits:** The Newcastle City to John Hunter Hospital, via Broadmeadow Corridor incorporates seven stops from Newcastle Interchange to John Hunter Hospital (excluding Newcastle Interchange). The first part of the route from Newcastle Interchange to Broadmeadow intersects multiple activation centres with significant urban renewal opportunities. Five of the seven stops are in the first stage east of Turton Road on the edge of the Broadmeadow Sports and Entertainment Precinct. The proposed route based on project feasibility is shown above

<b>Length:</b>	6.656km
<b>Number of stops:</b>	7

**Summary:** The John Hunter corridor performs strongly against all criteria except feasibility and affordability. These two issues are related, and constructability constraints and risks are driving its unaffordability. However, there are no known critical risks or Project inhibitors. The corridor has a positive BCR and alignment between strategic priorities, education, employment and housing goals.

Criteria	Results
Support workforce and education outcomes and precincts	<ul style="list-style-type: none"> <li>The John Hunter Corridor performs well against the sub-criteria as well as against each corridor as a result of the other corridors. This is primarily due to the confluence of multiple current and future employment activity catalyst areas along the corridor.</li> <li>The projected rate of employment growth in the baseline is 1.15% per annum growth (compounded), significantly greater than the Project Study Area (0.88%).</li> </ul>
Support delivery of an enhanced environment, amenity and resilience for quality of life	<ul style="list-style-type: none"> <li>The John Hunter Corridor offers a major opportunity to deliver place making and urban renewal. The corridor intersects multiple uplift areas and catalyst areas. The existing zoning emphasises the urban renewal potential, especially in the eastern part of the corridor. This is strongly reflected in the proposed stop locations across several precincts zoned for planned urban intensification.</li> <li>The corridor supports existing development precincts, a reflection of the significant R4 and B4 zoning along the Corridor as well as the major precincts in John Hunter and Broadmeadow</li> </ul>
Deliver housing close to jobs and services	<ul style="list-style-type: none"> <li>The corridor is forecast at a baseline to accommodate 5% of the total growth of the Project Study Area. This is lower than the 10% of the employment target. This emphasises the corridor potential to absorb a greater share of dwelling and population growth.</li> <li>A total of 14,146 housing capacity is identified for the corridor.</li> <li>185 dwelling completions per annum forecast in 15 years (2018-2032)</li> </ul>
Transport outcomes and connectivity	<ul style="list-style-type: none"> <li>The transport outcomes for the John Hunter Corridor show the corridor performs the best for ridership, peak loadings and transport benefits. It has the best transport outcomes against the three other corridor options.</li> </ul>
Alignment with Government Priorities	<ul style="list-style-type: none"> <li>The corridor aligns strongly with the <i>Newcastle 2030 Community Strategic Plan's</i> outcomes and strategies in providing an integrated and accessible transport network”                             <ul style="list-style-type: none"> <li>Outcome 1 - ‘Create a workforce skilled and ready for the new economy’.</li> <li>Strategy 4 – ‘Grow health precincts and connect the health network’.</li> </ul> </li> </ul>
Deliverability and Risk	<ul style="list-style-type: none"> <li>The John Hunter Corridor alignment is considered constructible, but has more challenges compared to other corridors, in particular the Charlestown and Wallsend Corridor.</li> <li>The current alignment between New Lambton and John Hunter Hospital has significant constructability issues, however, alignment optimisation could possibly mitigate or reduce the technical challenges with gradients.</li> </ul>
Affordability	<ul style="list-style-type: none"> <li>It is the most expensive option for \$/km, based on capital cost estimate (P50)</li> <li>It is the second most expensive option for OPEX costs (\$/km)</li> </ul>
Economic Feasibility	<ul style="list-style-type: none"> <li>The corridor is the best performing option and the only Corridor to have a positive economic benefit.</li> </ul>
Stakeholder support	<ul style="list-style-type: none"> <li>Within the broader advisory group, the John Hunter Corridor option was identified as the most favourable route.</li> <li>The corridor meets multiple strategic planning and transport goals, it intersects major urban renewal and employment precincts and has lower impacts to the traffic network compared to other options.</li> </ul>

Figure 16 Mayfield Corridor



Source: Corview, 2018

**Corridor Description:** The Newcastle City to Mayfield Corridor has five stops from the Newcastle Interchange to Frith Street where there is an option for a bus interchange at the terminus. The route travels along Maitland Road through the north western suburbs with intersection and station points at several small-medium size trip generators, including Hunter Institute of Technology (TAFE).

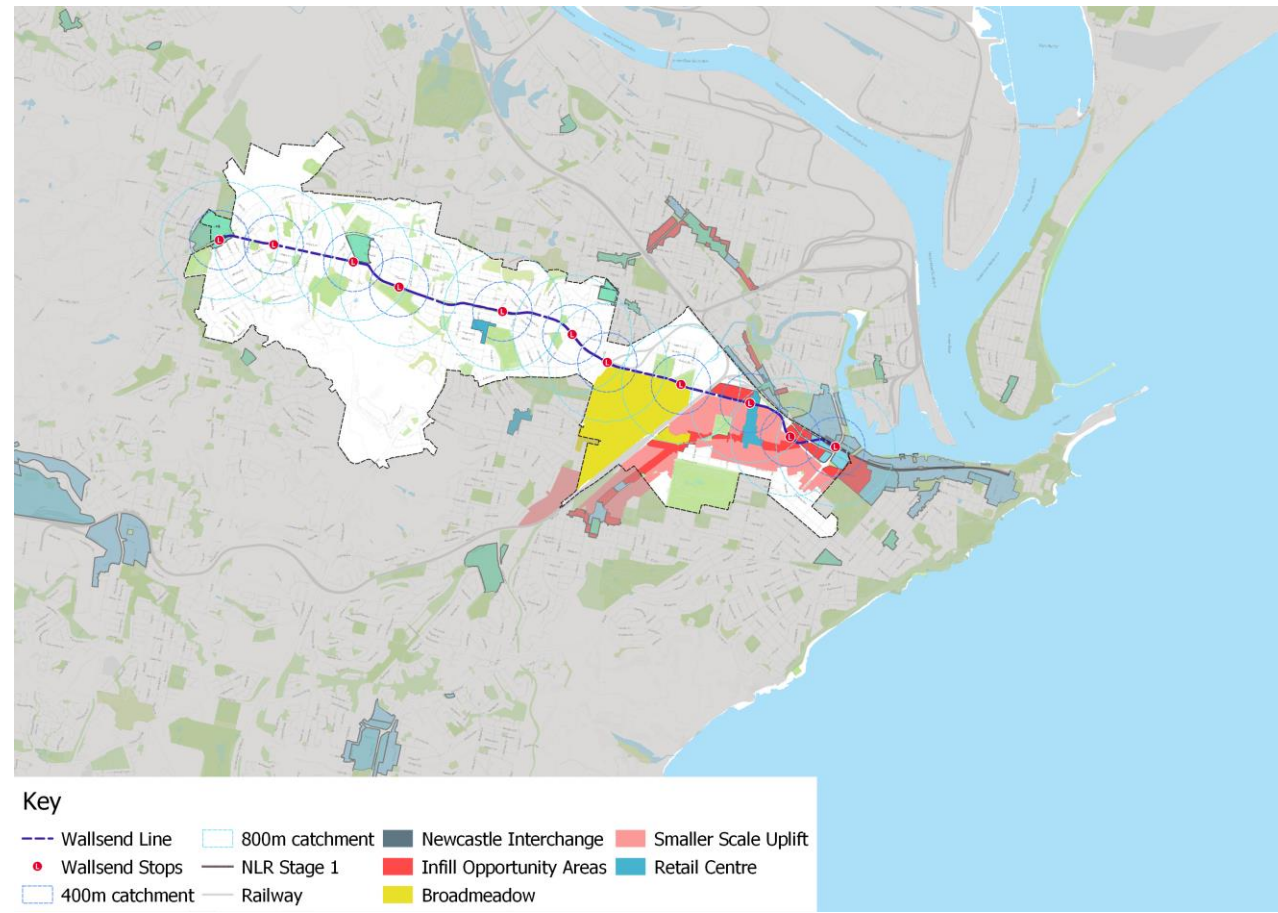
<b>Length:</b>	5km
<b>Number of stops:</b>	5

**Summary:** The Mayfield Corridor, while affordable and having moderate costs, has poor transport patronage outcomes and does not provide a strong base for urban renewal and employment growth as it only connects with a few smaller centres, once it moves outside Hamilton.

Criteria	Results
Support workforce and education outcomes and precincts	<ul style="list-style-type: none"> <li>The Mayfield Corridor performs satisfactorily against the sub-criteria, however underperforms against other corridors. This is primarily due to the short to medium term employment growth being located within Hamilton, which also falls into other corridors. Most of the corridor only intersects with minor employment precincts with moderate medium-term uplift employment projections.</li> <li>The projected rate of employment growth in the baseline is 0.98% per annum growth (compounded), against 0.88% for the Project Study Area, suggesting only moderate growth from light rail.</li> </ul>
Support delivery of an enhanced environment, amenity and resilience for quality of life	<ul style="list-style-type: none"> <li>The Mayfield Corridor has several smaller opportunities for redevelopment. This is reflective in the stops around the northern end of Beaumont Street and Maitland Road, Mayfield.</li> <li>There are no major catalyst areas or significant entertainment precincts. There are several future urban renewal precincts which border the Corridor, including Warabrook, Callaghan and Newcastle Port, but these are all outside of the Corridor.</li> </ul>
Deliver housing close to jobs and services	<ul style="list-style-type: none"> <li>Evaluation of the Mayfield Corridor suggests that residential and dwelling growth is moderate and therefore is not a clearly supportive base for light rail investment.</li> <li>The corridor is forecast at a baseline to accommodate 7.5% of the total growth of the study area. This contrasts to the 11% of the employment target.</li> </ul>
Transport outcomes and connectivity	<ul style="list-style-type: none"> <li>The transport outcomes for the Mayfield Corridor show the corridor performs poorly against the sub-criteria and other corridor options.</li> <li>The corridor has the second lowest travel speed (km/h) and equal lowest average passenger travel speed.</li> <li>The Mayfield Corridor has the lowest projected ridership and peak loading.</li> </ul>
Alignment with Government Priorities	<ul style="list-style-type: none"> <li>The Mayfield option also aligns with <i>Future Transport Strategy 2056</i>'s priority to create more liveable cities.</li> </ul>
Deliverability and Risk	<ul style="list-style-type: none"> <li>The corridor is constructible and deliverable, however has a higher risk profile compared to the Wallsend and Charlestown corridors. Its risk profile is comparable to the John Hunter Corridor.</li> </ul>
Affordability	<ul style="list-style-type: none"> <li>Based on capital estimates to P50, the Mayfield Corridor is the least expensive. It is the second most expensive when assessed at total cost/km.</li> <li>The operational costs/km are the most expensive of all four corridors.</li> <li>It is the most expensive route for operating costs.</li> </ul>
Economic Feasibility	<ul style="list-style-type: none"> <li>The corridor records a negative economic benefit.</li> <li>It has the highest decongestion benefits of all four corridors.</li> <li>It has minimal bus operating savings with the lowest saving based on a \$/sqm rate.</li> </ul>
Stakeholder Support	<ul style="list-style-type: none"> <li>The corridor has long term potential but is not a practical short-term option.</li> <li>The Port intends to continue to provide for port and logistics related land use purposes. Industrial Drive is intended to be protected for freight. Mayfield (Maitland Road) is identified as a Stage 1 urban renewal corridor with short to medium term potential for additional renewal. The considerable urban renewal and uplift potential was recognised as one of the key corridor strengths.</li> <li>Other issues raised in the stakeholder discussions were that the Callaghan and Warabrook catalyst areas, outlined in the Metro Plan, were outside the corridor. The corridor is also serviced by the Heavy Rail network.</li> </ul>



Figure 17 Wallsend Corridor



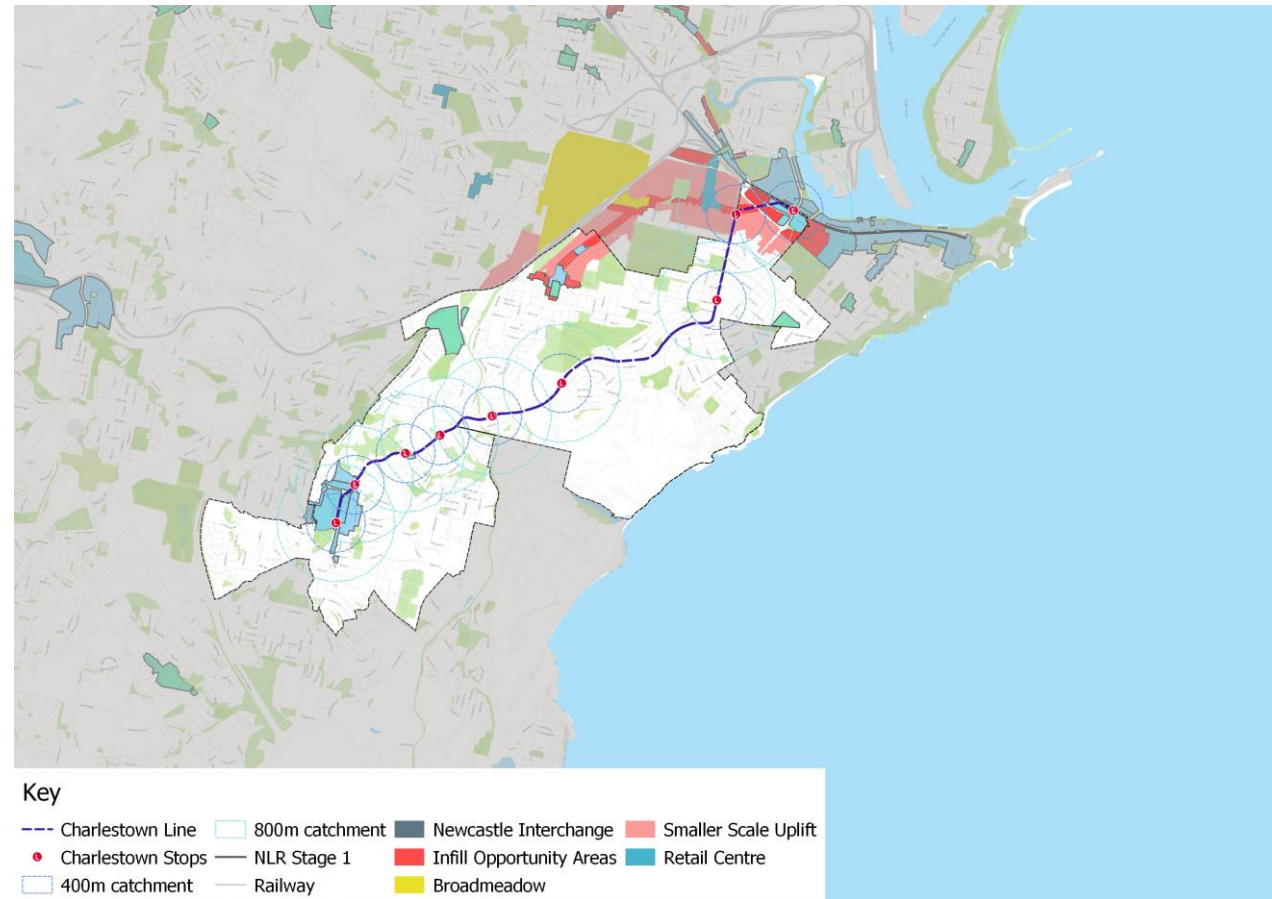
**Corridor Description:** The Newcastle City to Wallsend Corridor has ten stops from the Newcastle Interchange to Wallsend Shopping Centre where there are good opportunities for a bus interchange. The corridor travels along Maitland Road through the north western suburbs with intersections and stops at several small-medium size trip generators, including NSW TAFE.

<b>Length</b>	9.050km
<b>Number of stops:</b>	10

**Summary:** The Wallsend Corridor performs well against the sub-criteria as well as against each corridor. This is due to the confluence of multiple current and future employment activity catalyst areas along the corridor. It is relatively affordable against the other corridor, however compares poorly economically and has limited stakeholder support.

Criteria	Results
Support workforce and education outcomes and precincts	<ul style="list-style-type: none"> <li>The corridor has the highest employment forecasts out of the four options with over 6,500 jobs projected in the 20 years to 2036.</li> <li>6,500 new jobs in the Corridor by 2036.</li> <li>Removing travel zones at Hamilton, Broadmeadow and John Hunter Hospital, the Corridor has low job growth projections of only 2,100, with several travel zones projected for less than 200 new jobs in the 20 years to 2036.</li> </ul>
Support delivery of an enhanced environment, amenity/resilience	<ul style="list-style-type: none"> <li>The Wallsend Corridor has several place making and urban renewal opportunities which would be catalysed through investment in light rail. This includes larger urban renewal opportunities including Beaumont Street and Broadmeadow Sports and Entertainment Precinct.</li> <li>There is smaller urban amenity uplift in Jesmond and Wallsend.</li> </ul>
Deliver housing close to jobs and services	<ul style="list-style-type: none"> <li>The corridor is forecast at a baseline to accommodate 8.2% of the total growth of the Project Study Area. This is lower than the 14.5% employment target.</li> <li>The distribution of projected residential growth in the corridor is evenly distributed across about 10 of the 13 travel zones.</li> <li>This reflects the smaller scale urban renewal opportunities, and no significant housing precincts along the corridor.</li> </ul>
Transport outcomes and connectivity	<ul style="list-style-type: none"> <li>The transport outcomes for the Wallsend Corridor show the corridor performs moderately well against the other corridors; however, loadings (ridership/km) are lower than both Charlestown and John Hunter Hospital.</li> <li>The corridor has comparable loading with the Charlestown and John Hunter Corridors and peak ridership per km (inbound and outbound)</li> <li>Peak ridership is the second lowest of the corridors, though much higher than Mayfield, which is the lowest.</li> </ul>
Alignment with Government Priorities	<ul style="list-style-type: none"> <li>The corridor aligns with the <i>Greater Newcastle Metropolitan Plan</i> goal to improve connections to jobs, services and recreation.</li> <li>The Wallsend option also aligns with <i>Newcastle 2030 Community Strategic Plan</i> priority to create vibrant, safe and active public places. The corridor can support culture in the adjacent precinct such as the Broadmeadow Sports and Entertainment Precinct.</li> </ul>
Deliverability and Risk	<ul style="list-style-type: none"> <li>The Wallsend Corridor alignment is feasible from a constructability perspective.</li> <li>The corridor runs along Newcastle Road/Link Road which is one of the busiest east/west traffic routes through Greater Newcastle.</li> <li>There are several property impacts, including one heritage item, however, they are mainly limited to impacts on specific items.</li> </ul>
Affordability	<ul style="list-style-type: none"> <li>Based on capital estimates to P50, the Wallsend Corridor is the most expensive.</li> <li>It is, however, the second least expensive when assessed at total cost/km.</li> <li>The operational costs are also the most expensive of all four corridors, however rank as the least expensive when compared at a \$/sm rate.</li> </ul>
Economic Feasibility	<ul style="list-style-type: none"> <li>The corridor records the largest total negative economic benefit of all options.</li> <li>It also records the highest \$s/km negative economic benefit, greater than the next most underperforming corridor.</li> <li>It is also the only option to have negative vehicle externality and de-congestion benefits.</li> </ul>
Stakeholder support	<ul style="list-style-type: none"> <li>Whilst the Wallsend Corridor was identified as a potential corridor, there were several consensus issues which made it less favourable to other options.</li> <li>The major issues are impacts on Newcastle Road as a major thoroughfare as well as its assessment against other corridors.</li> <li>Furthermore, there are a more limited number of urban renewal catalyst areas which the corridor intersects.</li> <li>The western terminus of the line is in Wallsend which is a smaller scale renewal opportunity in the Metro Plan.</li> </ul>

Figure 18 Charlestown Corridor



Source: Corview, 2018

**Corridor description**

<b>Length</b>	8.672km
<b>Number of stops:</b>	7

**Summary:** The Charlestown Route is one of the best value for money for affordability. However, it does not connect to major centres and has minimal urban renewal benefits, other than the point to point connection from Charlestown to Newcastle City Centre. The corridor has poor economic feasibility, does not align to government policies, and has limited stakeholder support.

Criteria	Results
Support workforce and education outcomes and precincts	<ul style="list-style-type: none"> <li>• The Charlestown Corridor performs poorly against this sub-criteria.</li> <li>• 5,400 new jobs in the Corridor by 2036 – 15% of all new jobs 2016 – 36.</li> <li>• Dominated by services industry with retail trade (28%) and accommodation services (11%) with substantial health focus (12%).</li> </ul>
Support delivery of an enhanced environment, amenity and resilience for quality of life	<ul style="list-style-type: none"> <li>• The main opportunity area is Charlestown in Pulver Street, where there is some potential for long-term Growth.</li> <li>• There are no major urban renewal precincts which intersect the corridor for most of its length.</li> </ul>
Deliver housing close to jobs and services	<ul style="list-style-type: none"> <li>• The corridor is forecast at a baseline to accommodate 8.1% of the total growth of the Project Study Area. This contrasts to the 5% of the employment target.</li> </ul>
Transport outcomes and connectivity	<ul style="list-style-type: none"> <li>• The corridor is the second longest at 8.5km, however has the highest average speed (20.21km/hr).</li> <li>• The Charlestown Corridor has the highest boarding and peak loading, with the second highest for per km of track, after John Hunter.</li> </ul>
Alignment with Government Priorities	<ul style="list-style-type: none"> <li>• The Metro Plan identified that coordinating land use and transport is critical to the success of Greater Newcastle.</li> <li>• A visible and clear connection between Charlestown and Newcastle City Centre is an essential part of this vision.</li> </ul>
Deliverability and Risk	<ul style="list-style-type: none"> <li>• The Charlestown Corridor alignment is considered generally feasible from a constructability perspective.</li> </ul>
Affordability	<ul style="list-style-type: none"> <li>• Based on capital estimates to P50, the Charlestown Corridor is the second most expensive. It is however the least expensive when assessed at total cost/km.</li> <li>• The operational costs are also the second most expensive of all four options, however are the second least expensive when compared at a \$/sm rate.</li> </ul>
Economic Feasibility	<ul style="list-style-type: none"> <li>• The corridor recorded the second largest total negative economic benefit of all options to 2036.</li> <li>• It also records the second highest \$s/km negative economic benefit.</li> <li>• There are substantial car dis-benefits and low public transport benefits against Wallsend, the other longer route.</li> </ul>
Stakeholder support	<ul style="list-style-type: none"> <li>• The Charlestown Corridor was identified as a potential long-term corridor, however the least suitable when compared to the other corridor options.</li> <li>• Stakeholders raised that the proposed route has major sections where there are few residential or commercial precincts. The slow dwelling up-take and lack of feasible development opportunities in the southern part of the corridor were also raised as potential issues.</li> </ul>

### 9.3 Preferred Corridor for Future Extension

The Corridor Assessment Framework concluded that the Newcastle City to John Hunter Hospital via Broadmeadow option is the most suitable corridor to further assess and refine in the next Project stage.

The Corridor Assessment Framework concluded that the John Hunter Hospital corridor:

- Facilitates development of the Broadmeadow Urban Renewal and Entertainment Precinct, and the John Hunter Hospital redevelopment.
- Has the highest baseline employment growth of 1.15% per annum growth (compounded), significantly greater than the Project Study Area (0.88%), not considering potential uplift by the Broadmeadow and John Hunter Hospital precincts.
- Supports existing development precincts. The corridor also links, and potentially fast-track the development of, 14,146 total new infill housing capacity.
- Supports the urgent need for public transport connectivity to the John Hunter Hospital, and has the highest projected ridership, peak loadings and transport benefits.
- Is the best performing corridor on economic evaluation results.

However, the Framework results, especially the economic appraisal, highlight that there is no urgent need to extend Stage 1 of the Project. The John Hunter Corridor was the only option with a positive BCR.

The economic results also indicate the potential impact of light rail to the existing road capacity (i.e. taking away road capacity for light rail development will increase congestion along the corridor). Further optimising the alignment using additional road capacity within the corridor may help to improve the viability of a light rail solution.

The Framework highlighted that there are strategic merits to extend Stage 1, but there are several key requirements to improve the economic assessment results:

- Further definition and investigation works in the next phase of Project to confirm the Project costs, and reduce impacts to road capacity.
- Further land use planning (undertaken by local governments with other relevant planning authorities and stakeholders) to enable land use changes.
- More detailed, precinct-based land use modelling to inform the timing of land use benefits.
- Gradual shift in travel patterns and land use to build the foundation for mode shift from car-based to public-transport based travel.
- Defining the transport product and land use scenarios may significantly improve the economic results, the viability of an extension, and justify the need to extend Stage 1.
- In addition, there are technical difficulties (i.e. gradient issues) to implement the light rail section between New Lambton and John Hunter Hospital which requires further investigation and alignment optimisation.



## 10 Conclusion and next steps

This SBC recommends that the Newcastle Interchange to the John Hunter Hospital via Broadmeadow corridor is most suitable to become the next stage for the Project extension. However, the corridor assessment results, especially the economic assessments, highlight that there is no urgent need to extend Stage 1 of the Project. The John Hunter Corridor was the only option with a positive BCR.

The technical assessments also highlighted that there are technical difficulties (i.e. gradient issues) to implement the light rail section between New Lambton and John Hunter Hospital.

The Need for investment Chapter 4 indicates that the underlying drivers for the Project extension, the need for infill housing and precinct development, may not eventuate in the shorter term (less than 10 years). This is because the Newcastle City Centre is still undergoing land use and precinct transformation, enabled by the Project and this transformation may still take several years to realise. However, there are significant merits in providing public transport connectivity between Newcastle City Centre, Broadmeadow and John Hunter Hospital precincts. Further work is required to refine the preferred land use outcomes along the preferred corridor and capture additional benefits while ensuring the focus of renewal remains on Newcastle CBD for the meantime. A logical first extension of light rail is to the Broadmeadow urban renewal precinct enabling its transformation.

Considering that dedicated bus corridors have the potential to be converted to light rail corridors in the future, there is an opportunity to implement bus solutions in the shorter term prior to a light rail extension being considered for the John Hunter Hospital via Broadmeadow corridor. This investment in public transport will deliver early community benefits and support Newcastle light rail and align with the NSW fast rail network including connections to Greater Newcastle.