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Executive summary

Hoxton Park Road consists of two, 2-lane carriageways for eastbound and westbound general traffic. The carriageways are separated by a wide median that provides for future widening to an ‘ultimate’ six lanes.

In March 2018 the NSW Government released the Greater Sydney Services and Infrastructure Plan which nominates the Hoxton Park Road and Fifteenth Avenue corridor as a rapid bus link. Rapid bus links are fast and reliable bus connections providing customers with mass transit level services between major centres which are not linked by trains or light rail.

Roads and Maritime Services (Roads and Maritime) has identified two strategic options to provide a rapid bus route along the 2.2km of Hoxton Park Road corridor, linking Fifteenth Avenue at West Hoxton and the Liverpool–Parramatta T-way at Banks Road, responding to initiatives for medium term strategy (0-10 years) in the Greater Sydney Services and Infrastructure Plan (March 2018).

One option is to provide kerbside ‘Bus Only’ lanes on each carriageway (kerbside bus lanes) while a second option is to provide ‘Bus Only’ lanes between the two carriageways (centre running bus lanes) similar to the Liverpool–Parramatta T-way section east of Banks Road.

Recommended Option

Roads and Maritime has selected kerbside bus lanes as the recommended option as a result of various investigations and workshops with key stakeholders. The recommended option would involve completing the Hoxton Park Road upgrade by widening each carriageway towards the median, to provide a dedicated kerbside ‘Bus Only’ lane and two general traffic lanes in both directions. The proposed bus lanes would connect the Liverpool–Parramatta T-way in the east and proposed rapid bus lane on Fifteenth Avenue west of Cowpasture Road and service both rapid transit buses and local buses along Hoxton Park Road.

Roads and Maritime selected kerbside ‘Bus Only’ lanes with two general traffic lanes in each direction as the recommended option for the following reasons:

- greater reliability for rapid bus link services
- benefits for local bus services
- greater capacity for general traffic
- more flexibility of transfer options between local and rapid bus link services
- more flexibility to optimise bus stop locations in the future
- safer environment for customers accessing, and waiting at bus stops
- fewer property acquisitions and adjustments
- fewer impacts on stormwater drainage and utilities
- fewer impacts on footpaths, shared user paths, verges and property access
- less complex, hence more reliable and safer control at intersections for all road users

The recommended option was chosen with consideration for the proposed upgrade of Fifteenth Avenue being investigated by Liverpool City Council and Transport for NSW to provide a rapid bus link between Cowpasture Road and the Western Sydney International Airport and Aerotropolis.

Background

Provision of rapid bus link services linking Liverpool with the Western Sydney International Airport is a key feature of the connectivity theme of the City Deal, a 20 year agreement between all three levels of government to transform Western Sydney (The Western Sydney City Deal, March 2018).

Future Transport 2056 is an update of NSW’s Long Term Transport Master Plan. Its vision for Greater Sydney is a metropolis of three cities including the ‘Western Parkland City’ which is focused around the Western Sydney International Airport and extending east to Liverpool.
The vision for Greater Sydney is a ‘30 minute city’ where people across the city can access their nearest city centre in 30 minutes by public transport (Future Transport 2056 - Greater Sydney Services and Infrastructure Plan).

Specific initiatives of Future Transport 2056 include infrastructure to support rapid bus connections between Western Sydney International Airport and Liverpool (for priority planning in collaboration with the Commonwealth Government).

**Purpose of report**

The purpose of this report is to describe the process used to determine a recommended option, alternatives investigated and the reasons supporting its selection. It outlines the steps, and records the assessment and decision-making processes followed to identify the recommended option to upgrade Hoxton Park Road, to provide a rapid bus link, between the existing Liverpool-Parramatta T-way and Cowpasture Road.

**Recommended option selection process**

An iterative process examining constraints and assumptions, potential impacts and benefits and stakeholder consultation led to identifying the recommended option.

Key stakeholders attended various workshops between December 2018 and June 2019 to examine risk, constructability, health and safety and value for money against the project objectives.

Broad options which closely follow the alignment of Hoxton Park Road were compared to identify a better performed option. Specific aspects of the design of the options were then refined to identify the recommended option.

**Next steps**

The recommended option will be displayed publicly. This will provide an opportunity for the community to review the recommended option and provide feedback. Roads and Maritime will use this information to further refine and confirm the preferred option.
1. Introduction

Hoxton Park Road runs east-west between Hume Highway, Liverpool and Cowpasture Road, West Hoxton, a distance of about 6.5km.

It connects the south western limits of Liverpool CBD with the site of the new Western Sydney International Airport and the Aerotropolis at Badgerys Creek via Fifteenth Avenue and its proposed extension.

The Liverpool-Parramatta T-way runs along the central lanes of Hoxton Park Road between Brickmakers Creek, Liverpool and just west of Banks Road, a distance of about 3.7km.

Hoxton Park Road between west of Banks Road and Cowpasture Road comprises the study area of about 2.2km in length. An upgrade to four lanes with provision for six lanes was opened to traffic in November 2011 and currently features:

- two general traffic lanes in each direction separated by a wide, landscaped median
- an operating speed limit of 70 km/h
- asphalt surface pavement
- auxiliary lanes for right turn movements, where permitted
- traffic signal controlled intersections with pedestrians crossings at:
  - Banks Road
  - Whitford Road/Spire Circuit
  - First Avenue
  - Glen Innes Road
  - Cowpasture Road
- right turn provisions to and from Dorrigo Road via an uncontrolled ‘seagull’ intersection
- auxiliary lanes for selected left turn movements
- a mixture of parallel service roads and few direct property access
- an underpass of the Westlink M7 Motorway
- twin bridges over Hinchinbrook Creek
- a paved footpath on the southern side between Joadja Road and First Avenue
- a paved shared user path on the southern side between First Avenue and Cowpasture Road
- a paved shared user path on the northern side between Cowpasture Road and Banks Road
- underground powered street lighting

As outlined in the Greater Sydney Services and Infrastructure Plan (March 2018) Roads and Maritime has investigated options to upgrade Hoxton Park Road to provide ‘Bus Only’ lanes linking the Liverpool-Parramatta T-way west of Banks Road and Fifteenth Avenue west of Cowpasture Road as part of a rapid bus link between Western Sydney International Airport and Liverpool.

Two strategic options have been identified. One option is to provide kerbside ‘Bus Only’ lanes on each carriageway (kerbside bus lanes) while a second option is to provide ‘Bus Only’ lanes between the two carriageways (centre running bus lanes) similar to the Liverpool-Parramatta T-way section east of Banks Road.

Features of the two options are described in Section 5.

1.1 Project objectives

The objectives for the Hoxton Park Road upgrade proposal are to:

- provide a corridor that is safe for all road users
• provide a consistent and reliable journey experience for customers, particularly public transport customers
• support the principles of *Movement* and provide a corridor that aligns with the given classification
• improve liveability by making alternative sustainable modes more attractive and prioritising access to safe and amenable spaces
• facilitate bus movement along and across the network (including the T-way), linking existing and new strategic and local centres

1.2 Investigation area

The proposal lies between the western tie in to Fifteenth Avenue, approximately 500m west of Cowpasture Road, and the eastern tie in to the Liverpool–Parramatta T-way near the intersection of Hoxton Park Road and Banks Road.

It is wholly within the Liverpool City Council local government area and passes through the Sydney suburbs of Hoxton Park, Hinchinbrook and West Hoxton.

This section of Hoxton Park Road is located in Sydney’s south-west and forms part of the road network linking Liverpool and Badgerys Creek as illustrated in Figure 1.

*Figure 1: Locality plan*
2. Strategic planning

The Hoxton Park Road and Fifteenth Avenue corridor currently serves a predominantly Movement function.

Hoxton Park Road, with the Westlink M7 Motorway and Cowpasture Road, is a key connector for movement between Liverpool and local industrial areas. Hoxton Park Road incorporates the Liverpool-Parramatta T-way which currently runs down its centre, between east of Flowerdale Road and Banks Road.

Fifteenth Avenue is currently a local road connecting residential, agriculture and commercial properties to the State Road network and Liverpool CBD.

In future Hoxton Park Road and Fifteenth Avenue would form a city shaping corridor providing a major transit link connecting Liverpool with the future Western Sydney International Airport and the Aerotropolis.

2.1 The Western Sydney City Deal (March 2018)

The Western Sydney City Deal, a 20 year agreement between all three levels of government to transform Western Sydney, aims to improve community infrastructure and liveability.

Provision of rapid bus link services linking Liverpool with the Western Sydney International Airport and Aerotropolis is a key feature of the connectivity theme of the Western Sydney City Deal.

2.2 Future Transport 2056

Future Transport 2056 is an update of NSW’s Long Term Transport Master Plan. It is a suite of strategies and plans for transport developed in conjunction with the Greater Sydney Commission’s Sydney Region Plan, Infrastructure NSW’s State Infrastructure Strategy, and the Department of Planning, Industry and Environment’s regional plans, to provide an integrated vision for the State.

In Future Transport 2056 the vision for Greater Sydney is a metropolis of three cities. The three cities include ‘Western Parkland City’, focused around the Western Sydney International Airport and extending north to Greater Penrith, east to Liverpool and south to Campbelltown-Macarthur.

The vision for Greater Sydney is a ‘30 minute city’ where people across the city can access their nearest city centre in 30 minutes by public transport.

Future Transport 2056 (page 123) prioritises assessing potential infrastructure upgrades to support rapid bus links between centres to shape a sustainable urban form and support access to the Aerotropolis at Badgerys Creek.

Specific initiatives include infrastructure to support a rapid bus link between Western Sydney International Airport and Liverpool (for priority planning in collaboration with the Commonwealth)

2.3 Greater Sydney Commission Greater Sydney Region Plan

The Greater Sydney Region Plan (March 2018) supports the vision for a metropolis of three cities that will rebalance growth and deliver its benefits more equally and equitably to residents across Greater Sydney.

Hoxton Park Road falls within the Western City District, and aligns with the Infrastructure and Collaboration theme, addressing the following actions and outcomes:

Planning Priority W1 - Planning for a city supported by infrastructure

- Action 1: Hoxton Park Road upgrade would support the vision of A Metropolis of Three Cities by contributing to the realisation of 30–minute cities and providing part of the missing link between the Liverpool-Parramatta T-way and the Western Sydney International Airport
Planning Priority W7 – A well connected city

- Objective 14: Hoxton Park Road upgrade would contribute to the integrated land use and transport to create 30–minute cities

The Western Sydney International Airport is a key focus area of the Western City District, with public transport connections high on the agenda. The proposed Hoxton Park Road upgrade would facilitate a rapid bus link connecting the Western Sydney International Airport with Liverpool and Parramatta, improving public transport integration.
3. Stakeholder involvement

The recommended option was developed in consultation with major stakeholders including planning and approval agencies, major utility asset owners and bus operators.

3.1 Strategy

Consultation with major stakeholders to date has been through a range of workshops and meetings to establish: vision and objectives; constraints and opportunities; risks; options; and recommendations.

3.2 Stakeholders

Roads and Maritime consulted stakeholders throughout the development of the recommended option.

The stakeholders listed below include those Roads and Maritime identified as being expected to have an interest in, or potentially be affected by, the Hoxton Park Road upgrade:

- NSW Department of Planning Industry and Environment (DPIE)
- Transport for NSW (TfNSW) Transport Planning Branch
- TfNSW Metro Bus and Ferry Planning and Development Section
- TfNSW Transport Management Centre (TMC)
- Liverpool City Council (LCC)
- Western Sydney Planning Partnership Office
- Greater Sydney Commission
- Interline Bus Services (a bus service operator)
- Transit Systems (a bus service operator)
- Endeavour Energy (EE)
- Jemena
- Sydney Water
- Telstra
- Residents along Hoxton Park Road
- Bus services customers

3.3 Consultation and communication

Key stakeholders were consulted during development of the recommended option with combined stakeholder meetings held quarterly, in December 2018, March 2019 and June 2019.

A series of workshops were held to analyse options against criteria relating to vision and objectives, constraints and opportunities, assumptions and risks to identify a recommended option for the Hoxton Park Road upgrade. Key stakeholders were invited to attend the workshops listed in Table 1.
### Table 1: Workshops conducted by Roads and Maritime

<table>
<thead>
<tr>
<th>Workshops</th>
<th>Attended</th>
<th>Purpose and objectives</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| Value management        | Roads and Maritime, LCC, TfNSW, DPIE, Interline Buses, Transit Systems    | For stakeholders to:  
  - obtain a common understanding of the work undertaken to date  
  - review the strategic options and evaluate them against appropriate assessment criteria as well as the strategic cost estimates  
  - provide a recommended option(s) to progress the project  
                                                                                         | Both qualitative and quantitative assessment of options against the assessment criteria resulted in a recommendation for kerbside ‘Bus Only’ lanes, subject to further investigation on the benefits between kerbside and centre running bus lanes and design refinements.  
                                                                                         | A number of follow-up actions were assigned to the participants.                                                                                      |                                                                         |
| Risk management         | Roads and Maritime, LCC, TfNSW, DPIE, EE, Interline Buses, Transit Systems | Provide a forum for engagement with a broad section of project stakeholders, and obtain information on the risks to be addressed during development.  
  - To record information about the risk profile as identified across the range of risk topics for the strategic design. It identifies the issues and risks the designer shall address within the design, and identify those risks to be communicated on the remaining hazards.  
<pre><code>                                                                                     | Neither option was considered to present unacceptable risks that cannot be avoided, minimised, mitigated or controlled.                                         |                                                                         |
</code></pre>
<table>
<thead>
<tr>
<th>Workshops</th>
<th>Attended</th>
<th>Purpose and objectives</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructability</td>
<td>Roads and Maritime (subject matter experts in road design, bridge design, utility design and construction) Independent construction engineer</td>
<td>▪ To identify potential complexities of construction, operation or maintenance of the design.</td>
<td>The centre running bus lanes presented more constructability issues as well as a considerably higher estimated capital cost than the kerbside bus lanes.</td>
</tr>
<tr>
<td>June 2019</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Health and safety in design (HSiD) June 2019  | Roads and Maritime, TMC, Interline Buses, Transit Systems                                                                                                                                                        | ▪ to Identify, for current designs, any health and safety hazards for workers and those in the vicinity of the asset  
  ▪ to eliminate safety hazards – so far as is reasonably practicable (SFAIRP)  
  ▪ demonstrate consultation SFAIRP, with workers who carry out work for the business or undertaking who are, or are likely to be, directly affected by a work health and safety matter | For the centre running bus lanes option it was noted that, whilst not unique, the larger footprint would result in less available space for construction and more utilities having to be relocated and the associated risks. Operationally, the centre running bus lanes option would require rapid bus customers to access and wait in the median area whereas they may less exposed on the footpaths under the kerbside bus lanes option. However neither option was considered to present unacceptable risks that cannot be avoided, minimised, mitigated or controlled. |

Roads and Maritime will consult the community and stakeholders as part of the project development process as key milestones approach.

Communication will be via printed materials, a project website, media releases, NSW Government announcements, advertising and public information sessions and a continuation of stakeholder engagement meetings and workshops.

The recommended option is presented in Section 7 and displayed for community comment in late 2019.
4. Preliminary environmental investigation

A preliminary environmental investigation (PEI) was prepared to identify potential opportunities and environmental constraints that may influence the development of design options for the upgrade. Attachment 1 illustrates the environmental constraints identified by the PEI. Key issues and findings are summarised below.

4.1 Constraints and opportunities

A constraints analysis was completed to assess the existing conditions in the study area which may influence development of road upgrades. It involved preliminary mapping of environmental information, major utilities, existing and proposed future land uses.

The analysis was primarily based on readily available data, with limited field investigation carried out.

**Constraints**
- the route alignment is constrained to the existing Hoxton Park Road/Fifteenth Avenue corridor
- timing for selection of the preferred option for the development of Fifteenth Avenue
- existing services and drainage

**Opportunities**
- Hoxton Park Road / Fifteenth Avenue has been identified as a city shaping corridor in Future Transport 2056. Roads and Maritime, LCC, DPIE and TfNSW collaborated to identify and deliver the corridor upgrade by 2026 would contribute to the infrastructure necessary to support city shaping corridor requirements and rapid bus services between Liverpool and Western Sydney International Airport
- Hoxton Park Road / Cowpasture Road intersection has high number of crashes. There may be opportunities to improve the safety performance as part of an upgrade
- implementation of the proposal would enable the upgrade of bus stop facilities with shelters, signage and to meet the requirements of the Disability Discrimination Act 1992

4.2 Aboriginal heritage

Studies undertaken as part of the preliminary environmental investigation identified that the areas adjacent to Hinchinbrook Creek and Cabramatta Creek may retain Aboriginal archaeological potential.

Design refinements made during the development process referred to in Section 6 were made to minimise impact to land containing Aboriginal heritage. Roads and Maritime would follow the due diligence process and the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHI) during detailed environmental assessment to confirm whether there is a potential Aboriginal heritage impact.

4.3 Flooding

Roads and Maritime’s aspirational target is to provide immunity to the 1 in 100 year flood.

However the level of water inundation at some locations along the current Hoxton Park Road corridor has been recorded to be in excess of 1m above ground level following a flood. The flood map along the Hoxton Park Rd and surrounding area is shown in Figure 2.
Due to current constraint of M7 Motorway overpass and Hinchinbrook Creek, it is not feasible, within reason, to prevent Hoxton Park Road from flooding in these rain events. Therefore Roads and Maritime has adopted design criteria for the upgrade to not increase the flood levels on the road and adjacent property as a result of the road development.

4.4 Land use and property

Hoxton Park Road is characterised by a large percentage of low density residential housing with light commercial property dotted throughout and a large cluster of light industrial land use. To the east of the corridor, towards the Liverpool City Centre, land use moves into more high density zonings. In terms of educational facilities, the corridor is immediately serviced by one preschool, one primary school, one high school and Miller TAFE.

Prestons industrial area is located to the south east of the study area. To the west, on Fifteenth Avenue, housing is associated with agricultural land use and consequently includes larger lots and is considerably less dense.

4.4.1 Proposed future land use

The function and role of the Hoxton Park Road/Fifteenth Avenue corridor is expected to change substantially with the development of the Western Sydney International Airport as identified in the Greater Sydney Region Plan (March 2018).

Population is forecast to grow by about 80% within the study area between 2016 and 2036 with employment numbers almost doubling within the same period according to the Road Network Plan Summary Report RNP50 Hoxton Park Road and Fifteenth Avenue (April 2019) prepared for Roads and Maritime.

The function of the corridor is also likely to be driven by its strategic connection between Liverpool and the future Aerotropolis. The corridor has been identified as the key public transport link between the two and as such improvements in infrastructure and provision are likely to be prioritised.

Liverpool City Council reports on its website (August 2019) that it is considering a proposal to develop land adjacent to Middleton Grange Public School to create a town centre which includes increasing the number of residential apartments from 176 to 912 and construction of a large shopping centre.
Access roads to Middleton Grange would be improved. Works include the widening of Fifteenth Avenue, the extension of Middleton Drive under the Westlink M7 Motorway to Aviation Road, and the upgrade of Flynn Avenue from Cowpasture Road to Ulm Road.

New sports and recreational facilities are being planned for Cirillo Reserve, including two multi-purpose sports fields, with construction expected to begin in October 2019.

4.5 Utilities

Major public utility assets of Endeavour Energy, Jemena, Telstra, NBN Co and Sydney Water are present within the study area.

The recommended option has the potential to require relocation or physical protection of multiple public utilities. This may require temporary disruption to provision of services. Roads and Maritime would consult with utility asset owners during the next phase of the project with the aim to minimise impacts.
5. Description of options

Hoxton Park Road consists of two, 2-lane carriageways for eastbound and westbound general traffic. The carriageways are separated by a wide median that provides for future widening to an ‘ultimate’ six lanes.

Two strategic options to provide a rapid bus link, along the Hoxton Park Road corridor, linking the Liverpool-Parramatta T-way at Banks Road and Fifteenth Avenue were identified.

One option is to provide kerbside ‘Bus Only’ lanes on each carriageway (kerbside bus lanes) while a second option is to provide ‘Bus Only’ lanes between the two carriageways (centre running bus lanes) similar to the Liverpool-Parramatta T-way section east of Banks Road.

5.1 Kerbside bus lanes

The road would be configured to provide a ‘Bus Only’ lane in the left lanes (kerbside bus lanes) leaving two lanes each way for general traffic as illustrated in Figure 3.

This option proposes widening each carriageway of Hoxton Park Road towards the median to create six lanes, except for a section of 10 metres between Banks Road and Spire Court, where widening beyond the existing corridor is required to comply with current road design standards. It is expected that this may result in minor impact on two properties.

Figure 3: Hoxton Park Road cross section for kerbside bus lanes

The proposed kerbside ‘Bus Only’ lane would carry both rapid, and local bus services.

The existing bus stops operating in the study area on Hoxton Park Road/ Fifteenth Avenue are described in Table 2. Under the proposal these bus stops would be retained and any new bus stops, if required, would be confirmed in future.

Table 2: Existing bus stops in the study area

<table>
<thead>
<tr>
<th>Name</th>
<th>Stop ID</th>
<th>Routes serviced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspire Church, Hoxton Park Rd</td>
<td>2171432</td>
<td>853, 854</td>
</tr>
<tr>
<td>Hoxton Park Shops, Hoxton Park Rd</td>
<td>2168174</td>
<td>853</td>
</tr>
<tr>
<td>Hoxton Park Rd at Glen Innes Rd</td>
<td>2171307</td>
<td>853</td>
</tr>
<tr>
<td>Fifteenth Ave after Cowpasture Rd</td>
<td>2171223</td>
<td>853, 855</td>
</tr>
<tr>
<td>Hoxton Park Rd after Glen Innes Rd</td>
<td>2168173</td>
<td>853</td>
</tr>
<tr>
<td>Good Samaritan College, Hoxton Park Rd</td>
<td>2168175</td>
<td>853, 854</td>
</tr>
<tr>
<td>Hoxton Park Rd opposite Inspire Church</td>
<td>2168177</td>
<td>853, 854</td>
</tr>
</tbody>
</table>

Figure 4 illustrates the location of bus stops listed in Table 2.
5.2 Centre running bus lanes

This option also proposes widening each carriageway of Hoxton Park Road towards the median to create six lanes.

The road would be configured to provide ‘Bus Only’ lanes in between the eastbound and westbound carriageways (centre running bus lanes) leaving two lanes each way for general traffic including local bus services as illustrated in Figure 5.

To provide centre running bus lanes it would also be necessary to widen some sections towards the road/property boundary to cater for bus stops, physical separation and intersection operations. This option would have minor impact on approximately 16 adjacent properties.

The existing local services bus stops operating in the study area on Hoxton Park Road / Fifteenth Avenue are described in Table 2. Under the proposal these bus stops would be retained.

Bus stops for the rapid bus service, both eastbound and westbound would be provided on each carriageway at the eastern end near the Liverpool–Parramatta T-way connection. Figure 6 shows the exact location of the bus stop.

An additional bus stop would be provided on both eastbound and westbound on Fifteenth Avenue about 500m west of Cowpasture Road.
Figure 6: Proposed bus stop location near the Liverpool–Parramatta T-way connection
6. Process to select the recommended option

The recommended option for the Hoxton Park Road upgrade was identified through a routine staged project development process as illustrated in Figure 7.

*Figure 7: Process to select the recommended option*

Roads and Maritime prepared strategic plan for each option and engaged key stakeholders in a value management process including a workshop, as outlined in Section 3.3, based on multi-criteria analysis. Workshop participants nominated kerbside bus lanes as a recommended option, subject to further investigation to be carried out to identify the benefits between the kerbside vs centre running bus lanes and refinement on the design options.

As an outcome of the value management workshop, participants requested greater value be placed on bus travel time reliability and consistency of lane configuration along the corridor.

Roads and Maritime obtained public transport planning advice about the potential benefits and drawbacks of both kerbside and centre running bus lane operations from an external consultancy firm. This identified the key differentiators as being, the performance of both rapid and local bus services, broader road network safety and operations, land use integration and capital cost.
Roads and Maritime consulted subject matter experts and assessed risk on both design options. Subsequently, the centre running bus lanes design option was refined to minimise potential impact on properties and businesses.

Constructability and HSiD workshops were also conducted as outlined in Section 3.3. Further investigations on key performance differentiators, and stakeholder consultation, have contributed to the selection of the recommended option. This includes identification of a number of drawbacks associated with centre running bus lanes such as: the need to relocate existing drainage and utilities; the need for construction in multiple stages with complex arrangements required to maintain access for all road users and property owners; operational safety, efficiency and flexibility.
7 Identification of recommended option

7.1 Options comparison

Kerbside ‘Bus Only’ lanes along Hoxton Park Road between Cowpasture Road and the Liverpool-Parramatta T-way would be consistent with the Liverpool–Parramatta T-way which is made up of kerbside bus lanes, centre running bus lanes and dedicated bus roads in various locations.

A summary of the comparison of the two options is provided below considering efficiency and reliability (potential operational impacts), road user safety, potential construction impacts and capital cost. Detailed comparison is shown in Attachment 2.

7.1.1 Efficiency and reliability

Public transport customers place a high value on reliability. An important factor in reliability of services is on-time running. The lower the variability in travel times for a particular journey the greater its reliability and more certainty customers have when planning their trips.

Roads and Maritime examined actual bus travel time (data) on the Liverpool-Parramatta T-way data from 7 am to 9 am in the morning peak period and from 3 pm to 6 pm in the afternoon weekday peak period over 30 days in June in 2019.

The Liverpool-Parramatta T-way comprise of three segments:

- Kerbside running Bus lanes between the intersection of Great Western Hwy and Pitt St and the intersection of Fairfield Road and T-Way, Woodpark.
- Designated bus corridor between the Fairfield Road, Woodpark and Victoria Street, Wetherill Park; Victoria Street, Wetherill Park and Hoxton Park Road, Miller.
- Centre running Bus Only lanes on Hoxton Park Road between Banks Road and east of Flowerdale Road

To evaluate the reliability of kerbside bus lanes and centre running bus lanes, the actual running times for each segments on the Liverpool-Parramatta T-way were compared to the timetabled (target) running times for the corresponding segments (reliability study).

This reliability study indicated that on Liverpool-Parramatta T-way, the kerbside bus lanes operate with considerably less variability, which is more reliably, than the centre running bus lanes. The data also showed that the difference in average travel speed for each of these two configurations is negligible.

Kerbside bus lanes would service both local and rapid bus services using the same road space and bus stop locations meaning there would be two general traffic lanes free for general traffic. If and when in operation, rapid bus services is expected to run at five minute intervals in the peak periods and the two local bus services would run at about 15 minute intervals. With the provision of bus bays at bus stops and the low frequency of local services the impact of local buses on the operation of rapid buses would be negligible and manageable.

With kerbside bus lanes there would be greater capacity for provision of, and flexibility for positioning, of bus stops as well as future capability for relocating bus stops as desired without major works.

With kerbside bus lanes it would be necessary for general traffic to use the bus lane for a short distance to make left turns. However most intersections have deceleration lanes for left turns that would help negate any impacts and there are very few driveways for property access within the section of Hoxton Park Road between Banks and Cowpasture Road.
With centre running bus lanes, it would be necessary for general traffic turning right to do so across the operating bus lanes. Right turns are more complex traffic movements which have efficiency and reliability impacts greater than the impacts of left turn movements associated with kerbside bus lanes.

Under the recommended option:

- customers would have better access to rapid bus services
- customers would have more options for safe and efficient (seamless) transfer between local and rapid bus services
- local bus customers would benefit from improved operations
- local buses would no longer share general through traffic lanes, under normal operating conditions, which would improve general traffic flow
- bus operations would co-exist with the left turn movements of general traffic
- general traffic could potentially misuse the bus lane.

In contrast, centre running bus lanes would separate local and rapid bus services and local buses would use the kerbside lanes along with general traffic. This means that:

- the benefits of providing bus lanes would not be realised for local bus customers
- the efficiency and reliability of general traffic could be affected by the frequent stopping and occupation of the kerbside lane by local buses occupying an additional traffic lane.

It is acknowledged that centre running bus lanes would be consistent, in term of the central location within the road corridor, with the existing section of the Liverpool-Parramatta T-way between Banks Road and Brickmakers Creek. However forecast traffic growth associated with the Western Sydney International Airport and other development can reasonably be expected to drive the demand for two general traffic lanes.

### 7.1.2 Safety

Health and Safety in Design workshop was held on 18 June 2019. Summary of the outcomes of the workshop is provided below.

The recommended option offers greater safety for road users, particularly when it is noted that Hoxton Park Road will continue to cater for local bus services in the kerbside lane.

Centre running bus lanes would require the provision of bus stops in the median of Hoxton Park Road. Customers would have to access and wait at bus stops in the median. This would expose them to greater risks to personal safety from being situated in close proximity and in between to two ‘live’ carriageways and in some cases, being isolated. Kerbside bus lanes would mean customers would benefit from passive surveillance and have more options for security and escape route if they are, or feel, threatened. A further risk arises in a situation where a customer attempts to cross the road against, or not at, the designated crossing point. This is less likely under the recommended option.

As previously noted, with centre running bus lanes it would be necessary for right turning general traffic to do so across the bus lanes, where buses are approaching from the right and behind. Conversely with kerbside bus lanes, traffic turning left has only to merge into the bus lane, and in some case cross into a deceleration lane to turn left. While the right turn movements would be under signalised control, the risk of right turns across centre running bus lanes is considered to be greater than the risk of merging left into kerbside bus lanes.

The recommended option would have minimal impact on shared user paths whereas to accommodate the additional space required for centre running lanes while minimising property acquisition the width of shared paths would potential need to be reduced to fit in the current road allocation.
7.1.3 Potential construction impacts

Constructability workshop was held on 18 June 2019. Outcomes from the workshop identified that the kerbside bus lanes option would have a considerably lower impact on residents, business operators, local communities and all forms of road users during construction. Construction of centre running bus lanes would involve civil work on both sides and the median along Hoxton Park Road as it would require relocation of existing kerbside drainage, additional central raised platform for the proposed bus stop, potential direct impact on properties. It would take longer to construct and mean that:

- cyclist and pedestrian movement would be impacted
- property access would be disrupted
- more services and drainage would be impacted
- more road lighting is required
- considerably more property would need to be acquired

7.1.3.1 Potential environmental impacts

The road related infrastructure footprint of the recommended option would be less than the alternative option.

The recommended option would have no impact on flood levels. However the centre running bus lanes option carries a risk of adversely impacting flood levels as a consequence of a need to provide pedestrian barriers in the median and raise platform for the one proposed bus stop at west of Banks Road.

7.1.3.2 Capital cost

The estimated capital cost of the kerbside bus lanes option is estimated to be considerably less than that for the centre running bus lanes option. The estimated cost differential is because the kerbside bus lanes option would not require:

- Acquisition of, or adjustment to, private property
- Reconstruction of drainage that was installed under previous plans for widening to six lanes
- Adjustments to utilities along the footpaths and cycleway
- Reconstruction of footpaths, shared user paths and verges

7.2 Recommended option

The above sections show that the proposed kerbside running bus lane option has the potential to:

- Provide more reliable bus services for the rapid bus route
- Provide safer stops for bus customers
- Be easier for bus operation
- Allow flexibility for adaptation of bus stops and services in the future
- Have less impact on adjacent properties

Although it is recognised that the centre running Bus Only option would continue the urban amenity of the centre bus lanes from the Hoxton Park Road T-way east of Banks Road and the non-differential average speed over the kerb side Bus Only option, it is considered that the kerb side running bus lanes to be better value for money with significantly more benefits on all aspects. Therefore kerb side running bus lanes is recommended.

Features of the recommended options include:

- Improvements to the intersections of Whitford Road and Hoxton Park Rd, Dorrigo Road and Hoxton Park Rd.
- Additional two bus lanes west of Banks Road
- Retaining existing bus stops for local bus services.
- Provision for bus lane enforcement cameras.

8. Next steps
The recommended option will be displayed to the community for review and to provide feedback. Roads and Maritime will use this information to further refine and confirm the recommended option for endorsement.

9. References
- The Western Sydney City Deal (March 2018), Australian Government and NSW Government.
- Future Transport 2056 - Greater Sydney Services and Infrastructure Plan, NSW Government.
- Road Network Plan Summary Report RNP50 Hoxton Park Road and Fifteenth Avenue (April 2019).
- Liverpool City Council website.
Attachment 1

Environmental Constraints Map
Attachment 2

Option Comparison
<table>
<thead>
<tr>
<th>Item</th>
<th>Kerbside Running Bus Lanes</th>
<th>Centre Running Bus Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Comparison between existing sections of Liverpool to Parramatta T-way shows kerbside running bus performs more reliably than the centre running bus lanes.</td>
<td>Comparison between existing sections of Liverpool to Parramatta T-way shows kerbside running bus performs more reliably than the centre running bus lanes.</td>
</tr>
<tr>
<td>Consistency</td>
<td>On urban design perspective, the kerbside running bus lanes doesn't continue the current configuration of the existing bus lanes on Hoxton Park Road between Flowerdale and Banks Rd.</td>
<td>On urban design perspective, the centre running bus lanes option continues the current configuration of the existing bus lanes on Hoxton Park Road between Flowerdale and Banks Rd.</td>
</tr>
<tr>
<td></td>
<td>Bus lanes configuration on Fifteenth Avenue from Cowpasture Road to the WSIA has not been determined and therefore cannot be assessed.</td>
<td>Bus lanes configuration on Fifteenth Avenue from Cowpasture Road to the WSIA has not been determined and therefore cannot be assessed.</td>
</tr>
<tr>
<td>Travel time gain to general traffic</td>
<td>Improves journey time to all road users including general traffic, rapid and local bus users.</td>
<td>This option provides no benefits to the general traffic and local buses. The improvement is expected to benefit rapid bus users only.</td>
</tr>
<tr>
<td>Flexibility in relocating bus stops in future based on demand</td>
<td>Easier to relocate the bus stop along the kerb side, if required.</td>
<td>Relocation of bus stop is difficult, as it needs wider corridor and would have additional impact on neighbouring properties and other infrastructures.</td>
</tr>
<tr>
<td>Impact on adjacent properties</td>
<td>Marginal impact on 2 properties.</td>
<td>Partial impact on 16 properties.</td>
</tr>
<tr>
<td>Delay in program</td>
<td>No delay</td>
<td>No delay is expected, however additional time would be required to address the additional impact.</td>
</tr>
<tr>
<td>Safety of bus commuters</td>
<td>Safer for both local and rapid bus users. Bus stops are located at the footpath sides of the roads, which provides:</td>
<td>No impact to local bus users. Safety of rapid bus users is a concern, including:</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>• Passive security to the bus users. • Safe escape points in an event of an accident. • Sufficient space is available along the footway to accommodate occasional peak passenger demand.</td>
<td>• Passengers have less option for escape at bus stops on the centre median. • Potential risk to commuters waiting at central median bus stop due to travelling motorist on both sides of the bus stops. • Overflow passenger demand at the bus stops could spill out into traffic lanes or crossing, especially if required near schools.</td>
</tr>
</tbody>
</table>

| Impact on bus operation due to driveways | Results from assessment of the existing Liverpool to Parramatta T-way show negligible impact of drive ways to the buses reliability. There are only 3 driveways in this section of the road and buses are expected in every 5 minutes in one direction. Left in and left out movements from the residential properties are expected to give way to bus approaching. | No expected impact to the rapid buses and negligible impact on local buses. Rapid buses are separated from the general traffic and they are running at the centre. Local buses are operated in every 15 minutes in peak hours and every 30 minutes in the off peak hours. |

| Access by pedestrians and cyclists | Bus shelters are located at kerb side and easier to access by footpath/ shared pathway. | Rapid bus stops are located in the median and off set from signalised intersection. Pedestrians and cyclist are required to travel through connecting passages. |

| Impact to active transport facilities. | No impact in existing facilities. Opportunity to improve the facilities in particularly in front of the shops at Dorrigo Av. | Marginal impact on existing shared pathways is expected, where the corridor width is not negotiable. Opportunity to improve the facilities in particularly in front of the shops at Dorrigo Av. |

<p>| Interchange between local and rapid buses | As the bus stops for both local and rapid services are on the kerbside, it is expected that it would be easier for bus customer to change between rapid and local services. | As rapid bus stops are on the central median and local bus stops are on the kerbside at different required distances, it is expected that customers have to walk longer distances to change from local services to rapid services and vice versa. |</p>
<table>
<thead>
<tr>
<th><strong>Conflicting with turning traffic</strong></th>
<th>Buses may need to slow down at the intersections due to left turning traffic at Spire Ct and at Glen Innes Road. However, separate left turning lanes are exists at Cowpasture Road and at First Avenue where buses can filter through the turning vehicles, which are also expected to give way to buses. No possible conflict with the right turning vehicles.</th>
<th>No possible conflict with the left turning vehicles. Buses need to be stopped when vehicles are turning right. This has been proven to reduce the reliability of the current operation of the centre running bus lane section on the existing Liverpool to Parramatta T-way.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impact on existing infrastructures</strong></td>
<td>Impact on utilities in the median. No impact on existing stormwater system, as it was designed for six lanes with widening allowed for the existing central median. Not required to widen Hinchinbrook Bridge and the nearby culvert. No impact on M7 Western Motorway.</td>
<td>Impact on utilities both in the median and in the footways. Significant impact on existing stormwater drainage, as the road is to be widened both on the central median and on existing kerb line at various locations. Not required to widen Hinchinbrook Bridge and the nearby culvert. No impact on M7 Western Motorway.</td>
</tr>
<tr>
<td><strong>Impact on flood level</strong></td>
<td>No impact on flood level.</td>
<td>Possible increase of flood level in the upstream due to pedestrian safety barriers along the passage to the proposed centre bus stops near Banks Road.</td>
</tr>
</tbody>
</table>

The above comparison is specific to this corridor only.