NEWCASTLE TRANSPORT

for

BUSINESS DEVELOPMENT

Introduction to the Lower Hunter Tram-Train Network

REVISED SUBMISSION TO

HUNTER DEVELOPMENT CORPORATION
23RD February 2009

EXECUTIVE SUMMARY

Newcastle Transport for Business Development proposes a tram train network for the Lower Hunter as an alternative to cutting the Newcastle railway as proposed by GPT.

Hybrid tram train technology will run on the existing heavy rail line complementing the existing heavy rail train service both from Sydney and the Hunter Line. Tram trains will run between Maitland, Newcastle and Morisset without the need for an interchange at Wickham. The existing Sydney and Hunter trains will continue through to Newcastle Station. The tram trains will allow for an increase in service frequency over time at a lower cost overall. Tram trains are now operating in Sydney, Melbourne and Adelaide and are rapidly becoming the preferred method of high capacity urban public transport round the world.

An essential component of the proposal is the installation of new level crossings at Worth Place and Steel Street, in particular, and possibly a pedestrian only crossing at Market Street, to improve connectivity between the Newcastle CBD and Honeysuckle and the foreshore.

Stage 1 of the tram train network will see the creation of the new level crossings and the introduction of tram trains between Hamilton and Newcastle with a loop along Union Street to the Junction and returning along Darby Street with another loop through the Hunter Street Mall.

The Tram Train network could be funded by the Federal Government infrastructure fund approximately to the same amount as that to cut the rail and build a new Wickham terminal, as suggested by GPT.

Subsequent stages of the proposal will see the tram trains extended to the University, Maitland and Glendale linking with express buses to Charlestown, John Hunter Hospital, Raymond Terrace, Cessnock and the airport via transfer stations at Shortland and Tickhole.

Integrated ticketing will be an essential component of the network integrating the new tram trains with the existing Newcastle Bus and Cityrail services.

Such a network allows for future growth in response to demand, as the population of the Lower Hunter grows as predicted, and provides a much improved public transport system for the whole Lower Hunter.

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INTRODUCTION TO THE LOWER HUNTER TRAM-TRAIN NETWORK

Background

The Lake Macquarie Transport Taskforce outlined a proposal for a Tram / Train in 2007.

Newcastle Transport for Business Development (NTBD) has investigated and developed this proposal further.

The Proposal

The GPT proposal (referred to as the Wickham Terminal Option in this paper) proposes the expenditure of approximately $160 million to permanently reduce future transport options for all of the Lower Hunter. This paper advocates that a Newcastle City tram train service can be established for substantially less than that cost and, as stage 1 of a wider network, will significantly improve public transport in Newcastle, Lake Macquarie, Maitland and Port Stephens.

The proposed Lower Hunter tram trains will **complement** the existing heavy rail. The latest generation of tram trains can travel at speeds up to 100kph as required.

The proposal to close the railway line at Wickham Station is presented as an example of modern, mixed-use Transit-Oriented Development, precisely the kind of development that shelters an urban precinct from much of the pain imposed by periodic gas price shocks, whether driven by the Australian Dollar foreign exchange rate roller coaster or by the kind of crude oil price shock we saw in the winter of 2008.

However, it fails to consider the most important element of Transit-Oriented Development, which is more efficient use of valuable urban space through reduction in the average allocation of parking spaces required per pedestrian.

The rail line to be closed serves primarily to support access to Newcastle City from outlying parts of the Lower Hunter metro area, primarily from the City of Maitland and northern and western parts of the City of Lake Macquarie. There are 1,400 pedestrian entries to the CBD daily without requiring parking space support. A large share of these are rail commuters, arriving in the morning peak and leaving in the evening peak, and somewhere between 200 and 400 will drive rather than commute by rail if there is a break in service between their home station and current destination.

It is essential that we design and implement a public transport system that benefits the whole Lower Hunter community, (allowing for Peak Oil and future uncertainty) not just a select few.

The Lower-Hunter Tram-Train Network proposes a Newcastle City tram-train route, combining *additional* use of the existing rail corridor to access the Honeysuckle, Newcastle West, Civic, and Newcastle Mall precincts with a pair of Newcastle City tramlines that extends the access to include the Cooks Hill, Junction, and the Cathedral districts, extending to substantial new gateway parking at Hamilton Station.

The foundation of the proposal is the tram-train, a transport innovation of the past fifteen years, beginning in Germany but spreading into other European nations and to specific sites in the US.

It is reliance on the tram-train that allows this proposal to break the bottleneck of vehicle and pedestrian access across the passenger-only rail line.

Sustainable Cities

In 2005 the House of Representatives Standing Committee on Environment and Heritage handed down its report on sustainable cities. Amongst the recommendations on transport are the following:

- One particular mode of transport that appears to be overlooked is that of rail particularly light rail

- Strong rail cities are 45 percent wealthier than weak rail cities. Strong rail cities spend less on road transport and are more cost effective in their transit operations. Proper use of rail saves time and money.

- Since 1994 100 cities worldwide have now built or reintroduced light rail systems but in Australia government funding for urban rail transport is lacking.

- Reliable swift and affordable urban rail systems can have positive impacts on savings (both personal and city), health and transit speed.

Tram Train

The Lower-Hunter Tram-Train Network addresses these issues. It proposes a Newcastle City tram-train route, combining *additional* use of the existing rail corridor to access the Honeysuckle, Newcastle West, Civic, and Newcastle Mall precincts with a pair of Newcastle City tramlines that extends the access to include the Cooks Hill, Junction, and the Cathedral districts, extending to substantial new gateway parking at Hamilton Station.

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The first stage of this proposal, the Newcastle City Tram-Train, is the direct alternative for the Wickham Terminal Option. It supports a local Tram / Train route between Newcastle Station and Hamilton Station, connecting the Beaumont Street district, the Newcastle West district, the western Honeysuckle District, the Civic

District, The Junction district, the Newcastle Mall district and the Queens Wharf district.

The indicative cost is $90m. Unlike the Wickham Terminal Option this includes capital acquisition of rolling stock but, in line with Wickham Terminal Option, does not include operating costs.

The second stage and third stages of this network provides direct trips to an increased number of Lower Hunter residents and to a greater variety of Newcastle City destinations. It provides single transfer trips to those destinations for a large majority of Lower Hunter residents. By contrast, the Wickham Terminal option requires a minimum of one transfer for a majority of Newcastle City destinations, and imposes multiple transfers on residents of outlying areas.

Advantages of retaining rail into Newcastle

These advantages come largely from the work of distinguished planners and economists NTBD have studied and consulted:

- A critical factor is that the Lower Hunter can expect 160,000 new residents over the next 25 years. Direct rail access into the CBD will be a significant on-going benefit.

- Cities best able to handle growth are those with well developed public transport.

- Approximately 100 cities in the US are considering new rail projects. 44 US cities are proposing to retrofit rail which was previously removed.(Professor Peter Newman)

- Trains are more reliable than buses, and are usually faster with higher capacities.

- Being fixed assets trains provide a higher level of certainty for passengers, commuters and developers.

- Property values always increase when rail is added and decrease when rail is removed.

- The wealthiest cities are those with rail to the CBD. (Professor Peter Newman)

- The best generator of retail business is foot traffic and the best generator of foot traffic is rail.

- If passengers are forced to change mode at Wickham then up to 60% may switch to cars which will exacerbate parking issues.

- The Marchetti principle dictates that people will generally limit their daily commute to one hour a day. If the trip takes longer they will change their arrangements to minimize the journey time. Introducing a change of mode at Wickham will increase journey times for Lower Hunter commuters. This appears to have been confirmed by a recent survey of

Maitland commuters which indicated that many will consider using their cars if the Wickham interchange results in longer journey times.

Advantages of the Tram Train for Newcastle

The tram train proposal will have the following advantages:

- Addresses the perceived 'barrier' issue between the CBD and the foreshore by opening up and landscaping the rail corridor.
- Allows increased connectivity with additional level crossings - both vehicle and pedestrian.
- Allows for increase in service frequency over time at a lower cost
- Eliminates the need for an expensive overpass at Stewart Avenue or interchange at Wickham.
- Allows the existing Stewart Avenue level crossing to operate with tram activated traffic lights which can be coordinated with the Hunter St traffic lights.
- Provides a new public transport network which can be gradually extended across the Lower Hunter as population growth demands.
- Can be built in stages as required.
- Provides the light rail system that Novocastrians have continually requested in public opinion polls.
- Retains all the benefits of direct heavy rail into the Newcastle CBD and beaches.

Integrated ticketing & ongoing management

To ensure the full benefits of the Tram / Train proposal are realized it is essential that a fully integrated ticketing system is implemented integrating the existing heavy rail and bus systems with the proposed tram / train and tram / bus system.

It has been suggested that the best form of on going management would be to create a Lower Hunter Transport Authority. This could be a desirable long term objective but probably not realistic in the short to medium term.

The proposed Tram Train network could be managed by Newcastle Buses or a similar arrangement provided suitable access arrangements to the heavy rail corridor are negotiated.

Parking

A commuter requires a parking space all day, plus additional parking spaces in the local area during their lunch hour, so taking a parking place requirement of 1.25 per motor commuter, it is reasonable to estimate that the Wickham Terminal option must first find 250 to 500 additional parking spaces in the Civic and Newcastle Mall precincts.

In addition, a successful mixed use redevelopment in the Newcastle Mall Precinct assumes a substantial increase in pedestrian access to the precinct during business hours. The proposed local bus loop with interchange with regional bus routes at the Wickham Station Terminal Interchange provides no substantial inducement to a mode shift away from car traffic, since the increased convenience within the CBD district of a dedicated bus loop is offset by reduced convenience for access to the CBD district by bus and rail, and the proposed loop omits the Cathedral district, Cooks Hill, Darby Street, and The Junction.

Also omitted from the Wickham Terminal Station proposal is the additional pedestrian access required for commercial success of the professional and retail components of the development, and the parking access required to support this access.

Level Crossings

A key component of the Tram / Train proposal is the provision of additional level crossings at Worth Place and Steel Street and a pedestrian only crossing at Wolfe, Brown or Markets streets in the CBD.

High quality level crossings are far less expensive than full grade separation. ***For the current frequency of rail services***, well designed level crossings are closed for shorter intervals than traffic lights, so that proper design of responsive traffic signal cycles can remove level crossings as a factor in delaying motor vehicle traffic.

So ***at current service levels***, any reasonable cost-benefit analysis will conclude that additional level crossings are by far the most efficient solution to the problem of access across the rail corridor.

Certainly we wish to eliminate as many level crossings as possible across coal lines in any urban setting. However, this is not an issue in the passenger-only Newcastle CBD rail corridor.

The problem is, the ***most efficient use*** of the rail corridor in a parking-congested urban setting ***requires an increase in the number of services*** along the rail corridor, combined with an increase in the number of stops along the rail corridor.

Enter the tram-train. In this proposal, existing conventional passenger rail service frequencies are not changed. However, tram-train routes are added to the service mix through to Newcastle Station. These operate on new tramline loops to the Junction, and through the Hunter Street mall, and also operate on the existing rail corridor.

However, when operating through a level crossing, ***the gates remain up***. Interaction between motor vehicle and pedestrian traffic on a level crossing and the tram-trains are controlled by traffic signal, not by crossing gates. So no matter how many tram-

train services are ***added*** to the corridor, the number of gate closures remains unchanged.

Safety of level Crossings

One of the key aspects of the Tram Train proposal is the provision of additional level crossings at Steel St and Worth Place. Newcastle City Council has had a long term plan to provide these crossings and have constructed the necessary road works. Unfortunately Railcorp have steadfastly resisted any such crossings, presumably on the grounds of safety, leading to the belief by some that new level crossings are impossible, even prohibited.

In fact here is no general prohibition on new level crossings and it is notable that the Department of Planning interim guidelines – Development Near Rail Corridors, just released, allows for level crossings and sets out the planning considerations for level crossings.

Evaluating proposals for new level crossings should consider costs and benefits in the circumstances of the case.

New level crossings in Newcastle City are highly desirable in order to reduce the 'railway barrier' problem between the Central Business District and the waterfront redevelopment area.

New crossings would create minimal risk if properly managed. Risk management may take advantage of the fact that the line sees passenger trains only at relatively low speeds. Freight trains no longer operate on the Newcastle line and never will again.

The main risk is that a vehicle queuing illegally on the tracks is trapped when the boom falls. New crossings, by increasing total road capacity, will spread traffic and so reduce queues. **This will probably reduce the risk exposure of Newcastle City crossings in total.**

Refer to appendix 3 for a risk assessment of the proposed level crossings.

Summary of Indicative costs

NTBD has investigated the indicative costs of the tram/train proposal. We have identified a number of recent and costed tram/train projects and proposals, both overseas and in Australia, that indicate a range of costs depending on local circumstances.

Reference is made to a number of specific projects or proposals;

1) The Box Hill extension in Melbourne, opened in 2003, is 2.2km in length and cost $28m.

2) The Vermont South extension project opened in 2005 is a 3km extension with total cost of $42.5m, with $12m allocated to system operation, for a construction cost of $30.5m

3) The City of Port Adelaide Enfield light rail proposal identified proposed costs in 2006 ranging from $8m per km to $14m per km including rolling stock

4) Report to the City of Sydney - Oct 2008 by G Dawson – light rail – capital cost including double track, stations/stops - $10m/km and upwards

We have determined that the indicative costs of a single track tram / train is approximately $6 million per kilometre including rolling stock.

In 2006 the Port Adelaide Enfield Council (PAEC) prepared a report including costings of a proposed tram/train. It is understood the proposal has since been taken up by the South Australian Government and included into a city wide proposal.

The 69 page report includes a schedule of costs which range from $8million per km of double track (mainly new rolling stock on existing track) to $14m/km of double track which includes all the rolling stock, contingency etc

Indicative costings of the complete NTBD tram /train proposal based on the PAEC and other work is as follows:

- Hamilton to Newcastle - upgrade existing line with new rolling stock - 3.5kms @ $8m/km = approx $52million
- University single track loop – 3 kms @ $14m/km = $42 million
- The Junction single track loop – 4kms @ $6m/km = $24 million
- Maitland single track loop - 2.5 kms @ $6m/km = $15 million
- Hunter St Mall single track loop – 1.5 kms @ $6m/km = $9 million
- Hamilton & Glendale loops - $4 million
- Points, extra platforms etc - $12 million
- Express buses to connect Charlestown / Shortland / Raymond Terrace approx $5 million

Total - $163 million

(Note: this is the total indicative cost for a 3 stage project spread over, say, a 10 year period)

The Development Project - Staging

Redevelopment of the Newcastle Mall precinct requires an effective regional transport system. This proposal rests on the use of existing rail corridors for the establishment of tram service in strategic locations, while retaining existing regional rail services, through reliance on "Tram / Trains".

The Tram / Train is a tram that meets the standards for operating on a standard rail corridor, and supports both street level access and rail platform level access. Pioneered in Karlsruhe, Germany, the Tram / Train technology support "regional tramlines" to the University, Maitland and Toronto relying on existing rail track for over 90% of the route, while providing substantial improvements in local transport access from the Junction, Cooks Hill, and the Hill areas to the CBD and the Foreshore.

The class of Tram / Trains required is a dual-mode, electric and diesel hybrid-electric vehicle. Diesel-electric hybrid tram-trains have already been produced for projects in Europe where the rail corridor relied upon lacks overhead electric infrastructure. Given the high frequency and relatively short distance of the two routes supported in Stage 1, the proposal is to go for the operational simplicity of a single class of Tram / Train that operates on electric power when available, and diesel power otherwise.

The improvement in CBD public transport services is leveraged by establishing a substantial number of public Gateway Parking sites east of Hamilton Station and east of the Maitland Road overpass.

The reach of the Tram / Train system is extended with Tram / Buses. These are Express Stop services in quality buses, bringing Charlestown Square, the John Hunter, the Jesmond Center, Cessnock, Raymond Terrace, and the Newcastle Airport into the system.

Two traffic crossings and a pedestrian crossing support Tram / Train egress from and access to the CBD rail line, with two additional pedestrian crossings provided in support of the new Tram/Train platforms contained within the CBD rail corridor.

Stage 1, Phase 1 (Newcastle City Rail Shuttle): $21.2m ($21.2m infrastructure)

- Level crossings at Steel Street, Argyle / Darby Street and Worth Place
- Free Bus Zone gateway parking and City bus parking at Maitland Road site
- In-corridor tram / train platforms at:
    - Brown Street pedestrian crossing
    - Railway Street level crossing
    - Honeysuckle Road pedestrian crossing
    - Maitland Road Overpass
- Establish Newcastle CBD shuttle, Broadmeadow / Newcastle Beach Station.

Stage 1, Phase 2 (Newcastle City Tram-Train): $67.5m ($46.5m)

- Hunter Mall Tramline
- The Junction Tramline
- Hamilton Terminal Loop Tramline
- Acquire initial Tram/Trains
- Establish Newcastle City Tram/Train, replacing Newcastle CBD Shuttle

Stage 2 (Urban Tram-Trains / Tram-Buses): $75.6m ($43.6)

- Charlestown Tram/Bus terminal at Shortland Station
- In-corridor tram/train platforms at:
    - Clyde Street level crossing
    - Maud Street overpass
    - Bridge Street underpass
    - Charlestown Road/Tickhole tunnel
    - Main Road overpass
    - Glendale Center
    - Argenton
- Glendale Terminal Loop at Cockle Creek
- University Tramline
- Acquire additional Tram/Trains and initial Tram/Buses
- Establish Charlestown/University Tram/Bus
- Establish Glendale and University Tram/Train, replacing Newcastle CBD Shuttle

Stage 3: (Lower Hunter Regional Tram-Trains / Tram-Buses)

- Extension of Lake Macquarie service to Wyong
- Maitland City tramline
- Establish Cessnock, Raymond Terrace, Airport Tram/Bus routes
- Establish Morisset / City and Maitland / City Tram / Train

Stage 1, Phase 1: Newcastle CBD Transport Access Improvements

The Newcastle CBD rail line is dedicated to passenger service only. There are no freight services. A well-designed level crossing on a dedicated passenger corridor is closed for less time than a normal red cycle at a traffic signal. Modern textured concrete pavers in attractive colors and patterns allow traffic and pedestrian to cross on a surface that is superior to pavement.

Therefore, the CBD rail line depends upon level crossings for pedestrian crossings and platform access to the new in-corridor Tram / Train platforms, and level crossings and at-grade switches for Tram / Train access and egress to the CBD rail line.

Level crossings should be avoided wherever possible on rail lines with heavy freight trains, because of the length and slow acceleration of trains carrying heavy bulk freight, and so new level crossings are restricted to the CBD passenger trunk corridor east of Hamilton.

The pedestrian improvements are achieved at the outset of the project, in Stage 1, Phase 1:

- Pedestrian crossing at Honeysuckle Platform, Brown St. Platform, and Wolf Street
- A new level crossing from Wharf Road to Darby Street via Argyle Street
- A new level crossing from Honeysuckle Drive to Hunter Street via Worth Place
- New Tram/Train platforms at the Steel Street and Brown Street pedestrian crossing
- Gateway Relief parking at Hamilton Station
- Gateway Relief parking at the Maitland Road overpass

To support release of the Enterprise Prospect site for development prior to introduction of the tramlines, a rail-corridor shuttle service is provided by two-car electric trains between Broadmeadow and Newcastle Station. Three sets permit the operation of four services per hour, with schedules fine-tuned to fit with existing regional rail services. If necessary, the rolling stock may be acquired from the local electric rolling stock recently retired from Cityrail service.

Stage 1, Phase 2: Hunter Street Mall Tramline

The Hunter Street Mall tramline is a one way loop that leaves the rail corridor via the Wolf Street pedestrian crossing then to the Hunter Street Mall, past the GPT redevelopment, then to Watt Street, then around the front of the Enterprise Prospect development site, then on to a new dock platform at Newcastle Beach Station. It re-enters the rail corridor via the former Newcastle Station stabling line to the Wolfe Street pedestrian crossing. This tramline is served by all tram/train routes.

Stage 1, Phase 2: The Junction Tramline

The Junction tramline is a one way loop that leaves the rail corridor via the Worth Place level crossing, down Union Street to Kenrick Street, Glebe Road, and Darby Street, accessing the rail corridor via the Darby Street / Argyle Street level crossing. Westbound trams stop at the Civic Station platform before and after leaving the loop. This tramline is served by the Newcastle City tram / trains twice per cycle, as an open loop eastbound and a closed loop westbound.

Transport access:

- Newcastle CBD, University, Maitland, Garden City, Cardiff, Glendale, Toronto
- Express Maitland, Lake Macquarie, Central Coast and Sydney via Hamilton Station.
- Cessnock, Raymond Terrace and the Airport via Shortland Station.
- Hunter Line via Hamilton Station
- Lake Macquarie / Wyong line via Hamilton Station
- The John Hunter Hospital via Charlestown Road interchange and Shortland Station.
- Newcastle Bus services via the Newcastle Mall Bus Interchange and the Junction

Stage 1: Parking and Traffic Flow Improvements

Merewether Street is the sole level crossing between Stewart Avenue and the end of the rail line at Watt Street. With Honeysuckle Drive and Lee Wharf road deliberately designed to serve local rather than through traffic, this funnels traffic through the intersections of Stewart Avenue with Hunter and King streets, which operate at capacity during peak traffic periods.

Opening up the Worth Place level crossing connects the eastern end of Honeysuckle Drive to the boundary of the Civic and Newcastle West districts. Opening up the Argyle Street / Darby Street level crossing connects the western end of Lee Wharf Road to the boundary between the Civic and Newcastle Mall precincts, as well as establishing the Merewether Street District as the northern end of the extended Darby Street district.

Substantial works have already been completed in the rail corridor to reduce gate closing times, which are now shorter on average than traffic signal delays. Further traffic improvements are provided for in this proposal by upgrading the traffic lights at the intersections of the crossing streets with Hunter Street so that they have four distinct cycles:

- Level crossing open;
- Level crossing closed; and
- Transition cycles when gates are preparing to open and close.

Putting these cycles into place requires a passive feed from the signals received by the crossing gates themselves to the traffic light control box. There is no change required to rail corridor signaling, saving a substantial expense, while a well designed multiple cycle system will improve the effective capacity of the traffic intersections.

Finally, substantial new parking is provided at several points, which is integrated with public transport options so that the car can be parked once for a visit with multiple stops in the CBD. Gateway parking is provided east of Hamilton Station adjacent to the new Hamilton Station Rail / Coach interchange. Gateway parking is provided on the other side of the Maitland Road overpass, adjacent to the new Newcastle Bus Service site, to access the start of the Free Bus Zone. Each of these connects with the new CBD tramlines, and each is provides with support for substantial pedestrian accessibility.

Stage 2: Charlestown / University Tram / Bus

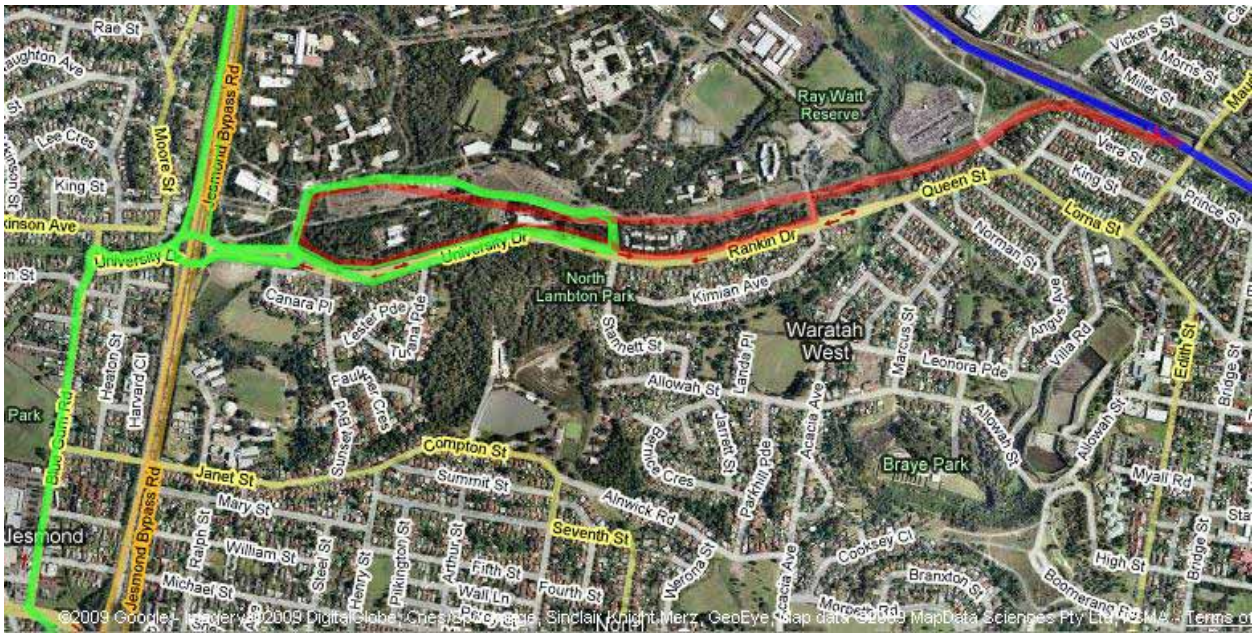
Tram/Buses are quality buses with tram/train style on-board ticket machines, low floor entry and one fewer row of seats than an equivalent city bus for improved luggage handling. The ticket machines including Lower Hunter Tram / Train and Rail services. They share livery with the Newcastle Tram / Trains and are operated as Express Stops Only services under tender, either by a private coach operator or the Newcastle Bus and Ferry service. Dedicated Tram/Bus stops have a raised curb height of 36cm for level boarding to and from both front and rear door.

The Charlestown/University Tram / Bus route runs from the Charlestown Square bus stop on the Pacific Highway through to Shortland Station, via Charlestown Road, Lookout Road, Croudace Street, Newcastle Road, the Jesmond center via Blue Gum Road, the University through the Design and Math bus stops, and the Western Newcastle Bypass.

Transport access:

- Newcastle CBD via the Charlestown Road / Tickhole tunnel. Transfer station, the University, and Shortland Station.
- Maitland via University and Shortland Station.
- Hunter Line via transfer at Shortland Station.
- Lake Macquarie / Wyong line via Charlestown Road interchange
- Raymond Terrace via transfer at Shortland Station.
- Newcastle Bus Services via the Charlestown Square, the John Hunter, and Jesmond Center

Stage 2: The University Tramline



The University Tramline is a two-way line that leaves the Main North west of the Maud Street overpass, which is the furthest west that the Main North passenger and interstate freight lines are on the University side of the rail corridor. The Maitland Tram / Train Eastbound Egress and the common Eastbound Access crosses over the westbound rail line at grade, and rail line priority holds the Tram / Train off the crossover until clear.

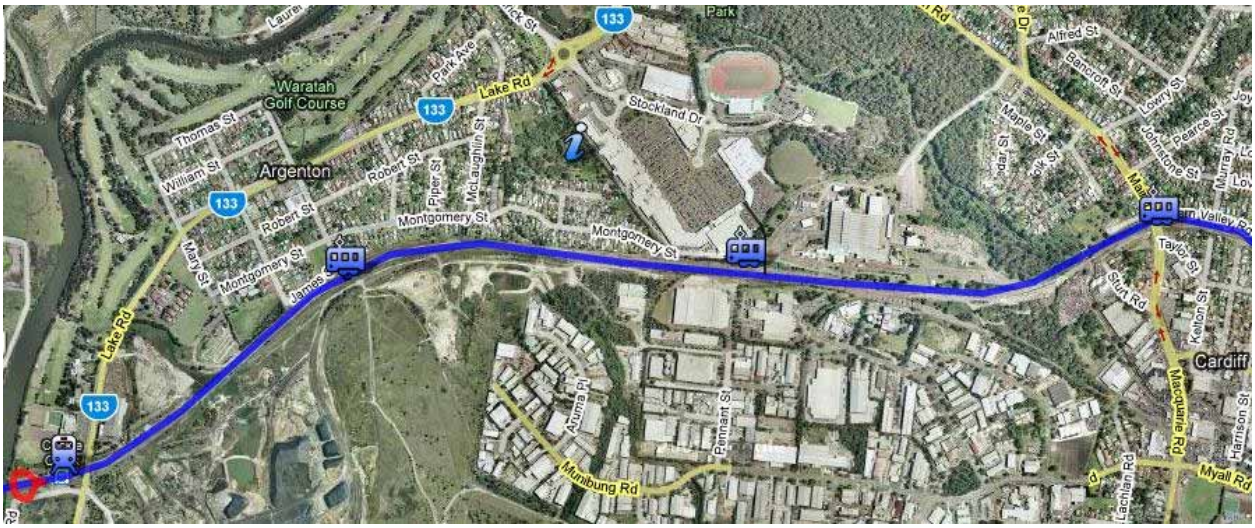
The Tramline continues behind International House to the Design Bus Stop, then to the Math Bus Stop, then along University Drive and Rankin Drive before returning to the rail corridor west of the Maud Street platform. When interchanging with the Express Rail stations, the University Tram / Train works as a closed loop from Waratah Station, while the Maitland Tram/Train works as an open loop between Waratah and University / Warabrook Stations.

The University Tramline is opened in Stage 2 for use by the University Tram-Train three times an hour, with one of the three services extended to the Maitland Tram / Train in Stage 3.

Transport access:

- Newcastle CBD, Hamilton, University, Maitland
- Hunter Line, Newcastle Express, Maitland Express via transfer at Waratah or University / Warabrook Station
- Jesmond, the John Hunter Hospital, Charlestown Square, Cessnock, Raymond Terrace and the Aiport via the Math and Design bus stops.
- Lake Macquarie Local via Hamilton Station
- Newcastle Bus Services via the Math and Design bus stops, Maud Street platform, the Junction, and Newcastle Mall Bus Interchange

Stage 2: The Glendale Terminal Loop

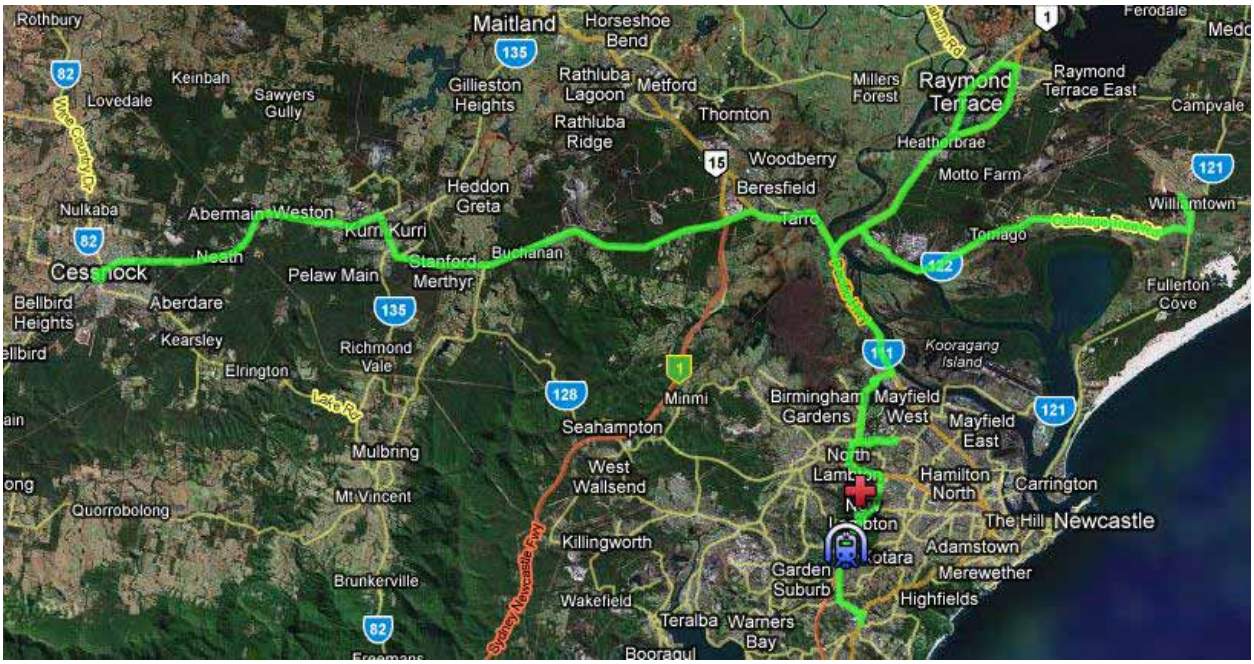


To ensure compatibility with the proposed Lower Hunter Transport Interchange, the Glendale Terminal Loop must be located to the west of the Glendale Center to the north and Munibung Road to the south. It is therefore located directly west of Cockle Creek Station, the first local rail station after Glendale Centre.

Cockle Creek is also adjacent to the Lake Road overpass. This makes Cockle Creek a strategic choice for a possible future Tram / Train, Tram / Bus interchange, as Lake Road is a main road arterial for lakefront settlements in both the eastern and western parts of the City of Lake Macquarie.

The terminal loop itself is the minimum required to allow clearance underneath the Cockle Creek rail bridge, between Cockle Creek Station and the shore of the creek. Passing under the rail bridge allows for full grade separation between the tram-train terminal loop and the main rail corridor without requiring construction of an elevated structure.

Stage 3: Cessnock, Raymond Terrace, and Newcastle Airport Tram / Bus



The Cessnock, Raymond Terrace and Newcastle Airport Tram/Bus services are extensions of the Charlestown/University Tram/Bus route, completing the range of regional routes in Stage 3. They begin at Shortland Station and proceed on the Pacific Highway through Hexham.

- The Cessnock Tram / Bus originates at Shortland Station, proceeding on the Pacific Highway, New England Highway, John Renshaw Drive and Maitland Road to Cessnock, serving a terminal loop and returning.

- The Raymond Terrace Tram / Bus proceeds on the Pacific Highway to the northern intersection with Adelaide Street, returns via Adelaide Street to the Pacific Highway

- The Airport Tram / Bus originates at Shortland Station, proceeding on Route 122 to Newcastle Airport at Williamtown

Connecting to Shortland and Hexham stations as a pair allows for improved integration with Tram / Train and Local Rail services while substantially reducing Tram / Bus layovers waiting on the arrival of the train. Both Shortland and Hexham are upgraded for full ramp access, including a pedestrian footbridge over the Pacific Highway for Hexham Station.

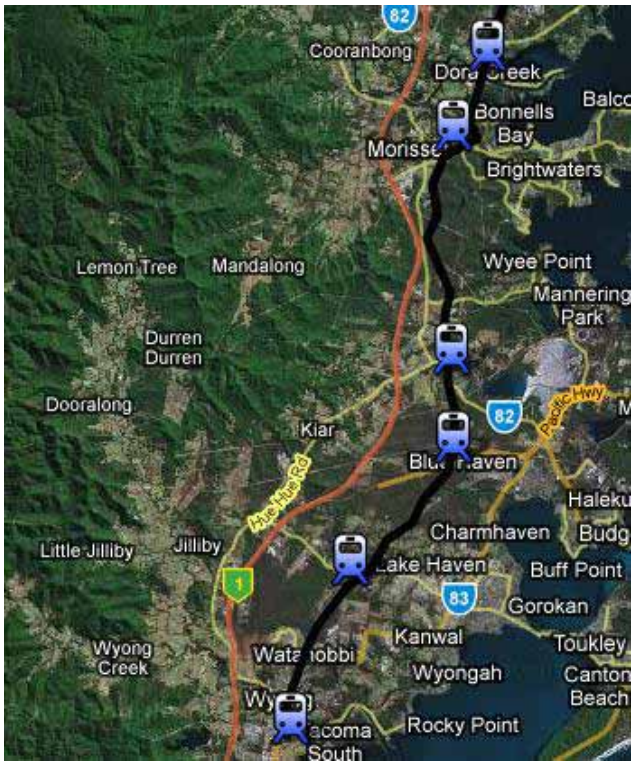
Transport access:

- Charlestown Square, the John Hunter Hospital, Jesmond Centre, University
- Extension to:
    - Cessnock, Kurri Kurri
    - Raymond Terrace
    - Newcastle Aiport, connecting via coach to Nelson Bay

- Newcastle CBD and Maitland via Shortland/Hexham stations
- Lake Macquarie / Wyong line via Charlestown Road interchange
- Newcastle Bus Services via University, Jesmond Center, the John Hunter, and Charlestown Square

Stage 3: Extension of the Lake Macquarie Line

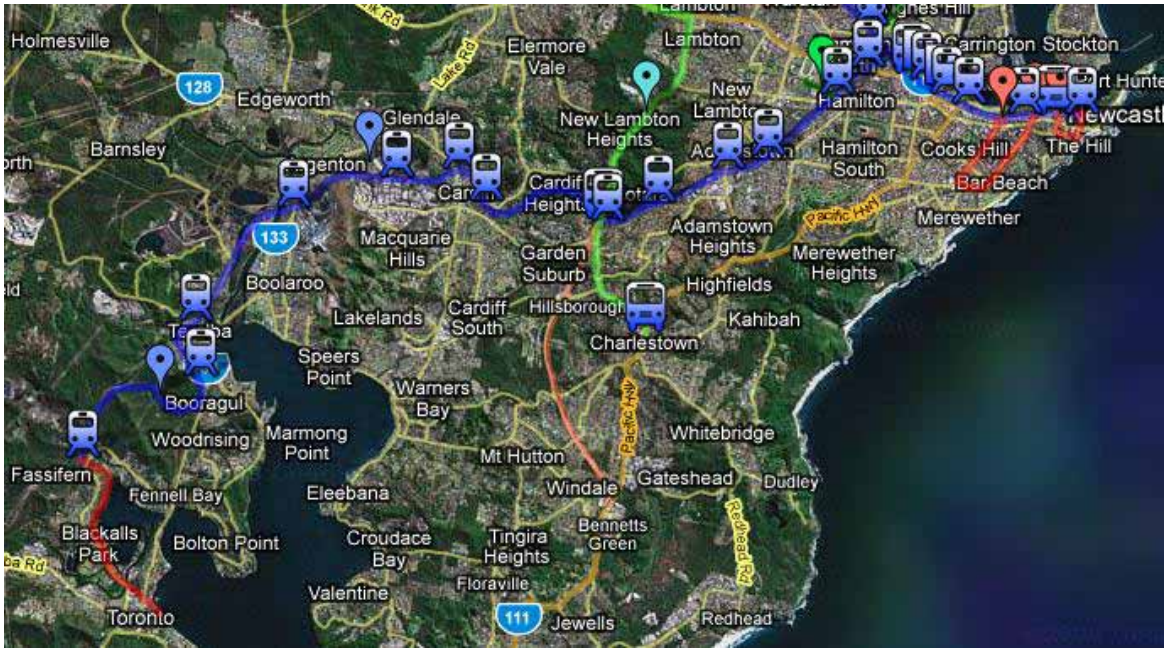
With completion of the North Warnervale Station in the Central Coast, as the terminus of Sydney Services from Wyong Shire, the origin/terminus of the Lake Macquarie line may be shifted from Morisset Station to Wyong Station.



With the shift of terminus, the Lake Macquarie local is free to operate in half hour intervals with the Newcastle Express at Wyong. The Local loses time against the Express, with the Fassifern Tram/Train scheduled to fill the gap, providing hourly service to Toronto and half-hourly service at Fassifern. The hourly Toronto Tram/Train completes one of the three hourly Glendale Tram / Trains routes.

Transport access:

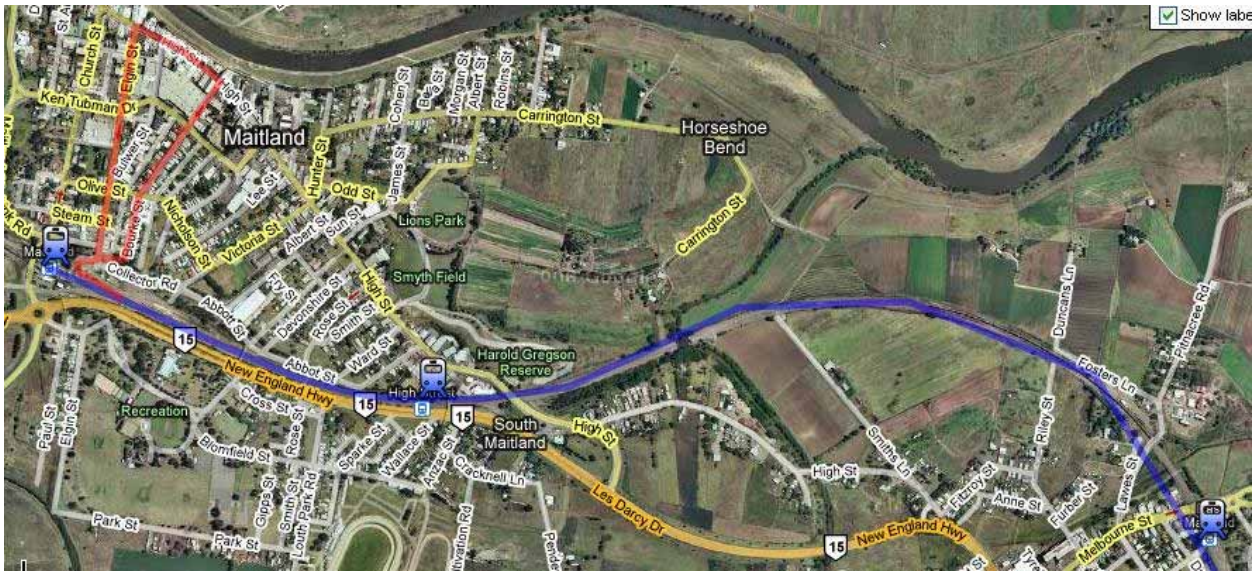
- Newcastle CBD, Hamilton, Garden City, Glendale Center, Morisset, Wyong
- Toronto via Fassifern Station
- Maitland and Hunter Line stations via Hamilton Station
- Express Sydney via Wyong, Morisset, Fassifern, Cardiff, Broadmeadow, Hamilton, Civic and Newcastle Beach Stations
- Charlestown Square, the John Hunter Hospital, Jesmond Centre, the University, and Raymond Terrace via the Charlestown Road interchange
- Local Newcastle Bus services via Charlestown Road interchange, Bridge Road interchange, Maitland Road interchange, and Newcastle Mall Bus Interchange.



Stage 3: The Toronto Bus Train

Toronto is currently served by an integrated bus service that coordinates with the heavy rail services at Fassifern. This service provides an improved level of service compared to the existing Newcastle bus service if only because the bus timetable is coordinated with the heavy rail timetable.

No change to this service is proposed except that integrated ticketing will be introduced as it will be throughout the network.



Stage 3: The Maitland Tramline

The Maitland Tramline is a one-way loop exiting the rail corridor east Maitland Station, switching to Bourke Street, High Street, Eight Street to return to the rail corridor. A dock platform is added as an extension to the north Maitland Station platform where the Tram / Train accesses the station.

The Maitland Tramline is opened in Stage 3, served hourly by the Maitland Tram / Train.

Opening the Maitland Tramline offers the possibility of also *replacing* the Maitland Local rail service, currently provided by Hunter diesel railcars. This might be in support of re-tasking of a small number of Hunter railcars to Countrylink for providing three daily rail services each way on the Far North Coast between Grafton and Byron Bay.

Transport access:

- Maitland, University, Hamilton, Newcastle CBD
- Hunter Line, Express to Newcastle CBD, Intercity to Sydney via Maitland Station
- Jesmond, the John Hunter Hospital, Charlestown Square via Shortland Station
- Raymond Terrace via Hexham and Shortland Stations
- Lake Macquarie / Wyong line via Hamilton Station
- Newcastle Airport and Nelson Bay via Hamilton Station
- Newcastle Bus Services via Lorna Street interchange, The Junction, and the Newcastle Mall Bus Interchange

APPENDIX A Indicative Costing

TRAMLINES

For indicative costing of the tram track and infrastructure cost per kilometer, an indicative cost of $6m per km is adopted for one-way street tramlines and $4.2m per km for one or two way tramlines in greenways.

For in-street construction, reference is made to three tramline extension projects in Melbourne. All three are two-way tramlines. The Box Hill extension, opened in 2003, is 2.2km and cost $28m. The Vermont South extension project opened in 2005 is a 3km extension with total cost of $42.5m, with $12m allocated to system operation, for a construction cost of $30.5m (though this also includes capital works for the complementary 732 bus route). The Docklands Drive extension, also opened in 2005, is 940m, and cost $7.5m. This gives an average in 2007 dollars (the most recent full year index available from the RBA) of $11.6m per kilometer for two-way tram routes, taken as $6m/route-km.

Constructing a tramline in a greenway substantially reduces capital cost. The North Central City Corridor Study for the Victorian Department of Infrastructure (Sinclair Knight Merz 2002) costs double track heavy rail at $1.9m, overhead at $0.8m/km and signalling at $0.8/km. In 2007 dollars, that is $4.12m/km for dual track heavy rail. The light rail track, overhead, and signalling each have lower capital cost than heavy rail, so for indicative costing, this proposal adopts $4.2m/km for greenway tramline, for both dual and single track.

CITY OF PORT ADELAIDE ENFIELD

In 2006 the City of Port Adelaide Enfield released a report entitled – Briefing Paper – Light Rail – a catalyst for Urban Development.

The report by Linqage International describes a proposal for a tram/train between Adelaide CBD and Port Adelaide utilizing existing the rail corridor as well as constructing new tramlines.

The report includes some comparative costs including;

- Glenelg tramway track upgrade & new tramcars - $7.77 million per km
- King William & North Terrace tram extension including additional tram cars - $14 million per km
- Greater Adelaide Tram system - $10.9 million per km

TRAM-TRAIN PLATFORMS

A design feature of the Newcastle City Tram-Train is replacement of the reverse driver module with a passenger trailer module with high-platform doors. This allows access to all existing local and express rail platforms without platform-side modifications.

This design feature means that Tram-Train specific platforms can be provided with on the order of 15mx3m platform space, which is small enough to fabricate the platform in steel or low-maintenance FRP composite off-site and bring on site for installation on a prepared foundation. This also reduces rail possessions, allowing

work to proceed on the foundations of multiple tram-train platforms in a single weekend possession, and installation to proceed in the low frequency overnight period.

For this indicative costing, the cost of an at-grade tram-train platform in the rail corridor is placed at $1m, and the cost of a tram-train platform requiring accessible ramp access from an overpass, underpass, or pedestrian footbridge is placed at $2m, with an additional $0.5m if more than 2 ramps are required. At the Charlestown Road Tram / Bus interchange, an additional $2m is added for the pedestrian subway under Charlestown Road.

Design costing of the Hamilton Station Coach Terminal requires detailed consultation with the coach operators that will be using the terminal. In particular, their preferences for access to and egress from the Coach Terminal will determine whether priority signal, round-about, or use of the open Maitland Road underpass used by the former freight rail line is to be used to gain access from Maitland Road to the Coach Terminal. An indicative envelope cost of $5m is placed on the Coach Terminal, and an additional $2m for gateway parking on rail corridor land west and east of the Maitland Road underpass, including at grade pedestrian walks.

TRAM-TRAIN POINTS

Tram-train points will be supported by signal-post priority signaling, with the Tram-Train signaling the need for a switch. There is a safety-interlock with railroad signaling permitting the switch, and when necessary a wait for a tram-train priority phase on traffic signals, and the tram-train receives a signal that it may proceed.

The per kilometre indicative costing of the tramlines is based on prior tramline experience and project costing guidance for electrified heavy rail, which will include the switching required. However, to discourage complexity in the rail corridor access/egress designs, a notional cost is applied of $1m per switch.

TRAM-TRAIN ROLLING STOCK

Alstrom's CITADIS Dualis bi-directional, dual mode electric / diesel hybrid electric tram train cars have been reported as delivered to recent tram-train projects for Euro 3.2m per car, or Au$6.4 million. Alstrom is a vendor that has sold in Australia, with trams currently in service in Melbourne. For this application, one low-floor bi-directional module would be replaced with a high floor trailer module with doors at rail platform level. While high floor rolling stock is generally less expensive than low-floor stock, and trailers generally less expensive than driving cars, there is also exchange rate risk, so the indicative cost per tram-train is taken as Au $7 million

In the Newcastle City circuit, it is assumed that two tram/trains are operating a continuous circuit with one in reserve, so Stage 1 is assumed to require three vehicles.

For Stage 2, the provisional estimate for complete cycles of the two cross urban services, based on the current local rail services with additional time for tramline service, is Newcastle Station to University and Return can be completed in forty minutes, and Newcastle Station to Cockle Creek station and return in an hour and twenty minutes, so that two sets are required for three University Tram / Train services per hour and three for a half-hourly Glendale service. This is a second tag requirement of an additional five vehicles.

The Tram / Bus is a low-floor bus with quality seating, geared for regional Express bus operation. An indicative cost of $800,000 is adopted. A provisional estimate, based on current Newcastle Bus Service timings on similar routes, is that the foundation Charlestown / University route with return can be completed within an hour, twenty minutes, so that four buses and a spare vehicle are required for a three per hour service frequency in Stage 2.

The provisional estimate is that the Fassifern / City tram-train can complete a cycle in under two hours, which is in addition to the two Glendale circuits each hour . The Maitland/City tram-train, which is an hourly extension of a University tram / train route, should complete a circuit in under an additional two hours. Extending the spare vehicles from one to two, five additional vehicles are required for these hourly Stage 3 services. Hourly extension of the Tram-Bus route to the Airport and Raymond Terrace can be completed in under an hour, and to Cessnock in under two hours, so four additional Tram/Bus vehicles are included for Stage 3.

SUMMARY OF INDICATIVE COSTS

STAGE 1, PHASE 1: $21.2 MILLION ($21.2M INFRASTRUCTURE)

Gateway Parking: $2 million
- Hamilton Station Gateway Parking,
- Maitland Road Gateway Parking,

Bus / Coach Terminal: $5 million
- Hamilton Station Coach Terminal,
- Maitland Road Bus Terminal,

Level Crossings: $3.3 million
- Crossing surface, four existing and five new, 9 at $0.1m, $0.9m
- Traffic Signal priority, three existing, two new, 5 at $0.1m, $0.5m
- Traffic Gates and rail signaling, two new, 2 at $0.5m, $1m
- Pedestrian Gates and rail signaling, three new, 3 at $0.3m, $0.9m

Tram / Train Platforms: $10m= million
- Grade Platforms, 2 at $1m, $2m
- Ramp Access Platforms, 4 at $2m, $8m

STAGE 1, PHASE 2: $67.5 MILLION ($46.5M INFRASTRUCTURE)

Rolling Stock: $21 million
- Tram / Train, 3 at $7m, $21m

Tramlines: $34.3 million
- Hunter Street Mall Tramline, 1.6km, $9.6m
- The Junction Tramline, 3.8km, $22.8m
- Hamilton Terminal Loop, 300m, $1.6m
- Hamilton Terminal Loop electrification, 300m at $0.8m/km, $0.3m

Corridor Access / Egress: $8 million
- Hunter Street mall tramline, 2 tram switches, $2m
- The Junction Tramline, 4 tram switches, $4m
- Hamilton Terminal Loop, 2 tram switches, $2m

Tram/Train Platforms: $4m
Dock Platforms, 1 at $1m, $1m
Grade Platforms, 3 at $1m, $3m

STAGE 2: $75.6M ($43.6 INFRASTRUCTURE)

Rolling Stock: $32m
Tram/Bus, 5 at $0.8m, $4m
Tram/Train, 4 at $7m, $28m

Tramlines: $23.1m
The Glendale Terminal Loop, 0.5km, $2.1m
The University Tramline, 5km, $21m

Corridor Access/Egress: $6m
Glendale Terminal Loop, 2 tram switches, $2m
University Tramline, 4 tram switches, $4m

Tram / Train Platforms: $12m
Ramp Access Platforms, 6 at $2m, $12m

Elevated Walkways and Disabled Access: $2.5m
Sandgate Tram / Bus transfer station
(*costed as 1 ramp access tram/train platform with 1 additional ramp*)

STAGE 3: $53.9M ($22.7M INFRASTRUCTURE)

Rolling Stock: $31.2m
Tram / Bus, 4 at $0.8m, $3.2m
Tram / Train, 4 at $7m, $28m

Tramlines: $51.4m
Maitland Tramline, 2.2km $12.2m

Corridor Access / Egress: $8m
The Junction Tramline, 4 tram switches, $4m
Maitland Tramline, 2 tram switches, existing rail switch, $2m

Tram / Bus Platforms: $2m
Dock Platforms, 2 at $1m, $2m

Elevated Walkways and Disabled Access: $2.5m
Hexham Tram / Bus transfer station,
(*costed as 1 ramp access tram/train platform with 1 additional ramp*)

APPENDIX B Indicative Service Scheduling

THE NEWCASTLE/WYONG LOCAL

This is organized around the schedule of the Newcastle / Sydney Express, where rescheduling would have repercussions throughout the Cityrail timetable. This is based on a balanced half hour frequency at Fassifern, the middle of the three Lake Macquarie Express stations.

Newcastle / Fassifern = +0:34, Fassifern / Wyong = +0:43
- Newcastle/Fassifern: 10:13 | 10:47 = +0:34
- Total trip time: 1:17
  - Midday scheduling of the Morisset local: 10:13 | 11:06 = +0:53
  - Midday scheduling Morisset/Wyong local: 11:11 | 11:32 = +0:22
  - Two new local stations (Charlestown, North Warnervale) = +0:02

Current Daytime Express at Fassifern
- Northbound: 10:29, 11:29, 12:29, 1:29, 2:29
- Southbound: 10:55, 11:55, 12:55, 1:55, 3:01

New local at Fassifern:
- Northbound: 10:29, ***10:59***, 11:29, ***11:59***, 12:29, ***12:59***, 13:29, ***13:59***, 14:29
- Southbound: 10:55, ***11:25***, 11:55, ***12:25***, 12:55, ***1:25***, 13:55, ***14:25***, 15:01

Three two-car K-sets are required to operate this schedule:

Wyong:	10:16	11:16	12:16
Fassifern:	10:59	11:59	12:59
Newcastle:	11:33	12:33	13:33
Newcastle:	11:51	12:51	13:51
Fassifern:	12:25	13:25	14:25
Wyong:	13:08	14:08	15:08

These are the number of K-sets currently scheduled to run to Newcastle Station from Greater Sydney during the morning peak and leading shoulder, returning to Sydney as part of the evening peak, with one two-car K-set and one four-car K-set. The operational change is therefore keeping the third K-set in service through the day rather than leaving it on the stabling line.

APPENDIX C Risk assessment of level crossings

RISK ASSESSMENT OF NEWCASTLE LEVEL CROSSINGS

G. Dawson, June 2006

SUMMARY

There is no general prohibition on new level crossings. Evaluating proposals should consider costs and benefits in the circumstances of the case.

New level crossings in Newcastle City are highly desirable in order to reduce the 'railway barrier' problem between the Central Business District and the waterfront redevelopment area.

New crossings would create minimal risk if properly managed. Risk management may take advantage of the fact that the line sees passenger trains only at relatively low speeds.

The main risk is that a vehicle queuing illegally on the tracks is trapped when the boom falls. New crossings, by increasing total road capacity, will spread traffic and so reduce queues. **This will probably reduce the risk exposure of Newcastle City crossings in total.**

BACKGROUND

It is proposed to install new level crossings in Newcastle City to reduce the problem of the 'railway barrier' between the CBD and the waterfront redevelopment area (HBC 2005:3; HTT 2006:1).

This may raise concerns about safety at crossings.

There is no prohibition on new level crossings

There is **no** Railcorp policy forbidding new level crossings under any circumstances (as is sometimes claimed).

The relevant policy is *Policy for Installing, Relocating, Removing and Changing the Configuration of Level Crossings* (Rail Infrastructure Corporation, August 2001).

The general policy is to minimise the number of crossings. However the policy recognises that in some cases community expectations or the cost of alternatives may conflict with this aim, and therefore it is not practical to prohibit new crossings entirely. Proposals are considered where 'no reasonable alternative is available', subject to a risk assessment (RIC 2001:9-11).

Assessing risk must consider all costs and benefits

In the Newcastle case the benefit of new crossings is the desired improved access to the foreshore. The cost is the possible risk to public safety created by new crossings.

There is **no** principle of risk management that says that a risk to personal safety, however small, must be avoided at all costs. If this were so, no transport system could operate at all. The community routinely accepts risks to safety in return for the benefits of mobility and access.

Some form of cost-benefit evaluation is essential in order to prioritise spending to reduce risk, or to evaluate a proposal that will create risk.[1]

Forgoing a benefit is equivalent to incurring a cost

Cost benefit evaluation of risk mitigation is usually thought of in context of proposals to incur a cost in order to reduce a risk (for example, grade-separating a level crossing). However it also applies where it is proposed to incur a risk in order to gain a benefit. In this case the cost of reducing risk is the value of the benefits forgone if the risk-creating action is refused.

Many transport improvements are in the category of incurring a risk in order to gain a benefit. For example, higher speeds will increase the severity of accidents, other things being equal.

In the Newcastle case the cost of avoiding the risk is the value of the desired access to the foreshore, which would be forgone if proposed new crossings are not built.

Risk at crossings <u>with barriers</u> is very low

Active crossings (with bells/lights or bells/lights/barriers) are over-represented in level crossing accidents.[2] This is because crossings chosen for active protection carry more traffic and so have a higher accident potential than passive crossings (which have signs only).

However, crossings with barriers must be distinguished from those with bells and lights only. The risk at crossings with barriers is very low compared with the risk at crossings with bells and lights only, after allowing for the different accident potential that results from different traffic levels.[3]

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1 A commonly stated principle is that risk should be made As Low As Reasonably Practicable (ALARP). This declares that some risks are so low that they require no special action; others are so high that they should be refused altogether; while risks between these extremes should be reduced to the lowest practicable level considering the benefits and costs of further mitigation. (SKM 2001:20; NTC 2004:16). An alternative approach is to value a death or injury explicitly and use that value in an economic cost-benefit calculation (NTC 2004:29).

2 Active crossings are about 30% of all public level crossings, but account for about 50% of fatal motor vehicle accidents at level crossings: Ford 2002:6; ATSB 2002:2.

3 Accident potential ('risk exposure') is approximated by multiplying traffic movements and train movements. For example, comparing a hypothetical suburban barrier crossing with 100 train movements and 10,000 vehicle movements per day, and an open rural crossing (bells/lights only) with 10 train movements and 1,000 vehicle movements per day: the first has an accident potential 100 times greater than the second.

Australia-wide, active crossings with/without barriers are in the ratio about 1:3 (Ford 2002), and fatal vehicle crashes at these crossings are in the ratio 1:4 (ATSB 2002:2). Thus the accident rates are similar in spite of the different accident potential. If the sample

Risk at crossings with barriers can be reduced further

In congested urban situations the major risk is that a vehicle queuing illegally on the tracks is trapped when the boom falls; or a pedestrian for some reason cannot clear the crossing in time.

Where the crossing operation is automatic (as is usual) this is a serious risk: in this case trains do not normally have a safe braking distance from the point where the danger becomes visible, so a trapped car or pedestrian will very likely be hit.[4]

This danger can be almost completely removed by using an operating system in which the crossing must be proved clear **after** the boom is shut, before the train is allowed to approach. This may be done either by a signaller controlling signals that protect the crossing, or by the train driver passing a suitably speed limited sighting point with sufficient braking distance.[5]

The second method allows a much shorter closure at the cost of slight delay to trains. It would be very suitable on the Newcastle line, which sees passenger trains only at relatively low speeds. It also reduces the cost of new crossings, as they do not need to be connected to rail signals.[6]

The minor risk is that a person tries to bypass the barrier to cross just in front of the train. This behaviour by motorists can be prevented by using median strips to stop cars from zigzagging around a closed half boom. For pedestrians the risk can be minimised by using powered gates with appropriate paths and fences to direct pedestrian traffic.

An additional risk with lower probability but possibly catastrophic consequences is that a level crossing crash derails the train.[7] This risk will also be greatly reduced by the interventions suggested above. The risk can be made negligible in any case by setting a low train speed.

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crossings above are typical it would mean that barriers, compared with bells/lights only, reduce risk by a factor of 100. A more accurate estimate would require information on traffic levels at individual crossings, which appears to be not available (ATSB 2002:4).

Wigglesworth (1991) found that upgrading 91 crossings from flashing lights to boom gates in Victoria from 1971 to 1989 was 'highly effective' in reducing accidents.

[4] Automatic crossings are designed to minimise closed time. The warning time is based on the time needed for traffic to clear the line, not on the time needed to stop a train (which is much longer). If traffic does not clear the line, there is no expectation that the train driver would be able to avoid a collision.

[5] '*Almost* completely removed': a remaining risk is that an inattentive train driver overruns a red signal in the first case, or fails to observe the crossing in the second. The probability that this behaviour will coincide with a blocked crossing must be very low. Where there is signal control the risk may be completely eliminated by some form of automatic train protection or train stop.

[6] In the UK this method is known as 'automatic barrier crossings locally monitored' and is listed as suitable for line speeds up to 90kph: Health and Safety Executive, *Railway Safety Principles and Guidance*, part 2, section E, 1996. See http://www.rail-reg.gov.uk/upload/pdf/rspg-2e-levxngs.pdf

[7] For example, accidents at Baan Baa NSW, 4 May 2004, and Trawalla Vic, 28 April 2006.

Application of these principles to Newcastle City

The Newcastle community is entitled to seek the benefits of improved access to the foreshore. It is entitled to conclude that the benefits of new crossings outweigh the risks.

The responsibility of Railcorp is to cooperate in minimising the risk, and to assure the safety of rail passengers, staff and property.[8]

Whether there is 'no reasonable alternative' to a new crossing (the core criterion of the Railcorp policy) must be considered in the circumstances of the case.

The fact that another crossing or overbridge exists within 500 metres may well justify refusing a new crossing in a suburban or rural situation. It does **not** justify refusing a new crossing in Newcastle City. The Newcastle City situation is unique in Australia. It is universally agreed that present access across the line is inadequate. The density of Central Business District activities requires a completely different approach to deciding how many crossings there should be.

Risk management may take advantage of the fact that the line sees passenger trains only at relatively low speeds. If desired train speeds may be reduced further with little inconvenience.

Minimising risk at new pedestrian crossings

Risk can be reduced to a very low or negligible level by:

- a train operating system in which the crossing must be proved clear after the gate is shut before a train is allowed to approach - to avoid danger to a person trapped on the closed crossing;

- powered gates, with appropriate paths and fences - to discourage people from trying to bypass the closed gate or cross away from the crossing.

The risk to pedestrians from a well-managed crossing is arguably far less than the risks which are accepted every day from traffic in the surrounding streets.

New pedestrian crossings create no risk to Railcorp passengers, staff or property.

Minimising risk at new motor crossings

Risk can be reduced to a negligible level by:

- a train operating system in which the crossing must be proved clear after the boom is shut before a train is allowed to approach - to avoid danger to a trapped vehicle;

- median strips - to prevent vehicles zigzagging around a closed half boom.

The main risk is that a vehicle queuing illegally on the tracks is trapped when the boom falls. New crossings, by increasing total road capacity, will spread traffic and

[8] Railcorp's policy is that applicants for new licensed crossings should pay the entire installation and maintenance cost: RIC 2001:11.

so reduce queues. **This will probably reduce the risk exposure of Newcastle City crossings in total** (SKM 2001:12,34).

The risk that an accident derails a train can be made negligible by setting a suitably low train speed. In Newcastle City this can be done with little inconvenience, as train speeds are low in any case.

REFERENCES

ATSB (2002): Australian Transport Safety Bureau, monograph 10, *Level Crossing Accidents*

HBC (2005): Hunter Business Chamber, *Submission by Hunter Business Chamber to the Premier's Committee reviewing options for the Lower Hunter Public Transport System*

Ford (2002): Ford G. and Matthews A., *Analysis of Australian Grade Crossing Accident Statistics*, Proc. 7th International Symposium on Railroad-Highway Grade Crossing Research and Safety, Monash University, February 2002

HTT (2006): Hunter Transport Taskforce, *Report*, NSW Premiers Department, February

NSW Department of Planning interim guidelines – *Development Near Rail Corridors* – Dec 2008

NTC (2004): National Transport Commission, *Risk Tolerability in Rail Safety Regulation – Issues Paper*, December

RIC (2001): Rail Infrastructure Corporation, *Policy for Installing, Relocating, Removing and Changing the Configuration of Level Crossings*, August.

SKM (2001): Sinclair Knight Mertz, *Level Crossing Risk Analysis*, report for Honeysuckle Development Corporation, October

Wigglesworth E.C. (1991): *An Evaluation of the Railway Level Crossing Boom Barrier Program in Victoria, Australia*, Journal of Safety Research, 22,2, 1991: 133-140

NOTES

NTBD is a not for profit organization of professionals, which includes a town planner and professional economist, whose special area includes transport and development economics. None of us is acting for clients, employers or any other person or organization, in this rail issue and we do not stand to gain financially from the rail staying or going, nor from any development proceeding or not proceeding.

We are interested in doing what we can to ensure that Newcastle has the best transport configuration to meet business, development, social and community needs for at least the next 50 years.

The primary author of this proposal is Bruce McFarling who has a PhD in Transport & Development Economics and has lectured at the Newcastle Graduate School of Business and currently resides overseas.

Assisted by:

Alan Squire, convener of NTBD, and a retired former corporate Lawyer
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Tony Proust, a practicing Town Planner and Registered Surveyor with 30 years experience in State and Local Government and now the private sector.
mob 0425-285782

PEER REVIEW

This submission is indicative only and is not promoted as resolving all the technical issues or establishing definitive costs. All costs are indicative only.

The proposal has been reviewed and assessed by transport and development consultants and experts some of whom may choose to remain anonymous for commercial in confidence reasons.

REFERENCES

1) City of Port Adelaide Enfield – Briefing Paper – Light Rail – A Catalyst for Urban Development – August 2006

2) Lake Macquarie Transport Taskforce - A proposal for Lower Hunter Transport – 2007 – other considerations - Light rail on Heavy Rail tracks

3) Report to the City of Sydney – The transport Needs of Sydney's North West (submission No 184) by Geoff Dawson – October 2008

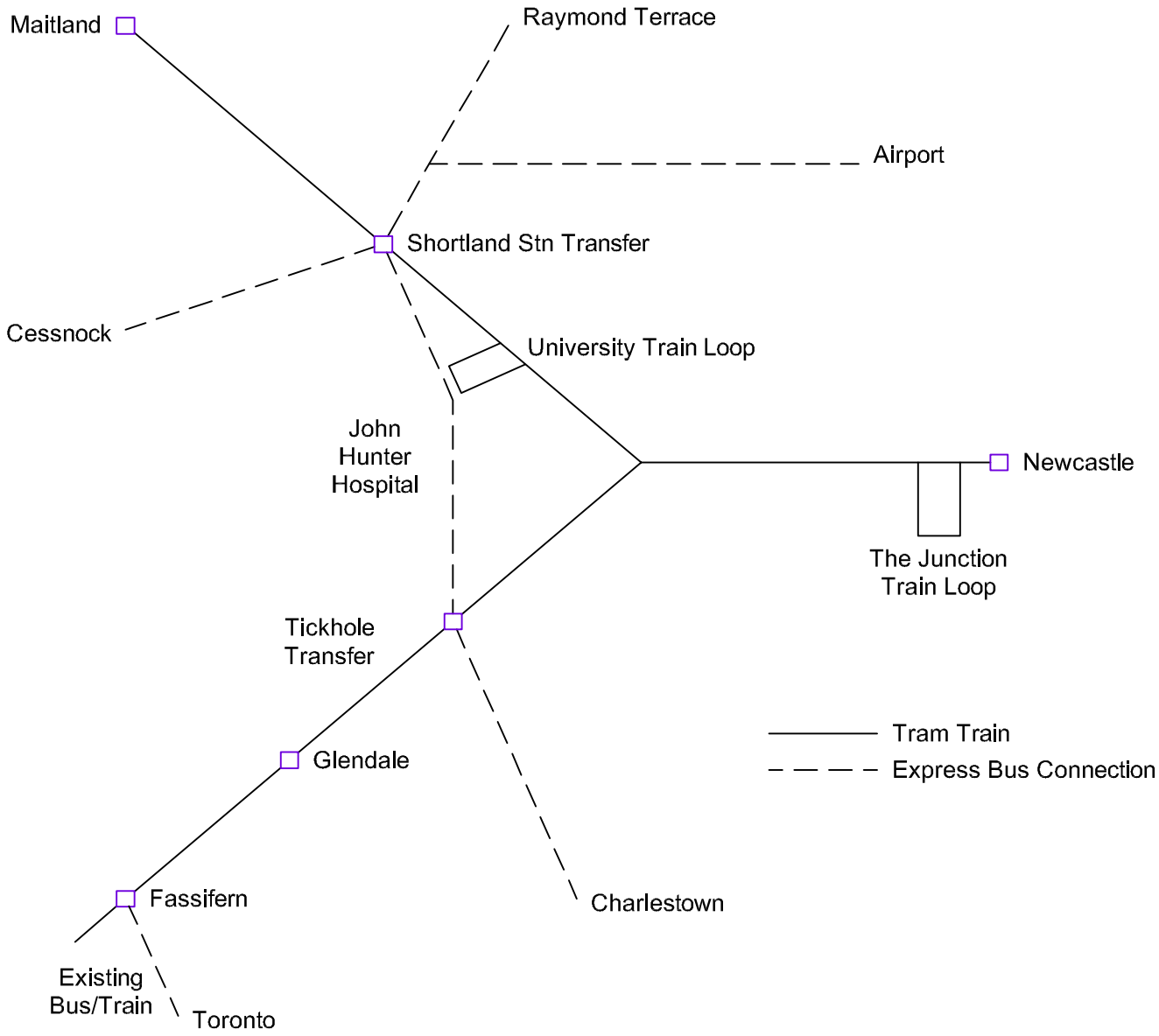
4) Sustainable Cities – House of Representatives Standing Committee on Environment and Heritage - August 200

5) Professor Peter Newman – Sustainability and Cities – Island Press

6) Peter Newman, Professor of City Policy Murdoch University – Trains, Buses and Cars – Planning for a sustainable future in Australian Cities

Proposed Newcastle Tram Train Network

Schematic Layout



Newcastle Transport for Business Development