Newcastle CBD Integrated Transport - Identification of Preferred Scheme

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Hunter Development Corporation

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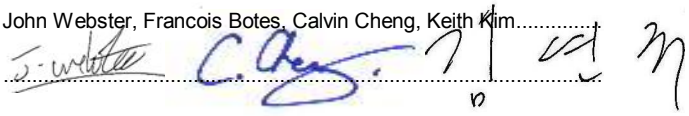
Signed:	
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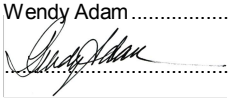
Signed:	
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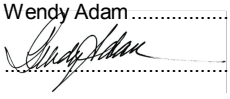
Signed:	
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Key transport findings

Public transit in Newcastle is failing to keep pace with the motor car for travel in the region, and the current rail service is used by few despite its long history and relatively high number of stations for the population.

A whole-of-government vision for a city centre plan *Revitalising Newcastle* has proposed an urban form for the next 25 years and beyond, a renewed and integrated transport strategy is needed to serve and achieve that vision.

A number of significant strategic Government and private sector redevelopment opportunities are being considered for Newcastle, both to take advantage of its unique strengths and to stimulate growth – a coherent transport plan is integral to these achieving and maximising the benefits from these projects.

PB was engaged by the Hunter Development Corporation (HDC) to carry out an expert review of transport options for central Newcastle. PB carried out its investigation through:

- A rapid, strategic appraisal drawing on extensive detailed transport work undertaken previously.
- Review of the rail options outlined in HDC's *Brief for Central Newcastle* to ascertain whether it was sufficiently comprehensive.
- Assessment of a library of reports on, or affecting, the rail line's future for a Strengths/Weaknesses/ Opportunities/Threats analysis informing a Joint Urban Design/Transport Planning Workshop.
- Use of PB's professional judgement in filling gaps and resolving conflicts in the existing material.
- Participation within the Joint Workshop to arrive at a common view of a preferred future integrated land use/transport strategy for the revitalisation of the Newcastle CBD.
- Reporting the process to support a funding strategy to achieve the preferred strategy.

Costing comparisons were done a common basis for assessment from recently costed rail projects, but these would not necessarily apply to a future delivery of a yet undefined project. Cost estimates in this report might vary from other sources, as:

  - only costs which would meet the existing technical and operational requirements were considered
  - common costs to all schemes (e.g. the fact that the rail signalling is aged and may require upgrading regardless of changes Newcastle operation), or those which might be borne by specific urban renewal projects (e.g. an expanded station which include a variety of other amenities) were not considered at this time
  - assumptions about whether construction work would be done while rail services were suspended as opposed to under possession in an operating environment (as with Railcorp's costing of preferred option) make major differences to estimates but were not yet defined to the point they were included in our estimates.

Rail must continue to play a key role in the transport future in Newcastle – linking the Region to its centre, but it has to be integrated into a much larger transit passenger network to do so. Rail must be the core, not a branch, of the passenger services. The current rail facilities are not in the optimal location as they are off-centre to the region, particularly on the north/south access, with much of the immediate area within walking distance of the stations reduced by Newcastle Harbour. Nor is the rail at the correct grade for a modern, successful urban passenger system as the conflict with the road network impairs the spur line's ability to compete with other modes, centralise accessibility and contribute to a prosperous, revitalised CBD.

Hamilton Station is a key interchange between Hunter diesel services and Sydney/Central Coast electric services – this role will remain and be enhanced.

The process also identified that keeping the rail corridor in place carried a significant cost if the desired urban density was to be achieved in Newcastle. Costs were associated with removing the level railway crossing of the regional road for safety and road network capacity reasons, and the surface corridor would need substantial amelioration against impacts from visual, noise and vibration intrusions into the urban environment. However, the preferred rail service was not required **before** major revitalising developments commence, and joint investment in CBD major projects and the transport network needed to occur in an effective and committed sequence.

Options to elevate or depress the present corridor were briefly considered and rejected as they reinforced the rail in the wrong place and would have a very high opportunity cost, diverting investment from more effective urban revitalisation projects. Heavy and light tram options were considered, but eliminated on safety and feasibility grounds for the next 25 years. However, retention of the rail corridor may allow these options to be reassessed once the critical conflicts are no longer factors. Given these broad assumptions, the Workshop considered shortening of the surface rail line did merit further discussion. The options considered were to terminals east or west of Stewart Avenue. The Workshop endorsed the western location because it appeared feasible, and it would:

- be at the gateway to the future central Newcastle
- integrate best into a regional passenger network of rail, bus, bicycles and pedestrians
- add road capacity to allow development levels as per the City Vision
- allow the greatest cost savings in terms of rail asset and operational costs for a CBD location of the options considered.

The rail corridor would remain a key transport asset for the future of the city: with short to medium term uses to form better road, bus and cycle networks; link sites with strong development potential; reinforce the Main Street functions of Hunter Street; and provide open space for travel and recreation. It could remain in public ownership, "banked" for later, high-value uses and available for transit operations once development patterns and urban density supported such a use. Any transfers imposed on existing travellers to East Newcastle would be seamless and to a high quality transit mode.

1. Introduction

In 1857, the City of Newcastle inherited an at-grade rail service to the northern edge of its historical centre as an off-shoot to the freight rail service to its working port. The close connection of the city to its industrial waterfront caused this to happen. Now with the changed foreshore uses, the consequences of maintaining this at-grade, heavy rail link create a division of the city from its increasingly recreational and commercial waterfront. The redevelopment of the Honeysuckle goods yard into a new commercial centre for the region has given impetus to the new *Revitalising Newcastle* city vision where the development of an integrated city is impeded more than helped by the continued presence of the surface rail lines. Newcastle Harbour needs to be connected to, and embraced by, the revitalised Newcastle CBD and a more effective integrated public transport and road network created.

A new partnership between land use and transport is needed for Newcastle to grow, improve and develop as a more sustainable regional city. Transport to Newcastle has to enable the city to grow, not restrict the city to past its forms.

1.1 Rail transport strategy

Rail service is the highest order of urban transit, but if Newcastle were planning a rail service for the future it not would create an at grade alignment with multiple level crossings and restricted public access, but look at elevating or building it underground because:

- The operational requirements of rail service, such as stabling yards and crew facilities, would be not be provided in high value city locations instead of surplus rail land because at one point in time there was surplus capacity at Newcastle Station.
- The safety requirements of operating a heavy gauge rail line at the surface form a barrier through the city, impermeable to pedestrians, buses, cyclists and cars except at a few congested locations.

However, if Newcastle were to have the opportunity to put a below, or above ground, rail system in, it would not locate the corridor in its present position as:

- The three trunk transit corridors of diesel rail, electric rail and bus service should not run in parallel, but would interchange into an efficient and accessible trunk service for all passengers.
- The rail line is at the edge of the CBD and being so close to the waterfront has almost half of its catchment area underwater, so it is not an effective centralising force to create a regional, high accessibility node for the Hunter Region which reduces the economic efficiency of future investment.

For these reasons, an integrated transport strategy for Central Newcastle, one with the best chance of helping achieve and delivering the vision for a revitalised city is not acceptance of the status quo but rather reinvestment in a modified and effective transport network.

An integrated transport network would link the Region with the Centre by rail, bus, coach, cycleways, and perhaps ferry, focussing on a central interchange at the threshold of the CBD. A high quality link, dedicated bus or future light rail, would run along the main street through the CBD and to Newcastle's east and south. Such a network within the CBD would

facilitate greater pedestrian, taxi, car and bicycle movement both east/west and north/south joining all Newcastle's urban precincts.

1.2 Objectives

In undertaking this study, the Hunter Development Corporation aimed to identify potential answers to the following key questions regarding the nature of the desirable future transport infrastructure:

- What is the most efficient network of transit for Newcastle now and as it develops?
- What should be the new hierarchy of public transport access to a revitalised CBD in Newcastle?
- And what is the best use, or combination of uses, of the land currently occupied by the rail line?
- Will the transport interchange and the corridor change with the growth of the city?

PB sought to address these questions given the long history and high number of investigations on the issue of rail in central Newcastle, not by undertaking additional research, but by critically examining the research carried out to date with a common, integrated set of criteria to advise the Hunter Development Corporation on how to achieve the transport services best suited to the proposed changing central business district of Newcastle and meeting the needs of development changes in the Lower Hunter.

1.3 Approach

PB was engaged by the Hunter Development Corporation to carry out an expert and strategic review drawing on extensive detailed transport research by others to date (refer to Appendix B) and options for central Newcastle. PB carried out its investigation through:

- Review of the rail options for Central Newcastle outlined in the Brief to ascertain whether it was comprehensive enough.
- Review of the library of recent reports on, or affecting, the rail line's future for a Strengths/Weaknesses/Opportunities/Threats analysis before the Joint Urban Design/Transport Planning Workshop.
- Use of PB's extensive local and international professional judgement in critically analysing, completing the gaps and resolving the conflicts in the existing material.
- Participate in the Joint Workshop to reach a common view of a preferred future strategy for the revitalisation of Newcastle.
- Summarise the outcomes and process at a high level to support a funding strategy which would achieve the preferred option.

Once the preferred option was selected, Chapter 2 describes, in a visionary context, how such a system might operate and serve all the future travellers in the city – commuters to the expanded CBD, the new city residents, students from the region travelling to the varied educational precincts, and tourists attracted to the high amenity urban coastal city.

Further, the Hunter Development Corporation engaged Urbis Consulting, to provide economic guidance, evaluate future development options and set the scene for the future Newcastle CBD from which the transport options would be assessed and evolve.

1.4 Rail under review

The Newcastle branch line has four stations – Hamilton to the west of Central Newcastle and Wickham, Civic and Newcastle covering the more urban precincts to the east. Around 5,000 people are estimated to use the Wickham, Civic and Newcastle stations during a typical 24 hr period. This is assumes people travel in round trips and enter and exit at the same location. If you combined all 3 into a single daily use figure, about the total passengers would be the equivalent of the 43th busiest station on the CityRail network, similar to Merrylands or Gordon. The *Compendium of CityRail Travel Statistics* (2006) estimates 5% of journey-to-work trips to inner Newcastle are made by rail, or 12,300 daily trips. This compares to 53% for Sydney, 34% for Chatswood, 26% for Parramatta, 20% for Hornsby and 10% to Liverpool. In Adelaide, a city twice as large as Newcastle, train boardings are six times as high. The average train trip is 50 km long for Newcastle residents, vs 18 km in Sydney, reinforcing the regional linking role of rail in the Hunter.

In comparison, 5 times as many passengers use bus daily in the Newcastle region than rail. In the 2007 release of *Travel in Sydney, Newcastle and Illawarra*, the Ministry of Transport gave the proportion of travel by bus as 3.6%, while train was 0.7%. This is in the same ratio as trip length, with the average bus trip being 10 km long (vs 7 km in Sydney region (MoT, 2007)).

In *Traffic Volume Data for the Hunter Region* (RTA, 2001) roads in the Central area carried the following daily volumes:

- Hunter Street 18,200 vehicles
- King Street 22,200 vehicles
- Stewart Avenue 17,100 vehicles
- Merewether Street level crossing* 3,500 vehicles

*. The traffic volume estimate for the Merewether Street level crossing extrapolates from peak period counts by Connell Wagner 1999/Council traffic counts for the *Newcastle CBD Accessibility Study* (Maunsell 2001).

For Stewart Ave, the number of vehicles crossing would be over 21,000 vehicles per day by 2016 if traffic grows at around 16% in that period..

Newcastle CBD is not well served by rail despite the high number of stations and services, demonstrated by the population's overwhelming choice to travel by car or bus even though for example, the travel times for car, bus and rail modes between Wickham and Newcastle are negligible. Figure 1 shows the Newcastle Local Government Area (LGA) journey to work mode split (ABS 2006). Table 1-1 shows the travel times between Wickham and Newcastle Rail Station by car, bus and rail modes

Table 1-1 Average travel times by transport modes between Wickham and Newcastle

Mode	Average travel time between Wickham and Newcastle Stations
Car	5 minutes
Bus	6 minutes
Rail	6 minutes

- Car travel time was based on 1 morning, 2 mid-day, and 1 afternoon trip between Hunter Street/Stewart Avenue and Newcastle Railway Station in 2007. The data was collected using a GPS data logger device attached to a private vehicle.
- Bus travel time of 6 minutes was based on Newcastle Buses route 100 timetable trip times between Hunter Street and Stewart Avenue intersection and Newcastle Railway Station at Scott Street timing points
- Rail travel time of 6 minutes was based on based on CityRail train trip times between Wickham and Newcastle Stations of 4 minutes with an additional 2 minutes of dwell time as per schedule.

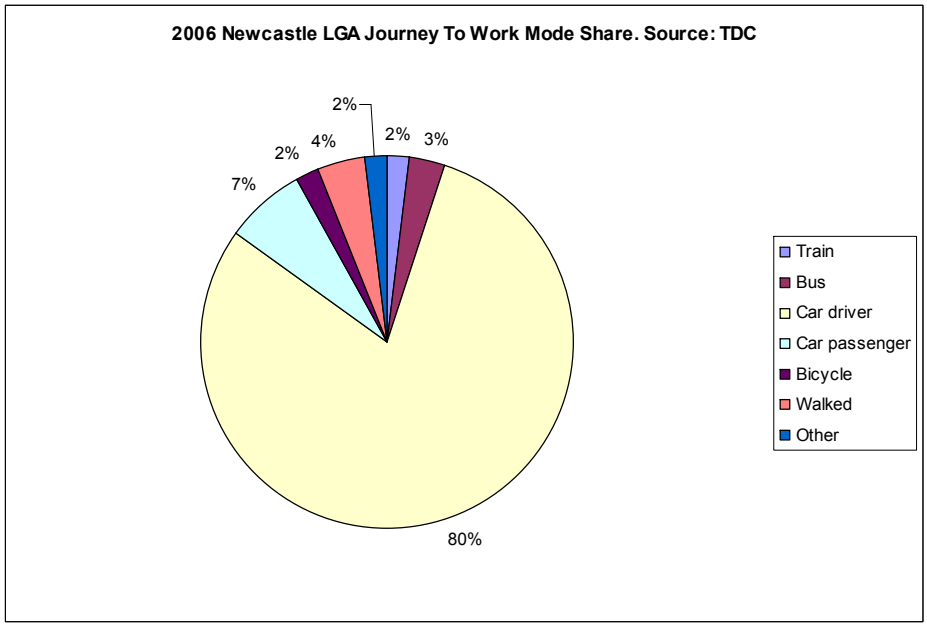


Figure 1-1 2006 Newcastle LGA journey to work mode share.

(Source: TDC, 2006)

A comprehensive re-thinking of all elements of the transport network; road, rail, bus, bike, pedestrian and freight is required for a more effective integrated system serving residents and visitors to the area.

1.5 Bus and rail use and capacity

Newcastle Buses operate through free fare zones in the Newcastle CBD. Given Central Newcastle bus passengers are not ticketed, it is difficult to obtain figures on the use of buses in this area. In 2007/08, Newcastle Buses carried 12.5 million passengers with an average 1.5 passengers/bus km of travel. Given the same ratio for Sydney is 2.4, one can infer that with the 7000 bus services it operates a week, Newcastle Buses could easily accommodate 20 million passenger trips, just by getting loadings to the level of Sydney's on a route kilometre basis. Currently, services along Hunter Street are sufficiently frequent that a bus would arrive every three minutes in the peak period. Patronage numbers have been stable for four years, despite a 3% increase over the same period in Sydney. Generally, there is significant capacity on Newcastle Buses for more passengers.

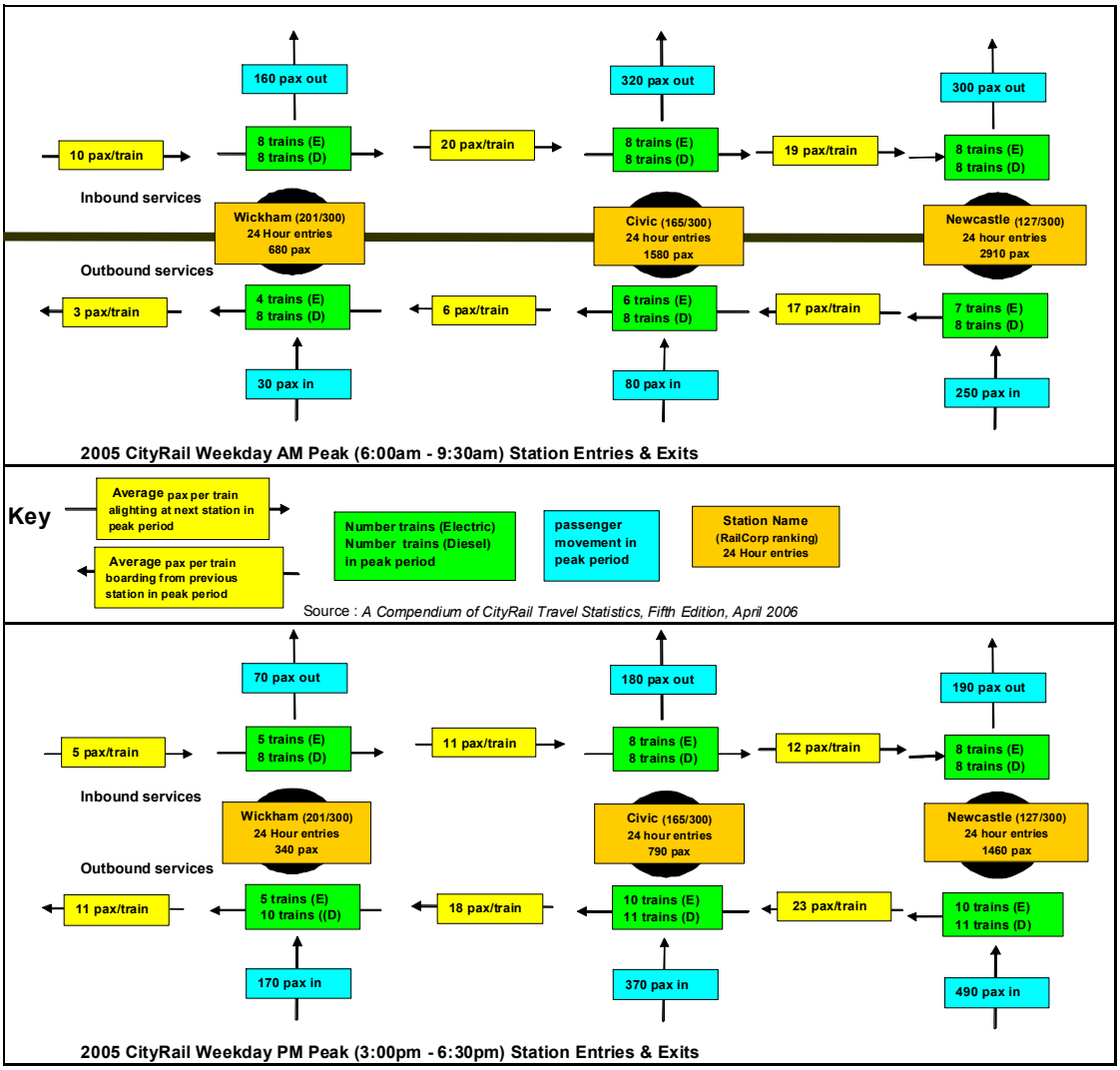


Figure 1-2 Schematic of train use in central Newcastle

For example, Figure 1-2 indicates that 340 passengers enter Wickham Station over a 24 hour period. During the AM peak period (6.00 am-9.30 am), there are 8 electric and 8 diesel eastbound services that stop at Wickham, during this period 160 passengers alight which equates to an average of 10 passengers per train (assuming that all alighting passengers have travelled from the West). The actual maximum capacity of heavy rail into Newcastle is shown in table 1-2. The data is based on RailCorp 2006 Standard Working Timetable (from 29 May 2006) which lists the number and type of carriages for each service. The assumptions for the total seating capacity on the V sets is based on each set consisting of one motor car and one trailer car type applying the maximum seating capacity, due to wide variations in V set carriage designs.

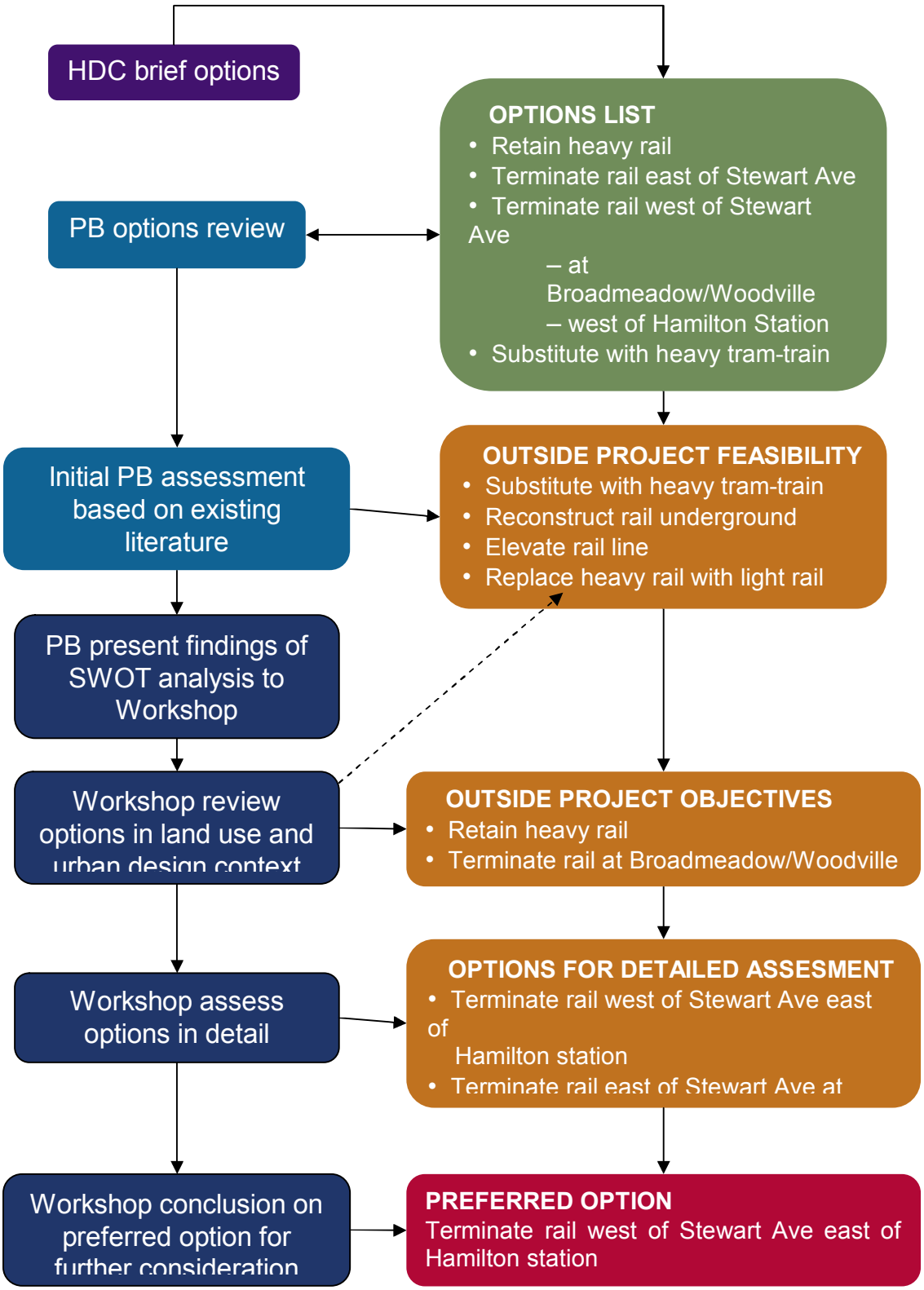
The maximum capacity is derived with a factor of 40% applied in addition the total to seating capacity. However, these carriages are not designed to carry standing passengers, unlike the 4-car Tangara units which operate in the Sydney CBD, and hence the maximum capacity is only an estimate.

Table 1-2 Rail service capacity into Newcastle

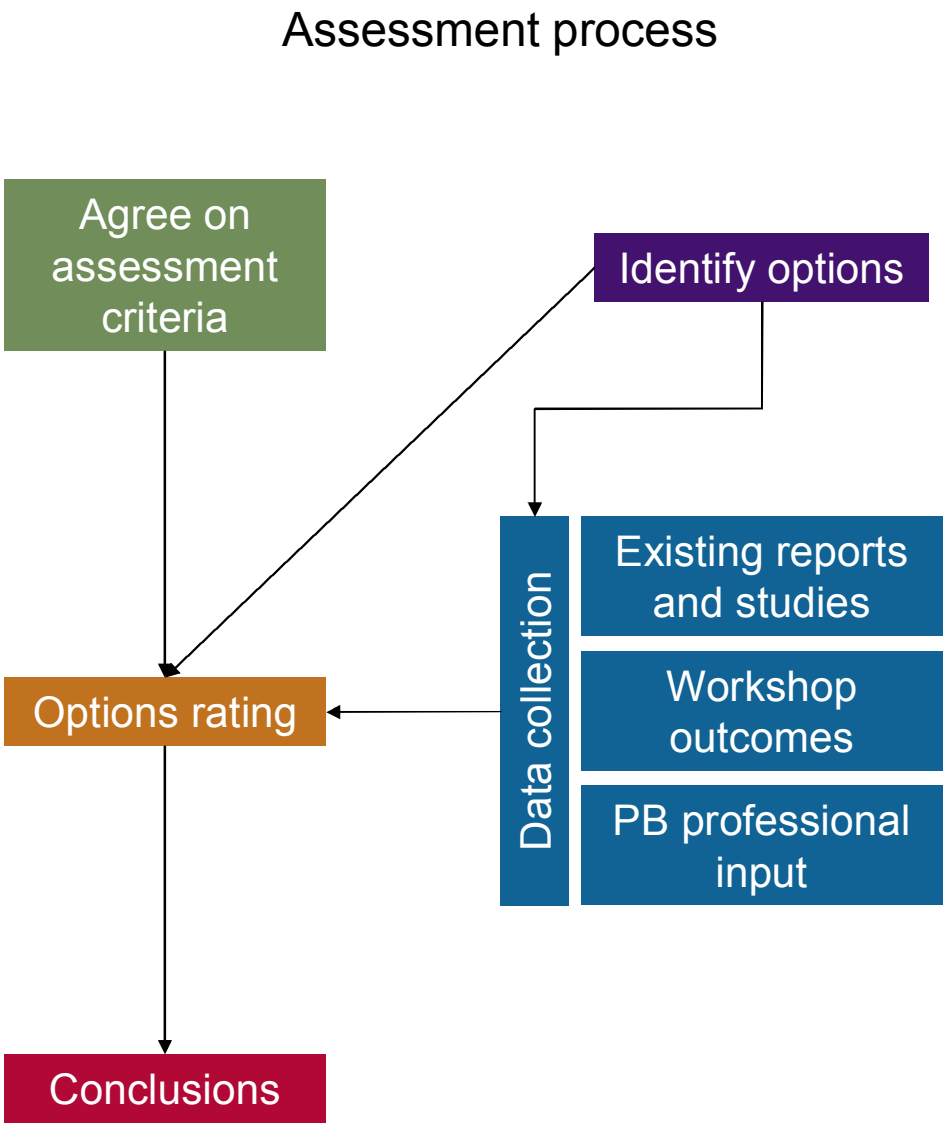
Train set type TO Newcastle (24 hour period on weekday)	No. of services	Total seats	Maximum capacity
4 car V set electric services to Newcastle	15	6,240	8,736
6 car V set electric services to Newcastle	8	4,992	6,989
8 car V set electric services to Newcastle	7	5,824	8,154
2 car K set electric services to Newcastle	13	2,808	3,931
2 car Endeavour diesel services to Newcastle	24	4,248	5,947
2 car Hunter diesel services to Newcastle	22	3,212	4,497
Total	89	27,324	38,254

On the basis of this information, currently passengers to Central Newcastle are using approximately 18% of the available daily seat capacity of the rail services to Newcastle.

1.6 Study process



1.7 Assessment process



1.8 Review of the rail options

An assessment comment highlighted in red indicates an unfeasible issue "fatal" to this option which precluded it from further consideration.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
1	**Retain heavy rail** Retention of the heavy rail along its current alignment with some improvements responding to urban growth. This option includes: ▪ additional north-south at-grade pedestrian and vehicular crossings east of Stewart Avenue ▪ grade separation of at-grade rail crossing at Stewart Avenue ▪ landscaping of the corridor.	The introduction of any new at-grade crossing for pedestrians and/or vehicles is contrary to rail safety guidelines, especially in urban areas. Rail corridor barrier to any circulating mini-bus and parallel bus corridor has plenty of capacity so shuttle bus in free zone is a financial liability with no gain in accessibility. Stewart Avenue grade separation: = $77m Landscaping of corridor: = $3m Contingency and un-priced items = $20m TOTAL Capital Expenditure: = $100m	**Support for urban design and land use objectives** Lost land use and urban design opportunities to use corridor for other purposes and to develop sites abutting the corridor. Physical and perceptual barrier which compromise north-south connectivity in established central Newcastle. **Pedestrian and cycling connections** No improvement in north-south pedestrian an cycle connections. **Transit accessibility and convenience** No existing passenger is inconvenienced. Heavy rail service retained to Newcastle Station. No need to change mode if travelling to Newcastle East from Sydney or Central Coast. No need to change mode if travelling from Maitland. Not an effective way to serve transport needs of passengers travelling within the CBD – track is not central to demands, stations spaced too far apart for internal circulation with low service frequency. **Technical feasibility** No change to the existing arrangement.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Congestion relief and traffic access No congestion relief if Stewart Avenue level crossing is not eliminated. Implementation constraints would make the construction of an overpass very difficult and costly. **Implementation constraints** Major technical constraints associated with constructing overpass at Stewart Avenue mean a level crossing is unlikely to be RTA or RailCorp compliant or funded. Consequently no improvement in safety and traffic flow appears feasible. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Noise and vibration levels from rail operations on land near corridor – resignalling and traction power upgrade was not addressed. Due to low patronage, greenhouse gas and pollution output per passenger would be fairly high. **Balanced scorecard summary** No need for further detailed assessment. Acts against identified land use, urban design and transport needs.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
2	**Sub-surface heavy rail** Reconstructing the rail line underground (cut and fill) from Wickham to Newcastle. This option includes: ▪ elimination of Stewart Avenue at-grade crossing (rail line would go underground west of Stewart Avenue) ▪ construction of new underground stations with mobility impaired access ▪ removing all surface rail infrastructure and decontamination ▪ landscaping and development of corridor above rail line ▪ construction of north-south pedestrian and vehicular links between Hunter Street to Honeysuckle Drive.	Rail line terminated during construction at Broadmeadow for period of up to three years Detour or temporary bypass work required for traffic crossing rail line during underground construction for periods of up to twelve months Tunnelling (cut and cover) = $425m Landscaping = $3m Stations = $120m Stabling = $26m Decontamination = t.b.d Contingency and un-priced items = $176m TOTAL Capital Expenditure = $750m	**Support for urban design and land use objectives** Land use and urban design opportunities to use corridor for other purposes and to develop sites abutting the corridor if additional costs are built into tunnel to permit the additional loading. No longer a physical and perceptual barrier to north-south connectivity. **Pedestrian and cycling connections** More opportunity for north-south pedestrian and vehicular circulation east of Stewart Avenue relieving State Road of local traffic and shortening trips. **Transit accessibility and convenience** Location of rail line is historical accident and is not optimal for meeting transport needs in the CBD. The route of this option has more to do with removal of a barrier than providing an effective transport service. Sub surface stations less convenient, and linking by escalators or lifts is high on-going maintenance expense. Potential and current patronage does not justify high construction cost. **Technical feasibility** High on-going maintenance cost to prevent flooding of underground rail. Ventilation facilities and costs from operation of diesel rail services. **Congestion relief and traffic access** Level crossing at Stewart Avenue would be eliminated resulting in improved safety and traffic flow.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Implementation constraints Loss of patrons during cessation of rail operations during construction. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Noise and vibration would be completely eliminated. No reduction in greenhouse gas emissions and pollution. Due to low patronage, greenhouse gas and pollution output per passenger would be fairly high. **Balanced scorecard summary** No need for further detailed assessment. Too costly to be economically justified given no gain in transport accessibility, current low patronage and poor location of rail corridor.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
3	**Elevated heavy rail** Reconstructing the heavy rail line as an elevated structure allowing vehicle and pedestrian movement underneath. This option includes: ▪ elimination of Stewart Avenue at-grade crossing (rail line would pass over Stewart Avenue) ▪ construction of new elevated stations with mobility impaired access ▪ landscaping of corridor ▪ construction of pedestrian and vehicular links north south from Hunter Street to Honeysuckle Drive.	Construction would be highly disruptive and is likely to require cessation of train service at Broadmeadow for two years or more. Construction noise would intrusive to city Viaduct = $175m Landscaping = $3m Stations = $120m Stabling = $26m Contingency and un-priced items = $76m TOTAL Capital Expenditure = $400m	**Support for urban design and land use objectives** Limited land use and urban design opportunities to use corridor for other purposes and to develop sites adjunct to the corridor. Would blight the urban landscape, especially the waterfront and is incompatible with heritage character. No longer a physical barrier to north-south connectivity at grade, but could restrict use of adjacent land Rail would continue to be perceived as a division between neighbourhoods in the city. **Pedestrian and cycling connections** Unconstrained pedestrian and greater vehicular ability to cross route east of Stewart Avenue. **Transit accessibility and convenience** Location of rail line is historical accident and is not optimal for meeting transport needs in the CBD. The route of this option has more to do with removal of a barrier than providing an effective transport service. Elevated stations reduce passenger accessibility. Rail service termination and traffic disruption during construction. Low patronage and lack of urban design benefit would not justify prohibitively high construction cost. **Technical feasibility** There would be technical challenges with the operation of elevated rail and stations.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Congestion relief and traffic access Level crossing at Stewart Avenue would be eliminated resulting in improved safety and traffic flow, but height clearance over State Road could cause large traffic to use less suitable routes. **Implementation constraints** Loss of patrons during cessation of rail operations during construction. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Would not completely eliminate noise and disturbance. No reduction in greenhouse gas emissions and pollution. Due to low patronage, greenhouse gas and pollution output per passenger would be fairly high. **Balanced scorecard summary** No need for further detailed assessment. Too costly and unlikely to be economically justified given low patronage. Does not fully satisfy land use and urban design requirements.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
4	**Heavy gauge tram-train** Retention of the heavy rail track with the substitution of conventional heavy rail cars with a tram-train. This option includes: ▪ no heavy rail cars other than tram-train allowed in the CBD (west of Wickham) ▪ hybrid tram-trains operated from Morisset and Maitland to Newcastle ▪ operating at very low speed (15 kph) from Wickham to Newcastle station ▪ additional north-south at-grade pedestrian and vehicular crossings east of Stewart Avenue ▪ grade separation of at-grade rail crossing at Stewart Avenue ▪ landscaping of the corridor	This mode is more suited to segregated corridor where constant low speeds are not required and there is only a short exposure to cross traffic. Relatively low cost – uses same track, stations and vehicles as current service but does not improve service for current or future users. Tram-train carriages Terminating platform for electric trains at Morisset Stewart Avenue grade separation: = $77m Landscaping = $3m Stabling relocation = $26m Contingency and un-priced items = $44m TOTAL Capital Expenditure = $150m	**Support for urban design and land use objectives** Although impact reduced, track remains a physical and perceptual barrier to north-south connectivity. Lost land use and urban design opportunities to use corridor for other purposes and to develop sites abutting the corridor. **Pedestrian and cycling connections** Additional pedestrian and vehicular level crossings east of Stewart Avenue add to traveller risk in contravention of State and National safety policies. **Transit accessibility and convenience** No need to change mode if travelling to East Newcastle from Maitland. No need to change mode if travelling from Morisset inwards, but a transfer in Morisset for Central Coast and Sydney travellers Very low safe operating speed (15 kph) extends lengths of trips below bus travel speeds. Not the most effective way to serve transport needs of passengers travelling within the CBD – track not in ideal location, stations widely separated and low service frequency. **Technical feasibility** Technical difficulties with maintaining steady low speed and diesel engines may overheat at very low speed. **Congestion relief and traffic access** No congestion relief if Stewart Avenue level crossing is not eliminated. Implementation constraints would make the construction of an overpass very difficult and costly.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Implementation constraints Major technical constraints associated with constructing overpass at Stewart Avenue means that level crossing replacement is unlikely to attract RTA or RailCorp funding. Consequently no improvement in safety risks or regional traffic capacity. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Noise and vibration levels near rail corridor not addressed. No reduction in greenhouse gas emissions and pollution. Due to low patronage, greenhouse gas and pollution output per passenger would be fairly high. **Balanced scorecard summary** No need for further detailed assessment. Not technically feasible. Reduces attractiveness of transit network. Undesirable safety and operational issues. Does not fully satisfy land use and urban design requirements.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
5	**Light rail** Retention of the heavy rail track with the substitution of conventional heavy rail with a light rail. This option includes: ▪ termination of all heavy vehicles outside the CBD (west of Wickham) ▪ operation of a new light rail from Wickham (or further west) to Newcastle Station ▪ grade separation of at-grade rail crossing at Stewart Avenue ▪ landscaping of the corridor	There will still be level rail crossing of other travel paths, but additional crossings could be provided at the expense of operational efficiency Light rail cars (6) = $24m Stewart Avenue grade separation: = $77m Stations (3) = $15m Landscaping = $3m Stabling = $26m Contingency and un-priced items = $35m TOTAL Capital Expenditure = $180m	**Support for urban design and land use objectives** Less of a physical and perceptual barrier, which would improve north-south connectivity. More land use and urban design opportunities to develop sites adjunct to the corridor. **Pedestrian and cycling connections** Passengers and vehicles can reasonably safely share corridor with light rail, but at a lower operating speed than the capability of the carriages. **Transit accessibility and convenience** Could provide more access along the current route with more stops and higher frequency service, so better internal trip distributor. Significant investment that disadvantages some train users and does not provide appreciable improvements in service and still travels on the periphery of the CBD. Slower travel times. Passengers would need to transfer from heavy rail service as it is unsafe to mix light and heavy rail cars (it would not be possible to operate service from Maitland). Not connected to a larger light rail network if operated only on current alignment and high vehicle floor height could be an issue if extended. **Technical feasibility** Although light rail systems are common elsewhere, the service would be unique to the Hunter region. It would therefore require specialist local infrastructure and expertise to run the service effectively.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Congestion relief and traffic access Although less stringent signalling requirements could provide some congestion relief at the Stewart Avenue level crossing, there would continue to be delays. If more frequent services are provided, the total delay may even increase. Implementation constraints would make the construction of an overpass very difficult and costly. **Implementation constraints** Major technical constraints associated with constructing overpass at Stewart Avenue means that level crossing replacement is unlikely to attract RTA or RailCorp funding. Consequently no improvement in safety risks or regional traffic capacity. Loss of patrons during cessation of rail operations during construction. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Reduced noise and vibration levels, except near some curves. Smaller vehicles with lower emissions would reduce greenhouse gas emissions and pollution. **Balanced scorecard summary** No need for further detailed assessment. Not part of a light rail network. In would be costly to create new light rail network to produce no appreciable transport service gains.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
6	**Termination of the heavy rail at Broadmeadow or Woodville Junction** This option includes: ▪ replacement of rail with an alternative public transport system based on low emission mini buses ▪ additional north-south pedestrian and vehicular links across disused rail corridor east of Stewart Avenue ▪ landscaping and development of the disused rail corridor.	This option removes the branch electric service, but creates discontinuities for the diesel service so it is not clear there would be operational gains for RailCorp. Role of Hamilton Station undermined. There are likely to be rail service disruptions while this option is constructed which would affect country trains, as well as Sydney electrics and Hunter diesel. This option gives the highest return for reduced operating costs and savings in track maintenance and recapitalisation of the signalling system, but at the greatest loss in transit accessibility. Stations = $45m Removal and reconfiguration = $40m Rehabilitation and landscaping = $6m Stabling = $26m Contingency and un-priced items = $23m TOTAL Capital Expenditure = $140m	**Support for urban design and land use objectives** No longer a physical and perceptual barrier through the CBD. Removing rail line through Honeysuckle precinct would create even more land use and urban design opportunities to use the corridor for other purposes and to develop sites abutting the corridor. May be perceived as disinvestment in the future CBD. Could divert new commercial/transport investment away from the CBD's core and designated future growth areas like Wickham and Honeysuckle. Land uses at either site are unlikely to change in the medium to longer terms and are not conducive to a major transit access node or a sense of arrival in Newcastle. Both locations are not gateways to the city, nor could they easily develop into such a role. Significant project cost with no apparent long term developmental benefits. **Pedestrian and cycling connections** North-south connectivity vastly improved without level crossing risk and delays. **Transit accessibility and convenience** Passenger rail would terminate some distance from CBD at a location with poor integration with road and bus networks. Need to change mode if travelling to East or West Newcastle. **Technical feasibility** A Woodville Junction "triangle" (as per existing arrangements) type interchange layout would raise accessibility issues and rail operational safety issues on a "non straight" type platform.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Congestion relief and traffic access No need for constructing overpass at Stewart Avenue. **Implementation constraints** Would require a new stabling yard, signalling changes and station upgrading. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Reduced noise and vibration levels in heart of CBD. **Balanced scorecard summary** No need for further detailed assessment. There would only be a reduction in transit accessibility with little potential for longer term improvement. Could be perceived as disinvestment from CBD and would diminish future rail opportunities to centre.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
7	**Termination of the heavy rail east of Stewart Avenue** This option includes: ▪ replacement of rail with an alternative public transport system based on low emission mini buses ▪ elimination of Stewart Avenue at-grade crossing by either: ‣ rerouting north south traffic from Stewart Avenue to Gordon Avenue and the Bullock Island route ‣ grade separating at-grade rail crossing at Stewart Avenue ▪ additional north-south pedestrian and vehicular links across disused rail corridor east of Stewart Avenue ▪ landscaping and development of the disused rail corridor.	This option could be built with little operating impact on the passenger rail services until the line is terminated. **If Stewart Avenue is grade separated:** Stations = $45m Removal and reconfiguration = $40m Rehabilitation and landscaping = $3m Stewart Avenue grade separation: = $77m Stabling = $26m Contingency and un-priced items = $49m TOTAL Capital Expenditure = $240m OR **If Gordon Avenue is upgraded:** Stations = $45m Removal and reconfiguration = $40m Rehabilitation and landscaping = $3m Gordon Avenue realignment: = $100m Stabling = $26m Contingency and un-priced items = $56m TOTAL Capital Expenditure = $270m	**Support for urban design and land use objectives** No longer a physical and psychological barrier in eastern portion of CBD. Land use and urban design opportunities to use eastern corridor for other purposes and to develop sites near the corridor. Significant implementation cost needs to be exceeded by long term developmental benefits. **Pedestrian and cycling connections** The former rail corridor could be used as a pedestrian and cycle spine for to link new and old Newcastle City. **Transit accessibility and convenience** Provides heavy rail service to the current edge of the CBD. Passengers travelling within CBD can be more effectively served by frequent, free buses travelling along Hunter Street. Rail passengers need to change mode if travelling to East Newcastle. **Technical feasibility** No specific constraints were identified. **Congestion relief and traffic access** North-south connectivity improved from Civic eastward with removal of level crossing risk and delays. Gordon Avenue realignment option would transfer State Road designation from Stewart Avenue to Gordon Avenue increasing regional traffic along local roads.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Implementation constraints The only location that appears feasible due to straight track and platform length requirements would require rail crossovers in Stewart Avenue, so it would need to be closed to traffic. Would require new stabling yard, signalling changes and new station at/or near Wickham station. Major technical constraints associated with constructing overpass at Stewart Avenue means that level crossing replacement with grade separated crossing is unlikely to be funded. Consequently no improvement in safety risks or regional traffic capacity. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Reduced noise and disturbance levels in heritage area of CBD. **Balanced scorecard summary** Consider for further detailed assessment. Satisfies all land use and urban design requirements but has little impact on transit accessibility and does not improve road capacity on regional routes.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
8	**Termination of the heavy rail west of Stewart Avenue** This option includes: ▪ replacement of rail with an alternative public transport system based on low emission mini buses ▪ additional north-south pedestrian and vehicular links across disused rail corridor east of Stewart Avenue ▪ landscaping and pedestrian cycleway of the disused rail corridor.	This option could be built with little operating impact on the passenger rail services during construction. There is a straight section of track that appears feasible for a terminus just west of Stewart Avenue. Stations = $45m Removal and reconfiguration = $40m Rehabilitation and landscaping = $3m Stabling = $26m Contingency and un-priced items = $36m TOTAL Capital Expenditure= $150m	**Support for urban design and land use objectives** This site is accessible to the regional north/south route as well as east/west corridor so it links better to Newcastle Airport and the growth areas of Port Stephens and Lake Macquarie. Is an opportunity for a gateway station/interchange looking to the water and civic precinct, facilitating development at Wickham. No longer a physical and perceptual barrier through the CBD. North-south connectivity improved without level crossing risk and delays and the regional through traffic route could be relieved of some local traffic generated by Honeysuckle and Wickham development. Removing rail line through Honeysuckle precinct would create even more land use and urban design opportunities to use the corridor for other purposes and to develop sites abutting the corridor. **Pedestrian and cycling connections** The former rail corridor could be used as a pedestrian and cycle spine **Transit accessibility and convenience** Provides heavy rail service to the edge of the future CBD and preserves Hamilton Station as an interchange. Internal distribution of passengers to and within the city can be handled by the frequent service bus corridor along Hunter Street. Passenger rail would terminate further than an “acceptable” walk from Civic Precinct, forcing some patrons to transfer. Despite the frequent bus service in Hunter Street, a dedicated shuttle bus would meet every train at an additional cost unless some services can be rationalised in response to the new shuttle. Need to change mode if travelling to East Newcastle by rail.

No.	Transport option	Impacts and costs For comparison purposes	Assessment
			Technical feasibility No specific constraints were identified. **Congestion relief and traffic access** Level crossing at Stewart Avenue would be eliminated resulting in improved safety and traffic flow. **Implementation constraints** No need to construct an overpass at Stewart Avenue. Would require new stabling yard, signalling changes and new station just west of Stewart Avenue. **Externalities (greenhouse gas emissions, pollution, visual intrusion)** Reduced noise and vibration levels in heart of CBD. **Balanced scorecard summary** Consider for further detailed assessment. Currently preferred option as it satisfies land use and urban design requirements, adds to the regional road capacity, and accessibility of the rail terminus to regional service networks of bus and car. It eliminates the level crossing at Stewart Avenue.

Summary on use of the rail right of way if track is no longer present

	Cost		Assessment
Bus priority corridor	Dedicated busway = $50 Stops (6) = $6m Landscaping = $3m Contingency and un-priced items = $16m TOTAL = $75m	*x x x* *x x* *x* *x*	Parallel service corridor to Hunter Street bus service for insignificant added value. Would not serve established central area land uses along Hunter Street well, especially in the outbound direction. Very few attractions or entrances interact directly with the rail corridor and passengers may not feel secure waiting along this route when Hunter Street is more active. It would restrict safe north-south movement to a certain extent or perform at exactly the same service characteristics as Hunter Street. Future residents may object to 24 hour operation at low levels of demand along the parallel routes.
Bicycle and pedestrian share way	Shared way = $1m Rehabilitation and landscaping = $3m Contingency and unpriced items = $1m TOTAL = $5m	✓ ✓ ✓ ▲	Could be a spine facilitating the connection of the established city to growth areas. Corridor accessible to public for transport use. It would therefore become a public space accessible to all. Pedestrians and cyclists would be able to freely cross and move along the corridor. **The cost of remediating the abandoned rail corridor would be high, so transport uses such as light pavements for pedestrian and cycle were attractive for the short term, especially as buses should remain in Hunter Street if it is to be confirmed and upgraded as the Main Street for Central Newcastle.**

1.9 Options rating

	Retain heavy rail (with grade separation at Stewart Ave)	Sub-surface heavy rail	Elevated heavy rail	Heavy gauge tram-train	Light rail	Rationalisation of rail spur line: at Broadmeadow or Woodville junction	Rationalisation of rail spur line: east of Stewart Ave	Rationalisation of rail spur line: west of Stewart Ave
Support for urban design and land use objectives	x x x	✓ ✓ ✓	x x	x x	✓ ✓	✓	✓ ✓	✓ ✓ ✓
Pedestrian and cycling connections	x x x	✓ ✓ ✓	✓ ✓ ✓	x	✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓
Transit accessibility and convenience	✓	x	x	x	x x	x	✓	✓ ✓
Technical feasibility	✓ ✓ ✓	x x	x	x x x	x x	✓	✓ ✓	✓ ✓
Capital cost required to achieve transport and land use objectives	✓ ✓ ✓	x x x	x x	✓ ✓	✓	✓ ✓	x	✓ ✓
Congestion relief and traffic access	x x x	✓ ✓ ✓	✓ ✓ ✓	x x	x	✓ ✓ ✓	✓ ✓	✓ ✓ ✓
Implementation constraints	x	x x x	x x	x x	x x	✓ ✓	✓	✓ ✓ ✓
Externalities (greenhouse gas emissions, pollution, visual intrusion)	x	✓ ✓	✓	x	✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓
Balanced scorecard summary	***0***	***0***	***0***	***0***	***0***	***0***	***C***	***P***

Key:

0	=	no need for further detailed assessment identified
C	=	consider for detailed assessment
P	=	preferred option
x x x	=	indicates that it performs much worse than other options in regard to a negative impact
x x	=	relatively significant negative impact
x	=	undesirable or minor negative impact
✓✓✓	=	delivers on project objectives at the highest level
✓✓	=	achieves many of the stated objectives and benefits
✓	=	achieve some of the stated objectives and benefits

1.10 The preferred transport option

In summary, there were two options that appeared to satisfy the general urban design and land use requirements for a future rail service, both had the rail line being shortened to the general area of Wickham, but one option had it terminate between Wickham and Civic and the other had it terminate between Wickham and Hamilton. Working through the options at the workshop, feasible sites with the requisite straight length of track could be located on both sides of Stewart Avenue, but modifying the existing station at Wickham was rejected because the rail crossovers required to serve the station's platforms would transition back through the carriageway of Stewart Avenue, resulting in its closure. This was seen as undesirable as accessibility would have been lost to the City and currently quiet local streets would receive heavy traffic increases from the diversion of regional traffic.

In transport terms, the preferred solution was a terminal west of Stewart Avenue because of the centrality it would give the terminus as a future transport interchange within the transit network of the region, the accessibility and road capacity benefits for the CBD, the catalyst options from the development of a modern, gateway station, and the additional savings to long term rail operations and maintenance. The catalyst projects related well to it in the sense that the rail and bus connections would remain between University of Newcastle campuses. The Law Precinct would integrate with the civic precinct and similar levels of bus, rail and road access would be present so it remains a civic precinct for the Hunter Region. Retail refurbishment of the central and East Newcastle areas would require a strong Main Street approach which seemed well suited and part of the heritage of Hunter Street. Bus services would remain to reinforce that active thoroughfare, and any dedicated bus service to coordinate with the trains terminating at the new Newcastle Station would reinforce that link, and even extend it to the eastern beaches.

The new station becomes the central hub for transit travel in the region. Good access would be available to move between rail and bus and car. Even ferry interchange might be possible if the Stockton service could be extended to Throsby on its way to its berth. The interchange is well situated to current cycle routes, but this could be enhanced further if the unused portion of the rail corridor were used for cycle and pedestrian connections.

Opportunities for use of the surplus rail corridor focused on what could be done while reserving the land for future transport requirements. In the short term, the land offered many opportunities for improved cycle and pedestrian facilities. However, since the nearby high bus service corridor of Hunter Street has sufficient capacity and the street is oriented to welcome travellers it was the preferred location for any rail-extension bus service, at least until the urban form changed around the rail corridor to become more welcoming to pedestrians and passengers. The next section imagines how such a modified CBD transit system might work for residents and visitors to the Hunter.

2. An integrated transport future for Newcastle – How would it work?

In the last fifty years, Newcastle has changed dramatically and with a dynamic integrated plan for the future CBD it would change at least as much in a similar time period. So how would an integrated transport system at Wickham, west of Stewart Avenue work? The following paragraphs describe how travellers might use the new transit facilities.

Rail passengers arriving from Sydney and the Upper Hunter disembark their trains into a modern, attractive, easy access terminus called Newcastle at the western gateway to the Newcastle CBD. Interactive information kiosks and directional signs help them choose whether to travel to connecting bus services in major stops in Hunter Street or Stewart Avenue to locations such as Newcastle Airport, Newcastle University's City or Callaghan campuses, the employment areas north of the CBD and along the Pacific Highway. Or if the travellers are heading for the eastern CBD, there will be a waiting Blue Shuttle to take them past the stops the rail spur line used to serve, but with additional intermediate stops. The shuttle would also go directly to East Newcastle, travelling through to Newcastle and Bar Beaches. This modern, low emission, air-conditioned bus will have luggage carrying capability for suitcases or surf boards, with an excellent passenger information service announcing stops with internal variable message boards capable of displaying destination advice in several languages. It is free, as are all the buses in this CBD zone. This is truly the central, accessible heart of the city with every bus destination within a 100-metre walk at the doorstep of the city.

As they emerge from the station, visitors can immediately orient themselves as the Harbour is on their left along with the new urban development and to the right is the commercial centre with its wide shaded walkways and active, busy footpaths. If the passenger wants to travel along the waterfront, the walkway connection to the waterfront promenade is clearly in view. There is also the entrance across Stewart Avenue to a pedestrian and cyclist shared zone accessing the new commercial and campus developments via the path of the former rail spur line.

Arriving at night is not intimidating as the taxi rank is close and integrated within the interchange. All connections between the station and interchanging services such as bus, taxi, kiss'n'ride are covered, illuminated and activated by food outlets and traveller services (car rental, accommodation booking, newsagency) along the way.

Passengers will also appreciate the drop off and short stay parking nearby, but away from the major bus stops, where they can be picked up or dropped off by their friends and family when travelling. There are bright and secure places to wait for drivers summoned by passenger's mobile phones as the train approached Newcastle Central.

The intersection Stewart Avenue and Hunter Street then becomes a major arrival crossroads and the centre for new development and a geographic focus for mobility to the Hunter Region. Tourists to Newcastle's waterfront and beaches arrive by train and ask about day tours to the Hunter Valley or whale watching in Port Stephens, and local vacationers and business travellers alight at their regional rail terminus for the express bus to Newcastle Airport so they avoid that long drive and expensive parking.

2.1 Role of the former rail corridor

As described above, the use of the current rail corridor, once the rail line is shortened, would still contribute to an integrated transport network and support the Newcastle CBD. It could fundamentally change the configuration of Newcastle and stimulate a revitalisation of its expanding core. The form of support to the city that this land provides will change over time, however, broadly the role would include:

1. providing an accessible pedestrian, vehicular and visual corridor complementing the waterfront and Hunter Street precincts
2. being a catalyst to the reorientation of commercial sites immediately south of the corridor
3. providing space for multiple north – south access ways linking the waterfront, Honeysuckle, retail, commercial, heritage and Civic precincts without a fenced rail corridor
4. improving traffic flow along existing north/south road links with additional road links possible, as well as eliminating the at-grade crossing of the State Road (Stewart Avenue) so it is safer and more efficient for regional travel
5. connecting the CBD via a grid of roads and pedestrian ways by extending identified roads across the rail corridor and bringing all central precincts closer to the new rail terminal and bus services on Hunter Street. This also allows the bottleneck of vehicle access to Honeysuckle to be relieved as alternative routes become available.
6. providing open space that can be used to join new developments and enable higher density on sites adjacent to the corridor
7. linking the central city through a self contained cycleway distributing riders to key destinations and regional cycle routes
8. acting as a land bank for future transport needs if required;
9. providing opportunities for other transport related uses such as parking, standing of services vehicles and special events overflow areas.

In the longer term, once development has embraced and enhanced the corridor, the corridor no longer needs to be “banked”. It may then be considered for use as a dedicated transit internal trip distribution corridor that integrates with a vibrant pedestrian, multi-use development corridor. This in turn could free Hunter Street for other types of travel use as it redevelops.

3. Conclusions

Summarising the previous materials and the findings of the Workshop, the reasons for shortening the spur rail line to Newcastle would be:

10. It is in the wrong place to serve the regional centre, established by the low use Newcastle residents, workers and visitors are making of the service.
11. It divides the precincts of the central city,
12. It reduces, rather than enhances, the accessibility of the central city.

Putting the rail under or above the ground would address issues 2 and 3, but not the first one.

If you shorten the line, the principles for locating a new terminus should include it be:

- in a location that can act as a hub/interchange for the regional transit network to boost the loading of the rail service
- along a straight run of track so the four platforms are as safe and easy as possible for rail passengers to use
- where it maximises potential congestion relief by removing at-grade crossings of critical vehicle and pedestrian routes
- on a site with the potential to house the ancillary uses that enhance performance of a rail terminal
- in a location that can easily serve the growing precincts with the highest density
- as far west as a city gateway could be to minimise the operational and asset management costs for rail

Of the options considered for a new terminus for the Newcastle spur line, a site west of Stewart Avenue was preferred because:

1. It had a straight line of track of the required length.
2. It would remove the at grade crossing of Stewart Avenue, which is the north/south regional access route to Central Newcastle providing additional car access to the city.
3. It is very close to the crossroads of the east/west regional route with the north/south regional access routes, making it the regional hub for bus, coach, car passenger drop off/collection, and park'n'ride.
4. It will be well located to the growing employment precinct planned for the Hunter Region.
5. It will be central for local networks of pedestrian paths, cycle routes and local bus routes.
6. It can serve the resident, worker and visitor markets well.

It has yet to be established if there is sufficient land use value to shorten the rail given the initial high costs associated with such construction and operational works, but if the decision is justified by the future growth of Newcastle, then a terminus west of Stewart Avenue best addresses the objectives of *Revitalising Newcastle*.

Appendix A

SWOT Analysis

Scheme/Option	Option 1: Retention of heavy rail along its current alignment
Sources:	1. Newcastle Transport Options Planning Study – October 2003 2. Lower Hunter Transport Working Group 1st Report – September 2003 3. Lower Hunter Transport Working Group 2nd Report – November 2003 4. Lower Hunter Transport Working Group Final Report – December2003 5. Newcastle Transport for Business Development (TramTrain report) January 2009 6. Draft Report on Newcastle CBD Task Force Development Options December 2008 7. Newcastle CBD Taskforce Workshop Report. November 2008 8. Discussion Paper – Newcastle City Centre Connectivity, Transportation & Urban Design. PB comments & observations in blue font
Descriptions	1a: Maintain Status Quo (do nothing) 1b: Maintain Status Quo (improved bus & rail services) 1c: Retain heavy rail with Stewart Avenue Road Overpass

		STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Transport • Demand/Patronage • Interchange • Operation • Newcastle Vision	CBD	1a) Enable passengers, particularly mobility impaired persons to continue to travel from Regional areas to Hunter Street Mall and beaches.[1] 1a) Retention of rail line would provide opportunity for increase in rail usage in catchment of suburban rail stations in conjunction with urban consolidation policy.[1] 1a) Direct rail access into CBD will be a significant benefit.[5] (Compared to removing/truncating the rail line itself) ". Direct rail" Rail mode not clearly defined. 1a & 1b) Trains are more reliable than buses, are usually faster with higher capacities.[5] 1c) Improvement in safety for pedestrians and vehicle users by removing level crossing at Stewart Avenue.[6]	1a)Significant upgrades required to pedestrian accessibility across rail line and Hunter Street to encourage links movement between key activity areas.[1] 1a) Does not integrate transport systems, traffic & pedestrian movements within City Centre.[1] 1c) Lack of flexibility -timetable, routes.[6] 1c) Only solves traffic issue in one area, benefits overall for the region are not clear as a result of this one level crossing. Congestion caused by the level crossing on Stewart Avenue perceived as an issue by some. A cause of rat running via Honeysuckle Drive.	1c) CBD redevelopment.[6] (This is more applicable to option 2c which we identified. Retention of the rail line east of Wickham Station would not open up the CBD towards the waterfront) 1c) Development of Wickham station precinct.[6] 1c) Opens up potential land for development/open space.[6] Very limited development opportunity given the rail crossing is confined to one small precinct of the overall area. 1c) Lower Hunter Transport Authority Model.[6] Project as an input for the Lower Hunter Transport Model, but there is still no clear timeframe yet for its development. The model is not dependent on this overpass being built. 1c) Delays for road users reduced.[6] (If the level crossing at Steward Avenue is eliminated.)	If passengers are forced to change modes at Wickham, then up to 60% may switch to cars which will exacerbate parking issues.[5] How is a forced change mode an advantage of retaining rail into Newcastle? 1c) There might be insufficient funds to implement the ideal solution. [6] 1c) Mine subsidence, ground conditions.[6] 1a) The future of the Newcastle rail line should be determined equally on the basis of the performance of transport services and the potential benefits for urban design and planning.[2] Option 1c does not mention where the heavy rail line will terminate, if there is any.
	Regional	Supports growth in the regions through provision of public transport links to City Centre. Services leisure and beach goers from the regions (e.g. surfboards are allowed on the trains, but not the buses).	Demand from the regions is unclear, Rail mode split is low.	Could accommodate extra regional demand to Newcastle if CBD a viable destination. In future there could be substantial benefits of linking Sydney CBD with Newcastle CBD by means of a high speed rail service.	Growth in rail demand from regions, not assured. Other destinations served by cars may be more attractive.
Urban Form • Urban form • Social/Liveability • Development opportunities • Newcastle Vision		1a) Urban Form – current railway is part of historical landscape character of town centre.[1] Is this a character that we want to retain and whether it's consistent with the Newcastle Vision. 1c) Provides open space and public connections.[6] To a limited extent given the rail crossing is confined to one small precinct of the overall area. 1c) Provides land for development.[6] See above comment 1c) Encourage pedestrian and cyclist activity.[6] See above comment.	1a)Does not allow the creation of a central public space (piazza) as indicated in the vision for Newcastle.[1] 1a)Does not help build a sense of place.[1] 1a)Current access and severance problems restricts CBD critical mass that will not improve the form and functioning of the CBD.[1] 1c) Potential unsightly visual impact.[6] 1 a,b and c) Maintains perceived barrier between CBD and foreshore – which may conflict with Newcastle Vision's stated aim of achieving permeability through and across the City (Actions 8 & 16). 1 a, b and c) Unattractive rail corridor bisects main CBD area.	TOD developments possible depending on land value.	1a) Would not enable full realisation of the desired future vision for Central Newcastle.[1]
Environment • Sustainability • Contaminated land • Newcastle Vision		No need for costly decontamination since it is already existing there.	1c) Energy & carbon efficiency.[5] (In the context of the bridge only given limited patronage of the overall line). 1c) Noise and vibration.[6]	Direct link between Sydney CBD and Newcastle CBD could have significant advantage for future mode shift from car to public transport.	
Economics • Cost • Funding • Encourage Economic Regeneration • Newcastle Vision		No job losses on the rail service.[3] Property values always increase when rail is added and decrease when rail is removed.[5] The best generator of retail business is foot traffic and the best generator of foot traffic was rail.[5]	1a) Does not enhance the value of City assets due to poor rail patronage - assets underutilised.[1] Operating cost is $148 million over the next 20 years, $27-37 million higher than the cost of removing the rail line and upgrading Broadmeadow	Use of existing infrastructure & rollingstock.	1a) Does not increase employment opportunities due to poor level of service restricting commuters at lower income levels.[1] 1a) The cost of operating the rail service on the Newcastle branch line exceeds revenue generated by over $9 million each year.[3]

	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
		station.[3] 1 a, b and c) The second cheapest option.[3] 1c) Operating and user costs for road and rail.[6] 1 a, b and c) Retaining status quo heavy rail does not encourage regeneration.		1a) The discounted cash flow analysis of costs, including capital, operating and maintenance and decontamination costs, indicates, that over 20 years, the Broadmeadow options would save a total of $33 million or $43 million in comparison with retention of Newcastle Branch Line.[2]
Implementation • Construction • Disruption • Impact on other modes • Newcastle Vision	Minimal construction period.[3]	1c) cost of implementation.[6]	Availability of funding and commitment for a whole of Government/Stakeholder group to implement 1c) Minimum disruption of service during implementation	
Acceptance • Public • Government • Others	Maintaining the railway would be popular to current users and others.	May be perceived as maintaining a problem area by some.		1c) Community acceptance appears mixed.[6]

Scheme	Option 2: Termination of heavy rail EAST of Stewart Avenue and replacement of alternative public transport system based on low emission mini buses	Sources: 9. Newcastle Transport Options Planning Study – October 2003 10. Lower Hunter Transport Working Group 1st Report – September 2003 11. Lower Hunter Transport Working Group 2nd Report – November 2003 12. Lower Hunter Transport Working Group Final Report – December2003 13. Newcastle Transport for Business Development (TramTrain report) January 2009 PB comments & observations in blue font.
Description	2a) Closure of branch line to Civic Station with upgraded station facilities & interchange 2b) New Interchange at Civic Station – All trains terminate with busway corridor to CBD (Light rail option discussed in Option 4) 2c): Retain rail service up to a new public transport interchange just east of current Wickham Station (ideally this should include elimination of the level crossing at Steward Avenue) Service the areas east of the new station with either a bus or light rail service (see the discussion of these options).	

		STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Transport • Demand/Patronage • Interchange • Operation • Newcastle Vision	CBD	2b) Increases transport effectiveness/accessibility.[1] 2b) The light rail line represents an improvement in accessibility to and within Central Newcastle.[1]	Some patrons would require an additional mode interchange, the further west that the heavy rail is terminated, the greater the number who would need to change. Not all rail passengers may switch. Major change to travel patterns. No relief for Stewart Avenue (congestion will be an issue).	Unused railway corridor could be used for buses, cyclists or other transport uses. Complete redesign of services in the CBD. An efficient CBD bus feeder service could increase the rail catchment area. 2c) A new public transport interchange east of the current Wickham station could serve to integrate CBD bus service with the regional rail service. 2c) Due to the fact that the RTA is unlikely to fund a new bridge at Stewart Avenue in the foreseeable future, providing a new rail station and bus interchange with federal funding could include elimination of the level crossing. 2c) Current rail patronage is low and incorporating rail into current precinct planning and development could boost the attractiveness of rail.	Extra mode interchange would reduce the rail patronage. Whichever new station is used as terminus would require extensive additions to provide extra train capacity for terminus operations. Bus services could more easily be terminated from rail. Long term sustainability.
	Regional				
Urban Form • Urban form • Social/Liveability • Development opportunities • Newcastle Vision		2b) New physical links can be created.[1] 2b) New development around corridor can blend with landscape.[1] 2b) New Interchange at Civic station would revitalise Civic Cultural Precinct.[1] 2c) Terminating the rail line at a new interchange just east of Wickham Station would retain the benefits of a heavy rail service to the edge of the CBD and would give access to the waterfront for developments in the heart of the CBD further east.	2b) Wharf Road/Hunter Street still represent barriers between the CBD and waterfront.[1] Introduction of a bus service may not be in keeping with vision to concentrate CBD development. Due to denser route network and closer bus stop spacing bus services tend to encourage development to disperse rather than focus on a specific node.	2c) Provides opportunities for incorporating heavy rail into urban development vision. Improves permeability to the foreshore from existing shopping areas. Depending on station location would improve permeability to Honeysuckle development (therefore accords with Vision Actions 8 & 16). If station is at Civic then much of the shopping areas still within a reasonable walk distance. More frequent stops and density of route network of bus service may integrate CBD. Rail land would be freed up and could be used for other urban development purposes (there are constraints on the purpose and manner in which the rail land could be used).	Success depends on location of demand generators, if CBD moves further west, then the rail line may still bisect it. If line terminated at Wickham, then Stewart Avenue still incurs delays (but Honeysuckle development opened up to rest of City). Fewer opportunities to change urban form with “minibus”. Compulsory decommissioning of railway land. Rail corridor has to be developed/secured in order to avoid it becoming a “dead’ zone within the CBD.
Environment • Sustainability • Contaminated land • Newcastle Vision		Contamination issues could be minimised through design (capping). Less visual and noise intrusion than heavy rail.	2a) Decontamination required Cheaper corridor capping cost ($80,000 - $775,000) than Broadmeadow and Woodville option (Option 3).[3] Pollution if alternative modes are powered by diesel/petrol.	2a) Decontamination cost can be contributed by developer.[3] The unused corridor could be made attractive. 2c) Direct link between Sydney CBD and Newcastle CBD could have significant advantage for future mode shift from car to public transport.	Vacant contaminated rail land poses an environmental hazard in the heart of the CBD if not rehabilitated.
Economics • Cost • Funding • Encourage Economic Regeneration • Newcastle Vision		2a) No job losses because the heavy rail connection is not completely removed.[3] 2b) Maintains commercial, retail and entertainment focus on Central Newcastle, good for employment.[1]	2a) Cost exceed the cost of Base Case (Option 1a) by $49 million.[3]	Rail land could be used for development. This may fund bus service. 1d) Unused rail land east of new transport interchange could be incorporated in urban redevelopment. 1d) new public transport interchange could be a focal point around which development could take place.	May not be able to use income from sale/lease/development of rail land for development. Funding for bus service may have to come from elsewhere, whereas RailCorp fund current rail shortfall.
Implementation • Construction • Disruption • Impact on other modes • Newcastle Vision		Construction could take place with minimum disruption to existing services. Transition to bus would be seamless (compared to light rail were there would be an extended period during construction when passengers are inconvenienced).	2a) 2 years of construction period required² (not clear from the reports why the construction period would be this long).	Replacing part of the rail line could be done rapidly and would not require initial construction.	Corridor widening may be required in vicinity of station to provide train capacity at terminus. Stabling Capacity would need to be located elsewhere. Disruption to services if not well co-ordinated with termination of rail (better than light rail).
Acceptance • Public • Government					All options may attract criticism from certain quarters. May be seen as a compromise

	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
• Others				solution which does not full satisfy any requirement.

Scheme	Option 3: Termination of heavy rail WEST of Stewart Avenue with an alternative public transport system based on low emission mini buses.
Description	3a) Woodville Junction – a new station and interchange at Woodville Junction (closure of branch line to Woodville Junction triangle) 3b) Broadmeadow Station – upgraded interchange and station facilities (closure of branch line to Hamilton Junction)

Sources:

14. Newcastle Transport Options Planning Study – October 2003
15. Lower Hunter Transport Working Group 1st Report – September 2003
16. Lower Hunter Transport Working Group 2nd Report – November 2003
17. Lower Hunter Transport Working Group Final Report – December 2003
18. Newcastle Transport for Business Development (TramTrain report) January 2009
19. Evaluation of Woodville Junction Proposal. December 2002
20. Sustainable Transport in the Lower Hunter Region. April 2003

PB comments & observations in blue font

		STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Transport • Demand/Patronage • Interchange • Operation • Newcastle Vision	CBD	3b) Facilitates cross platform changes with connecting rail services- Easy access facilities enhance interchange capacity and safety.[3]	Depending on how far west the line is closed, this may eliminate the future option of a fast train service between Sydney CBD to Newcastle CBD. 3a) Regional rail patrons would be required to change modes at Woodville Junction when travelling to CBD, which would diminish the CBD's perceived accessibility by public transport, further reducing its role as the regional centre.[1] This comment applies also to Broadmeadow. 3b) Need to keep current rail line operational between Broadmeadow and Woodville operational. Connectivity issues between Broadmeadow and CBD.[1] 3a & 3b) poor connection between Broadmeadow & City East CBD.[1] An interchange west of Gordon Avenue would not be in area served by free CBD buses.	3b) Free bus service provided from Broadmeadow to CBD is rail line is closed, subject to feasibility of interchange study at Broadmeadow.[4] Existing fare free bus zone around the CBD between 7:30am and 6:00pm 7 days a week could be optimised. 3b) Retention of corridor for future public transport uses.[4] 3b) Urban renewal of areas adjacent to the transport corridor with major access points at key locations (Hamilton, Wickham, Civic and Newcastle Stations).[4] 3b) Redevelopment of railway land adjacent to preserved corridor at 3 key accessibility points (Hamilton, Civic & Newcastle Stations) with revenue dedicated to improved transport facilities in the Lower Hunter.[4] 3b) Provision of space for establishing cycleways.[4] Review and integrate bus operations with new interchange and along the rail corridor.	3a) Reduced public transport services from suburban Newcastle and the region, CBD would be more dependent on private motor vehicles , increasing the need for parking stations and road capacity.[1]
	Regional	3a) The interchange would allow services for all key destinations to be met.[6] 3a) Bus routes would be rationalised.[6] 3a) The interchange would provide a high level of service to users.[6]	A Woodville Junction "triangle" (as per existing arrangements) type interchange layout would raise accessibility issues and rail operational safety issues on a "non straight" type platform. Have to consider train stabling requirements and timetable operating patterns as part of this proposal (i.e. will there be any extra train movements due to the availability or lack of sidings to hold layover trains).	3a) The improved integrated transport system will increase patronage and solve key access problems such as the John Hunter Hospital.[6] 3a) Newcastle Trains would terminate at the interchange to be replaced by a frequent shuttle bus. The rail line could be used as a "transport corridor".[6]	Extra modal interchange would reduce the attractiveness for rail users.
Urban Form • Urban form • Social/Liveability • Development opportunities • Newcastle Vision		3a) The City Centre will be better connected to the harbour and Honeysuckle.[6] 3a) Freeing up rail corridor between Woodville and Newcastle enables creation of multi-use transit corridor, which would be less visually obtrusive than the existing rail line.[1] 3a) Major transport interchange at Woodville Junction would enable transit-oriented mixed use development surrounding the interchange on currently vacant urban land, which is consistent with urban consolidation objectives.[1] 3a) Maximise the future redevelopment potential of Woodville and Broadmeadow localities with a predicted 25 year growth of 7,600 residents and 6,450 jobs in the combined areas.[1]	3a & 3b) Woodville & Broadmeadow options would provide a competing CBD/retail/commercial and employment focus. It would further elongate the CBD and dilute the role of the CBD as the regional centre.[1] 3b) Intact residential heritage precincts threatened by redevelopment pressure.[1] Depending on the location creating a multi modal node which is integrated into the surrounding network may be very difficult. (especially difficult for Woodville Junction).	Urban consolidation objectives need to be checked whether consistent with "transport" objectives.	Expense of restricting potential residential and commercial growth of the CBD and Honeysuckle precincts where predicted growth would be approx one third (33%) lower than would be achieved by the Civic rail terminus option (2a & 2b).[1] 3a) Small fragmented ownership restricts potential for co-ordinated redevelopments.[1]
Environment • Sustainability • Contaminated land • Newcastle Vision			3a & 3b) Decontamination required Cost range of capping corridor - $ 320,000 to $3.1 million.[3]	3a & 3b) Decontamination cost can be contributed by developer.[3]	

	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Economics • Cost • Funding • Encourage Economic Regeneration • Newcastle Vision	3a & 3b) No job losses.[3]	3a)Capital cost of $253 million over 20 years – over twice the cost of either of the Broadmeadow options Cost up to $92 million more than Option 1.[2] 3b) The discounted cash flow analysis of costs, including capital, operating and maintenance and decontamination costs, indicates, that over 20 years, the Broadmeadow options would save a total of $33 million or $43 million in comparison with retention of Newcastle Branch Line.[2]	3a) $66 million can be saved by retaining Countrylink services at Broadmeadow.[3]	Extended free bus service could be burden on council – who will fund it in the long term.
Implementation • Construction • Disruption • Impact on other modes • Newcastle Vision	3a & 3b) The shortest construction period (1 year for both options) – Civic Station: 2 years, Woodville Junction: 3 years	3 years of construction period required.[3] Extensive disruption during construction if Woodville or Broadmeadow.		
Acceptance • Public • Government • Others	New use of rail corridor would be well received by some.	Loss of rail corridor over such a distance would be opposed by some.		

Scheme	Option 4: Retention of heavy rail track with the substitution of conventional heavy rail with a TramTrain (This includes options of stopping the heavy rail line at Broadmeadow station, west of Stewart Avenue. or west of Stewart Avenue).
Description	

Sources:
1. Newcastle Transport Options Planning Study – October 2003
2. Lower Hunter Transport Working Group 1st Report – September 2003
3. Lower Hunter Transport Working Group 2nd Report – November 2003
4. Lower Hunter Transport Working Group Final Report – December2003
5. Newcastle Transport for Business Development (TramTrain report) January 2009

PB Comments & observations in blue font.

		STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Transport • Demand/Patronage • Interchange • Operation • Newcastle Vision	CBD	Allows the existing Stewart Avenue level crossing to operate with tram activated traffic lights which can be coordinated with Hunter Street Traffic lights.[5] The rail corridor would be protected for transport purposes.	New parking (with connections to tram line) is provided at several points such as • East of Hamilton Station near new rail/coach interchange • Gateway parking is provided on the other side of the Maitland Road Overpass, adjacent to the new Newcastle Bus Service site. • Substantial new parking is made available north of Newcastle Beach Station at ground level beneath Enterprise Prospect Development Site Does not have same capacity of heavy rail (this may not be an issue given the low patronage). This will bring only minor improvement to traffic flow on Stewart Avenue compared to grade separation.	Allow more frequent pedestrian/cycle vehicle connections across rail line Allows increased connectivity with additional level crossings – both vehicle and pedestrian.[5] Would be a better service intra CBD movements as it could provide more frequent stops Elevated frequency would improve the transport service and probably increase patronage.	Provision of light rail AND "substantial" new parking? The issue of the provision of parking for a new mode and whether its purpose is for park and ride or other purposes needs to be investigated further. Report notes that this is part of parking and traffic flow improvements The mixing of freight trains and light rail vehicles on a wider regional network may be difficult to resolve due to freight train path priority There might not be sufficient demand to warrant such an advanced and costly new travel mode. Success is highly dependent on an extensive the light rail network. This means that the service would either be run all the way from Broadmeadow Station, or the service would have to be extended through the CBD if it is run from Wickham Station (i.e. a short spur from Wickham Station to Newcastle Road Station would not be feasible).
	Regional	Provides a new transport system which can be gradually extended across the Lower Hunter as population growth demands.[5] Would significantly enhance regional connectivity.			
Urban Form • Urban form • Social/Liveability • Development opportunities • Newcastle Vision		Light rail corridor can provide design image and help build a sense of place.[1] Addresses the perceived "barrier" issue between the CBD and the foreshore by opening up and landscaping the rail corridor.[5]	Diesel units can be noisy and vibration may be an issue without careful track design.	Because a rail service is retained in the corridor it would not affect property values negatively. Light rail is of a more human scale in a CBD environment compared to an above ground heavy rail system. Shows a level of government commitment which is unmatched by a bus service.	Electric regional network option would require overhead catenary which would be intrusive to urban landscape.
Environment • Sustainability • Contaminated land • Newcastle Vision		Greenhouse gases pollution reduced. Less visual intrusion than heavy rail. Contaminated land not a major issue if light rail is implemented.	Diesel units may not be very 'clean' in an urban environment.	There are more opportunities (compared to heavy rail) to integrate the rail reserve as an urban amenity.	Level crossings and unprotected reserves could be a safety issue.
Economics • Cost • Funding • Encourage Economic Regeneration • Newcastle Vision		Retains all the benefits of direct heavy rail into the Newcastle CBD an beaches.[5] Eliminates the need for an expensive overpass at Stewart Avenue or interchange at Wickham.[5] Hamilton to Newcastle – Upgrade existing line with new rolling stock – 3.5 kms @ $8 km = approx $52 million.[5]	Still the need for crossings at various places such as Wharf Road to Darby Street via Argyle Street and from Honeysuckle Drive to Hunter Street via Worth Place.[5] Diesel system may be costlier than electric in the long run. Very high capital cost even if 2nd hand tram units purchased. (approx $1.2m each 2nd hand/ $3m – 4m each new).	Major opportunity for focus point of CBD regeneration and development. Electric system would have high initial capital costs at a regional level due to need for overhead wires.	Cost of decontamination if the rail corridor is to be incorporated into surrounding development. High cost of developing corridor. Electric system would have high initial capital costs at a regional level. Major patronage and feasibility study required.
Implementation • Construction • Disruption • Impact on other modes • Newcastle Vision		Can be built in stages if required.[5]	Decontamination of existing rail corridor may be required Would require Automatic train protection for all rail users if a regional network is adopted on existing rail tracks west of Woodville junction Vehicles may need to be diesel, which can result in noise/ emission problems.	The rail corridor could be redevelopment as an integral part of the light rail implementation.	The transition from heavy rail to light rail is problematic as the heavy rail service would have to be terminated at the start of construction. This would bring a high level of disruption to current rail users during the transition period. Commitment to building it in stages, otherwise could end up like a "white elephant" and have and asset that does half the job and provide half the benefits. Operational mix of light & heavy rail since its not possible if operated from Broadmeadow (unless separate line provided).

	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
				Staged construction would be a risk as benefits may not accrue without extensive system. Only feasible to run trams in a freight corridor if all services have automatic train protection. This system may not be extended to freight lines Administratively very difficult interface with RailCorp/ARTF etc
Acceptance • Public • Government • Others	Would probably be popular with the public.			May not be supported by RailCorp.

Appendix B

References

Tile	Author	Year
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Level Crossing Risk Analysis - Rail Risk Assessment Report	Sinclair Knight Merz Pty Ltd (for Honeysuckle Development Corporation)	2001
Broadmeadow Transport Interchange Feasibility Study	Various authors, for Transport Infrastructure Development Corporation	2004
Decision to Close the Newcastle Branch Rail Line - Independent Review of Transport Reports	Professor Graham Currie, Institute of Transport Studies, Monash University	2005
Evaluation of Woodville Junction Proposal	SGS Economics & Planning	2002
Examination of Options for a Transport Link Between Hunter and Hannell Streets, Newcastle	Christopher Hallam & Associates Pty Ltd	1996
Newcastle CBD Accessibility Study - Final Report	Maunsell McIntyre Pty Ltd	2000
Proposal to Boost Public Transport Usage at a Regional Level - Pre- Feasibility Study: Final Report (CONFIDENTIAL)	Sinclair Knight Merz Pty Ltd	2001
Public Transport in the Lower Hunter: A Five-year Plan	NSW Ministry of Transport	2005
Warrabrook Modified Light Rail Study	Hunter Business Chamber	
Newcastle Twards a Vibrant and Sustainable City	Save Our Rail	2008
Economic Impact of Rail Closure in Newcastle	GHD	2004
Tram Train Proposal	Duc Associates	2008
Standard Working Timetable 2006 Passenger Services from Monday 29 May 2006	RailCorp	2006