



PARRAMATTA ROAD
TRANSPORT
OPPORTUNITIES
STUDY
SUMMARY

TRANSFORMING PARRAMATTA ROAD



INTRODUCTION

In response to the NSW State Government's Parramatta Road Urban Transformation Strategy (PRUTS) and potentially reduced traffic volumes on Parramatta Road (predicted to result from the WestConnex Motorway project) the Inner West Council commissioned Bodhi Alliance and EDAB Consulting to examine opportunities to provide a light rail service along Parramatta Road. This study was proposed in recognition of the need to support the increased residential population and workforce envisaged in the PRUTS.

The scope of the study proposed a simple analysis to determine whether light rail could be physically accommodated within Parramatta Road's existing carriageway and an examination of best practice in the provision of public transport as a catalyst for revitalisation.

It was envisaged that, should this initial study highlight feasible public transport solutions, a more detailed feasibility study and operational analysis could be initiated, ideally prepared by Transport for NSW (TfNSW) in consultation with Councils along the corridor.

Noting the Department of Planning's requirement (WestConnex Stage 1 approval condition) that two lanes of Parramatta Road, between Burwood and Sydney City, should be devoted to public transport, the study focused on this area. Subsequently, as a result of interest expressed by Canada Bay Council, the study was later extended to include connectivity with Strathfield heavy rail station and consideration of a spur link to Rhodes. (Ultimately the study has been supported by all four Corridor Councils – Burwood, Canada Bay, Inner West and Strathfield Councils).

It should also be noted that while this study bases its traffic volume assumptions on Parramatta Road levels that the State Government anticipates, occurring concurrent with the opening of WestConnex Stage 3, should WestConnex not come to fruition the importance of public transport in catalysing the revitalisation of Parramatta Road would be even more important.

The first phase of the study was to examine the physical constraints associated with the existing configuration of Parramatta Road and the potential impacts light rail could have on its streetscape, heritage and place making opportunities. The study examined both kerbside and centre running of light rail.

Initial findings indicated that kerbside running of light rail had the potential to inhibit activation of frontage uses by sterilising the kerbside lane and precluding kerbside parking. The study also indicated that, in order to accommodate centre running light rail many locations along the corridor were likely to require widening of the carriageway and loss of footpath width and/or frontage buildings.

Additionally, the study noted that, to best capitalise on any reduced traffic volumes resulting from the opening of WestConnex it would be essential to introduce a public transport system which could be operational from *Day One* of the opening of WestConnex Stage 3. Should this not occur there was a high likelihood that any spare capacity on Parramatta Road would rapidly be taken up by increased traffic, particularly traffic associated with latent demand.

Based on the above, the study findings indicated that, while light rail was likely to be able to provide the capacity required and image desired to encourage revitalisation it was unlikely to be able to be

implemented in time of Day One of WestConnex Stage 3 and was likely to have significant impact on frontage uses and streetscape.

The second phase of the study required the consultants to address world's best practice in public transport provision to encourage revitalisation of inner urban areas. In examining the various networks and systems in use it was noted that the proximity of Sydney's heavy rail network was likely to result in a large proportion of commuter travel demand (to and from the city) being catered for by heavy rail. This encouraged the study to focus on public transport systems which could cater for a mix of short-medium distance traveller (shoppers, local workers, residents and visitors) and a moderate level of medium distance commuters. This meant that the systems would need to be high frequency at predictable intervals and with regular stops some 600m to 800m apart.

The analysis of existing and emerging technologies indicated that urban revitalisation required significant investment in public transport infrastructure, a mode that was contemporary and marketable, and an image that assured developers and residents that there was a genuine commitment from the government. This analysis also indicated that the establishment of a public transport corridor using advanced electric or hybrid vehicles was likely to provide a catalytic effect which would facilitate revitalisation. Additionally, investigations indicated that several of these systems were capable of integrated, or retrofitted, electronic guidance technology which had the potential to reduce lane width requirements to a size which would minimise the need for reduced foot paths or demolition of frontage buildings along Parramatta Road.

During the preparation of this study the State Government announced that it was considering a kerbside running rapid bus service (RBS) for the corridor, between Burwood and Sydney City.

Consequently, the scope of this study was expanded to include a comparison of the proposed RBS and the Guided Electric Transit System (GETS) suggested by Council's consultants and strategic transport planning team.

In summary, this comparison indicated that:

- both systems could be introduced from *Day One* of WestConnex ;
- both systems have relatively minor sub-surface road works and consequently are unlikely to encounter the construction delays encountered in many light rail projects;
- implementation of the RBS would cost less than the GETS, however the long term benefits of a GETS included environmental savings, likely mode shift and lower maintenance costs;
- the GETS has greater capacity than the RBS;
- the GETS represents state-of-the-art public transport technology which has the potential to be incrementally upgraded (eg should only limited funding be available the opportunity exists to purchase electric vehicles with a later retro-fit of electronic guidance technology);
- based on the Institute for Transportation & Development Policy's (ITDP) rapid bus transit scorecard the RBS did not rate as a rapid transit service while the GETS received a "gold" rating;
- kerbside running of the RBS would preclude any opportunities for kerbside parking. Noting that kerbside parking (for at least part of the day) is considered essential in achieving frontage activation and revitalisation;

- the GETS has a greater likelihood to both encourage mode shift to public transport and to act as a catalyst for revitalisation.

Ultimately the findings of this study suggest that a GETS:

- could generally be accommodated within the corridor between Strathfield and Sydney City;
- has an image and appeal that is likely to encourage confidence in developers and future residents and so act as a catalyst for revitalisation;
- would provide a cost-effective solution positioned between the price of rapid bus services and light rail, while providing capacity comparable to light rail;
- provide sufficient capacity, frequency and flexibility to both the service the growing population and encourage revitalisation.

Consequently, the study recommends that Councils and the State Government work together to analyse the feasibility of introducing a GETS for the Parramatta Road Corridor that will be operational from Day One of completion of WestConnex.

CONTEXT

Since the late 1980s both state and local government have recognised the need to enhance Parramatta Road. This need has been identified in numerous studies since that time, however with the recent decision to construct WestConnex, potentially resulting in reduced traffic volumes on parts of Parramatta Road, an opportunity has been presented to progress the corridor's revitalisation. This revitalisation is now being driven by the Parramatta Road Urban Transformation Strategy (PRUTS) which provides a 30 year vision targeting 42,900 additional people, 20,600 additional homes and nearly 30,000 additional jobs in the eastern section of the corridor (Burwood to Sydney City).

This is further supported by the Greater Sydney Commission's Central District Planning Process, the Sydney CBD to Parramatta Strategic Transport Plan and numerous other strategies.

Consequently, the need to support the increasing population and workforce with an efficient and reliable public transport network is well recognised. The State Government's vision for Parramatta Road identifies it as *living street* that is *a corridor enterprise* and *a place for people*.

In addition to the PRUTS the inner west sub region has a number of dynamic proposals which will compete for resources over the next 20 to 30 years including:

- The Bays Precinct;
- Sydney Metro;
- The Greenway;
- The Inner Sydney Regional Bicycle Network;
- WestConnex, Iron Cove Link and the Western Harbour Crossing;
- Callan Park.

In order to balance the numerous competing interests in a manner which will produce the most desirable outcome for Parramatta Road it is essential to adopt and maintain a consistent vision for the corridor. This vision, supported by Councils and the State Government, includes the creation of a friendly and inviting street which encourages sustainable transport and the activation of frontage uses, while providing adequate parking to ensure its vitality. It is considered that the inclusion of kerbside parking to be introduced in a manner which provides a buffer between the pedestrian environment and calmed traffic lanes would also assist in reducing vehicle speeds and provides short to medium stay for the patronage of frontage uses.

While the role of public transport on Parramatta Road is to provide for short – medium distance travellers (shoppers, local workers, visitors and residents) and limited medium distance commuters, the ultimate determination of its success will be its ability to act as a catalyst for the revitalisation of the corridor as a whole. With this in mind it is considered that the RBS currently proposed by TfNSW has the potential to be viewed by developers and future residents as a *business as usual* approach rather than an indication of the State Government’s commitment to ensuring the success of the PRUTS. Consequently it is considered essential to examine opportunities to introduce a modern, environmentally friendly and consumer appealing public transport system to Parramatta Road.

PHYSICAL CONSTRAINTS

An initial step in determining the suitability of light rail operation within the existing carriageway of Parramatta Road was to examine current road pavement widths at critical locations along the route. A summary of these dimensions are shown in Figure 1, below

Parramatta Road Approximate Road Widths (source SixMaps)		
Intersection	Current Road pavement width metres	Lot to Lot (metres)
Carlton Street	24	34
Victoria Park	26	33
Sydney Uni	20	26-30
Larkin Street	21	25-26
Camperdown	20	27
Johnston Street	20	27
Norton Street	17	26
Taverners Hill (Tebutt)	19	25
Ashfield Park	17	28
Wattle Street	22	30
Iron Cove	19	24
Kings Bay	17	23-26
Burwood	17	25
Strathfield –Moseley Street	10	25
Leicester Ave -	17	26

FIGURE 1 – PARRAMATTA ROAD WIDTHS

The initial phase of the study (examining opportunities for light rail) indicated that the 17m width, encountered at five locations, was insufficient to accommodate light rail platforms with through-traffic lanes.

The figures below show typical configurations for centre-running light rail. In general, even though the approval conditions for Stage 1 of WestConnex include the provision of two full-time lanes for public transport the existing width of Parramatta Road creates an extremely constrained environment, particularly if kerbside parking is to be provided. This means that it is highly likely that RMS would only permit kerbside parking outside peak periods and this only if WestConnex were to remove significant volumes of traffic from Parramatta Road.

However, it is considered that the impetus provided by the PRUTS should be considered a *once-in-a-lifetime* opportunity to reclaim Parramatta Road, reconfigure it and create a desired future road environment that will support the corridor's revitalisation. With this in mind it is important to consider the overall function of Parramatta Road and the movement priority that should be given to sustainable transport in contrast to private vehicle travel. Should WestConnex be completed measures should be immediately introduced to discourage long distance through traffic from Parramatta Road, vehicles speeds should be reduced and a safer, friendlier, pedestrian environment established.

In examining opportunities for light rail the study provided potential configurations for centre running of light rail in streets of 20+m, were conceptually developed as shown in Figure 2, below. (Noting that these configurations exclude platforms)

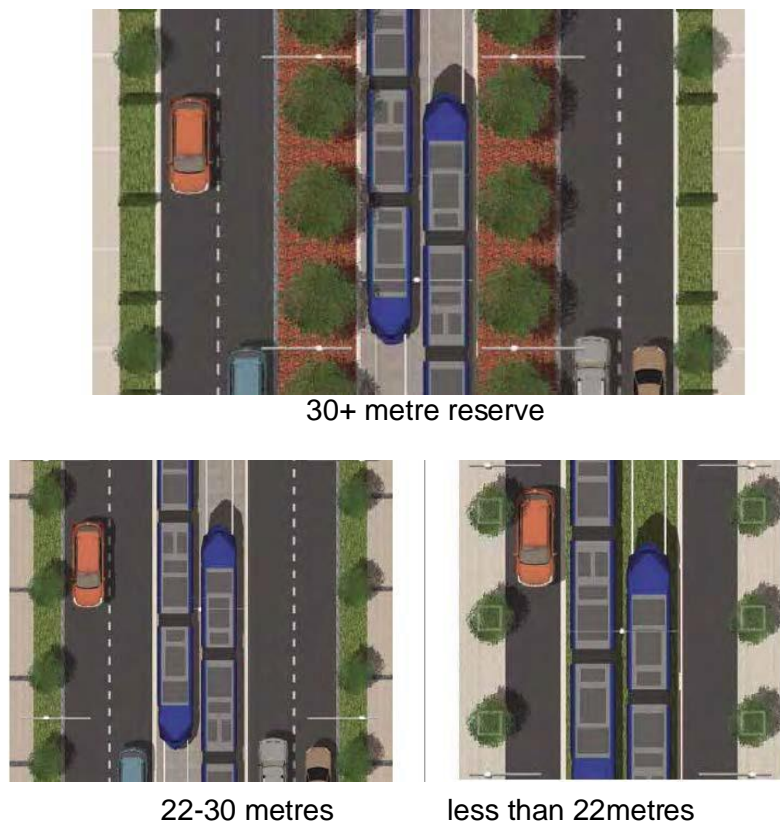


FIGURE 2 - CENTRE RUNNING CONFIGURATIONS

The study indicated that while much of Parramatta Road could accommodate the lanes associated with centre-running of light rail there was insufficient width to accommodate platform infrastructure at several locations. Additionally, the time spent in modifying the roadway would make it impractical to introduce a light rail system on Parramatta Road by *Day One* of WestConnex.

OPTIONS CONSIDERED

While the study was initially designed to examine opportunities to provide a light rail along Parramatta Road ultimately it considered the following transport systems:

- a “Do Nothing” option which retained existing kerbside running bus services;
- Light Rail (both kerbside-running and centre-running) - these are generally electric vehicles running in their own discrete and separated corridor with rails embedded in the road surface, platform-style stops and a power source which is either overhead wiring or embedded in the road surface. Vehicles stop at all stops and run at a prescribed frequency rather than a timetable (ie a “walk-up and ride” system). Light rail generally caters for a mix of short-medium distance travellers and medium distance commuters.
- Bus Rapid Transit (BRT) – generally uses conventional buses (including bendy buses) in their own discrete and separated corridor. This corridor will usually be fenced or defined by substantial barrier kerbs or guide rails. The service will usually operate for a minimum of 3 km, stopping at platforms anywhere between 600m and 1.2 km apart, generally targeting medium distance commuters with a secondary service being used by medium distance travellers. Vehicles stop at all stops in the corridor however these may not correspond with stops on an adjacent parallel roadway and are usually further apart than conventional bus services (often 1 km or more). BRT’s are often supplemented by feeder buses (or mini-buses) that serve adjacent areas. BRT services may run at a prescribed frequency or to a timetable. (Noting that the higher the commuter loading the more prevalent timetabled running is).
- Rapid Bus Service (RBS) *as currently being explored by TfNSW for the Parramatta Road Corridor* – generally uses conventional buses and runs kerbside using existing bus stops, consequently it does not have the exclusivity of lane use (other vehicles including taxis, bicycles and left turning vehicles will momentarily occupy the bus lanes). Additionally, the use of these kerbside lanes inhibits kerbside parking or can be blocked by illegally parked service vehicles or breakdowns. RBS will normally only stop at a specific/express stops with the distance between stops often reaching 1 km or more. Because RBS runs in the same lanes as the local bus services, past local bus stops, confusion may result for less frequent users who stand at local bus stops and are passed by RBS vehicles. RBS is biased towards commuter use however conflict with multiple users of its lane and congestion at intersections may discourage some commuters.
- Guided Electric Transit System (GETS) - these are generally electric vehicles running in their own discrete and separated corridor (usually centre-running) with on-board optical guidance which, in combination with narrower vehicles, permits use of a narrower lane than buses or light rail. The system would have platform-style-stops (sometimes prefabricated to offer

ease of installation) and-a power source within the vehicle that is rapid charged at key stops¹ (with full charging occurring overnight at a depot). Vehicles stop at all stops and run at a prescribed frequency rather than a timetable (ie a “walk-up and ride” system). GETS generally caters for a mix of short-medium distance travellers and medium distance commuters. An example of a typical GETS vehicle (Van Hool Exqui.City) is shown in Figure 3, below.



FIGURE 3 – EXAMPLE OF GETS VEHICLE

Phase 1 of the study generally considered that:

- The “Do Nothing” option would not support the increased demand associated with the propose revitalisation, its image would not inspire sufficient confidence to act as a catalyst for revitalisation and that its kerbside running would inhibit reactivation of frontage uses, particularly as a result of its preclusion of kerbside parking.
- Light Rail would inspire sufficient confidence to act as a catalyst for revitalisation, particularly if introduced as centre-running (and thus permitting kerbside parking at least outside peak periods). However its implementation timeline would preclude operation from

• ¹ Van Hool vehicles charge overnight and received 15 second top ups at selected stops en-route during the day, while the new Tesla charging system (on the Catalyst E2 E-Bus and Proterra buses) has the ability to fully charge a vehicle in 20-30 minutes)

Day One of WestConnex, its width requirements would potentially necessitate footpath reductions and possible acquisitions of frontage properties;



- Bus Rapid Transit would require a dedicated and separated corridor (much like light rail) and consequently would have similar impacts on footpath widths and frontage uses without providing the capacity of a light rail service.

TfNSW’s decision to pursue an RBS, rather than light rail or BRT system, implies that their analysis has produced similar findings to those above..

COMPARATIVE ANALYSIS

Based on the above consideration of options Phase 2 of the study expanded its scope to prepare a comparative analysis of the TfNSW RBS proposal and the Councils’ GET proposal. The comparison conducted is indicative only, as a comprehensive comparison of the two systems was not possible due to the lack of detail available regarding TfNSW’s RBS proposal. The assumptions made in the comparison are detailed in the consultant study and align well with all information currently available. (As stated earlier in this report the Opportunities Study is an indicative study to determine opportunities for improved public transport and has been prepared to encourage development of a more detailed GETS feasibility study to be jointly prepared by the State Government in consultation with the Corridor Councils.

The comparison was conducted using the Institute for Transportation and Development Policy (ITDP) Bus Rapid Transit Scorecard and item specific details (eg cost and capacity assessment). An overview of the two systems is provided in Figure 4 below.

Configuration of the RBS (as anticipated for Parramatta Road)	Configuration of the GETS
 <ul style="list-style-type: none"> • Branded standard single diesel buses • Spacing of stops – assumed as currently exist • Superstops will have seating and some with shelters and landscaping • Kerbside running in painted pavement • Dedicated lanes at peak. It should be noted on the information available the implementation of the RBS is to be staged over a period of 10years or more. • Accessibility will be as per currently exists (wheelchair accessible buses that squat and have 	 <ul style="list-style-type: none"> • Branded and highly recognisable and high customer appeal • Station spacing aligned to needs of PRCUTS no more than 800m • Superstop stations with -weather protection and bicycle facilities – bike share and storage • Dedicated lanes (painted pavement) • Centre running • Off board fare validation • Signal priority • Multiple door boarding

Configuration of the RBS (as anticipated for Parramatta Road)	Configuration of the GETS
<ul style="list-style-type: none"> a driver operated ramp) On-board fare validation (consideration is being given to changing the fare validation system with a more advanced contactless system) No signal priority Front door boarding Squatting bus with ramp for disability access Scalable with ability to add additional buses including higher capacity buses to system Real time passenger information on vehicle and at stations is envisaged in the longer term as stated in the Sydney Bus Future. 	<ul style="list-style-type: none"> Full disability accessible low floor small gap between platform and vehicle, audible travel advice on and off-board Electric or hybrid electric vehicle proven technology Various sized vehicles including 24m vehicle (3 standard buses) = less vehicles to move the same number of people at peak. Scalable can increase system capacity to cater for demand Low noise and pollution Real time passenger information on vehicle and at stations Higher capacity vehicles and dedicated lanes provide additional opportunities to space arrivals more evenly apart and avoid clogging/bunching as currently occurring with existing buses.

FIGURE 4 – BASIC COMPARISON OF RBS AND GETS

Use of the ITDP Scorecard indicated that, because the proposed RBS did not have several key elements, it did not achieve even a basic rating as a bus rapid transit system, however the GETS provided sufficient elements to achieve a “Gold” rating. While this scorecard is designed primarily to examine the level of effectiveness of a bus system it is, also, considered to provide suitable metrics to examine public transport systems in general.

The Figure 5, below, summarises the key findings of the comparison of the two systems.

Item	Rapid Bus System (proposed by TfNSW)	GETS(proposed by Corridor Councils)	Notes
Implementable for Day One of WestConnex	Yes	Yes	<i>In order to minimise disruption to traffic GETS platforms and drop charging units could be prefabricated, then placed in situ the weekend prior to opening of WestConnex.</i>
Kerbside Parking	Not available unless RBS only operates part-time	Centre-running of the GETS permits kerbside parking; however it is possible that RMS may require clearways during peak periods.	
Land acquisition/footpath narrowing	Not required	May be required adjacent to platforms at some specific locations	<i>The width requirement for platforms should also be balanced with any need for right turn bays at specific locations</i>
Vehicle Capacity	Approx. 60 - passengers	Approx. 150 passengers	<i>Variations are possible depending upon body style and seating configuration</i>
“Stations”	Normal kerbside bus stops	Central platforms	
Seamless accessibility	Possible- may require “kneeling” buses which may result in operational delays.	Roll-on-roll-off at-grade platforms	

Item	Rapid Bus System (proposed by TfNSW)	GETS(proposed by Corridor Councils)	Notes
Current operational examples	In common use	Narrow width electric vehicles are used world-wide including Malmo, Douai, Metts, Geneva, Luxembourg, Hamburg, Barcelona, Parma. Precision guidance systems are used in several cities including Castello (Spain),Rouen (France)	<i>The majority of precision guidance systems currently in use are related to “docking” at platforms and “lane assistance”. More advanced technologies such as autonomous control are also currently being piloted.</i>
Consumer Appeal of the Vehicle Style	“Business as Usual” approach, not considered to significantly alter appeal	The attraction associated with contemporary vehicles that look, sound and operate as people imagine future transport will be. This was particularly noted in Malmo (Sweden) where 15 gas/electric hybrid vehicles were purchase in 2014 – a 12% growth in ridership has since been experienced (and an additional 20 are on order for 2019). In Metts (France) a fleet of diesel/electric hybrid buses were introduced and a 33% increase in ridership was experience in the first year.	
Catalyst Effect for Revitalisation	“Business as Usual” approach not considered to significantly influence revitalisation. Likely to deter revitalisation of Parramatta Road frontage uses by precluding kerbside parking	It is considered that the image and appeal of the vehicles, in combination with commitment shown by investment in the system, will provide confidence that the Government is supporting the corridor’s revitalisation. Additionally, the availability of Parramatta Road’s kerbside for parking (at least outside peak periods) will assist in activating frontage uses.	
Reliability and Efficiency	May be impacted by turning vehicles, illegally parked or broken down vehicles and congestion at intersections.	Runs in its own, dedicated corridor and so is less likely to be impacted by other vehicles. Queuing of	

Item	Rapid Bus System (proposed by TfNSW)	GETS(proposed by Corridor Councils)	Notes
		vehicles across intersections is less likely as the dedicated corridor and more substantial vehicles tend to “demand more respect” from car drivers.	
Vehicle Cost	Approx. \$320,000 / 60 seat bus	Approx. \$700,000 for electric vehicle, upto \$1,200,000 for fully guided vehicles	<i>Prices vary significantly based on body style, seating configuration and running gear.</i>
Operating cost	\$9-\$19 pvkm	Approx. \$4.50/pvkm	
Optimum route capacity	5,000pax/hr/direction	10,000 pax/hr/direction	
Road based construction costs	\$0.39-\$0.78/km	\$0.39-\$0.78/km	
Station costs	Nil	Yet to be determined	<i>GET station costs vary significantly depending upon their design, charging configuration and street furniture. It is anticipated that the next stage (feasibility study) would provide a more appropriate opportunity to establish these costs.</i>
Vehicle width	2.5m – 2.6m	2.1m-2.55m	<i>Narrower vehicles generally have less capacity</i>
Lane width required	3.0m - 3.2m	2.5m (guided) – 3.0m (unguided)	
Estimated total system cost	Approx. \$131 million (based on PRUTS forecast), primarily associated with purchase of new vehicles	Approx. \$200 million including vehicles, platforms and charging infrastructure.	

FIGURE 5 – COMPARISON OF RBS AND GETS

CONCLUSION

While the role of public transport on Parramatta Road is to provide for short – medium distance travellers (shoppers, local works, visitors and residents) and limited medium distance commuters, the ultimate test of the success of Parramatta Road's new public transport system will be its ability to act as a catalyst for the revitalisation of the corridor as a whole. With this in mind it is considered that the RBS currently proposed by TfNSW has the potential to be viewed by developers and future residents as a *business as usual* approach rather than an indication of the State Government's commitment to ensuring the success of the Parramatta Road Urban Transformation Strategy. Consequently, is considered essential to examine opportunities to introduce a modern, environmentally friendly and consumer appealing public transport system to Parramatta Road.

Having regard to this it is proposed that the four Corridor Councils work with the State Government to prepare a detailed assessment of the feasibility of introducing a Guided Electric Transit System to Parramatta Road. Subject to the findings of such a study the system may be fully optically guided or may simply use narrow width electric vehicles which could be retrofitted with optical (or similar) guidance at a later date.

Should a Metro style seating configuration, with double sided doors, be used the vehicles operating within centre-running lanes (on Parramatta Road) would also be capable of extending the service to adjacent suburban areas using kerbside bus stops. Alternatively, this initiative would provide a valuable opportunity to revise the bus network around the Parramatta Road corridor to include feeder and crossover services which seamlessly interchange with the GETS.

STUDY RECOMMENDATIONS

Specifically the consultant study recommends

- Preservation of the public transport corridor (in Parramatta Road) for a Guided Electric Transit System (GETS) with the option of incremental upgrades in capacity by increasing the frequency of service (by adding additional vehicles) as demand increases.
- Centre-Running vehicles from 'Day-One' of WestConnex Stage 3, Part 1.
- Provision of short-term kerbside parking outside of peak periods.
- Pursuing opportunities for a future 'spine and spur' network with first and last mile infrastructure as identified in the TfNSW Roadmap 2016.
- The relevant Councils to work collaboratively with State and Federal Governments to progress the project. Initially this would involve more detailed investigations that collectively would comprise a Feasibility Study. Of note through this Opportunities Study the relevant Councils now have a well-informed basis to productively contribute in a collaborative partnership with State and Federal Governments.

Further, it proposes that the next steps should include the establishment of a collaborative approach between all levels of government to progress a Feasibility Study. This would provide a detailed assessment of the viability of a Guided Electric Transit System for Parramatta Road capable of being introduced to coincide with the opening of WestConnex Stage 3 Part 1 (if approved). It also proposes that the system be configured for centre-running, providing kerbside parking (at least outside of peak periods). Consideration could also be given to arrangements that would enable (as required) for the new GETS to support the short-term inclusion of existing buses running in a mixed traffic environment (including cross-over services which link to the GETS).

In the language of the TfNSW *Future Transport Technology Roadmap 2016*; the GETS provides opportunity for putting in place 'no regrets' technology and infrastructure. Thus reserving the corridor and the agility to respond to change and accommodate future uses be that light rail or other transport innovations.