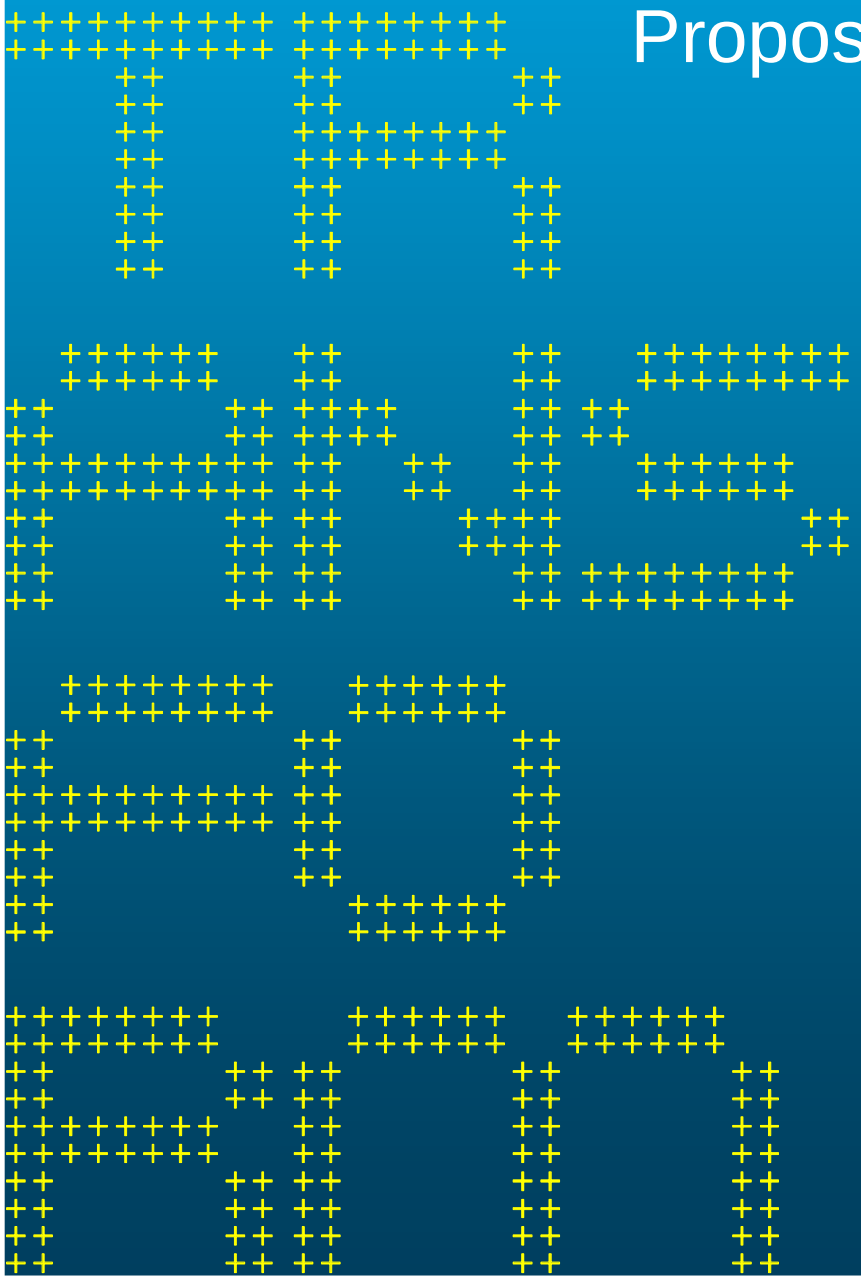
Newcastle CBD Strategy – Rail Proposal Cost Benefit Assessment

May 2009



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Newcastle CBD Strategy – Rail Proposal Cost Benefit Assessment

Prepared for Hunter Development Corporation

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May 2009

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Executive Summary

Study Purpose

The purpose of this study is to assess the costs and benefits associated with two options that have been identified for Newcastle's rail line:

1. The rail is retained in its current position with additional station option proposed by the Save Our Rail Group and the construction of a vehicle overpass over Stewart Avenue.
2. The rail is terminated west of Stewart Avenue, as assessed by Parsons Brinckerhoff (preferred rail option) with utilisation of bus services to service the CBD from Wickham.

The study will provide a basis upon which HDC can advise its stakeholders on the decision whether to proceed to further investigations on the preferred rail option.

Project Methodology

The two identified rail options are assessed by way of a Cost Benefit Analysis (CBA), involving quantification of the net benefits to society that would accrue as a result of each of the options. The two key project performance indicators which are quantified through CBA are:

1. Net Present Value (NPV);
2. Benefit Cost Ratio (BCR).

The NPV of the projects are calculated under three different discount rates – a 'medium' rate (7%); a 'low' rate (4%) and a 'high' rate (10%).

Consideration is also given to non-quantifiable benefits for both options, some of which may have a strong influence on a decision to retain or terminate the rail line at Wickham.

In undertaking this assessment we have adhered to the guidelines produced by NSW Treasury in Economic Appraisals. Cost Benefit Analysis

Retain Rail Line Option

Under a discount rate of 7%, the NPV of maintaining the current rail line is -$182.2 million, whilst the BCR is 0.36. Under the higher and lower discount rates the costs continue to outweigh the benefits. After excluding the costs of constructing the Stewart Avenue overpass, which has been proposed under this option, the costs again continue to outweigh the benefits. Thus, continuing to operate the rail line from Wickham to Newcastle should be regarded as a poor investment of community capital, irrespective of whether the Stewart Avenue overpass is constructed.

Preferred Rail Option

The costs and benefits that would accrue under the preferred rail option are those costs and benefits which are associated with the catalyst projects that are contingent on or strongly influenced by the removal of the rail – these are: the Retail Precinct (GPT's development), and the Education Precinct (University of Newcastle CBD campus). Other quantifiable benefits that will accrue include tourism sector benefits and reduced waiting time for road commuters with the removal of level crossings in the CBD

Under a discount rate of 7% the NPV of terminating the rail line is $163.4 million and the BCR is 1.25. The benefits of the preferred rail option continue to outweigh the costs under the higher and lower discount rates.

If GPT does not proceed with its development, the costs will outweigh the benefits. However, the NPV of the preferred option under this scenario is still higher than the retaining the rail line option. Thus,

regardless of whether GPT proceeds with its development, the preferred rail option would provide more benefits to the community than if the rail is retained.

If GPT proceeds but University of Newcastle does not proceed with their investment, the costs of the preferred rail option will outweigh the benefits and the NPV will be less than the retain the rail option.

Thus, based on quantifiable benefits for NSW, the preferred rail option would only be a positive investment of community funds if the University proceeded with its major city campus development as a result of the rail lines removal. We note however there are a number of significant local benefits that will accrue as a result of the removal of the rail line to Wickham that can't be measured because of transfer effects at the state level. Some of these benefits that detailed in the following conclusion.

Conclusion

Terminating the rail line west of Stewart Avenue clearly provides a net community benefit, regardless of whether GPT proceeds with its development. This is true under varying discount rates. However, if a scenario emerged whereby the University of Newcastle did not proceed with its developments, the preferred rail option would post a net cost to the community as measured at the state level, however would provide a number of local benefits that are not measurable due to actual or perceived transfer effects.

Assuming that the University of Newcastle did not proceed with its city campus development, retaining the rail line calculates as a more positive quantifiable economic option, albeit that the costs of this option would still outweigh the benefits. The Save Our Rail options would also limit the opportunity to realise the additional local benefits that would accrue from the removal of the rail line to west of Stewart Avenue.

There are a number of non-quantifiable local benefits that will continue regardless of whether the GPT or University of Newcastle projects proceed as a result of the rail line being terminated west of Stewart Avenue. These benefits are discussed in our March 2009 Economic Impact Assessment of the Catalyst projects proposed in the Newcastle CBD Revitalisation Strategy. These include:

1. Facilitate the evolution of a more integrated Newcastle CBD
2. Facilitate linkages and the agglomeration of economic activity in the Newcastle CBD
3. Facilitate investor confidence
4. Increased Revenue Base for Newcastle City Council
5. Higher and better land use
6. Improvement in residential amenity
7. Reduced noise and vibration levels in the heart of the CBD

As such, we recommend that the proposed termination of the rail west of Stewart Avenue should be further investigated as the potential benefits may exceed the costs and provide a better economic outcome than retaining the rail in its current position. The proposal also has the ability to deliver a number of non-quantifiable local benefits that are unable to be measured at the state level.

1 Background

In March 2009 Urbis undertook an economic impact assessment of the potential catalyst projects identified for the Newcastle CBD. This comprised quantification of the economic cost and benefits of the catalyst projects, and a qualitative assessment of the intangible social costs and benefits associated with each catalyst project.

Whilst undertaking the assessment, Parsons Brinckerhoff (PB) simultaneously undertook a study to investigate the possible options for Newcastle's rail line. The preferred option, as assessed by PB, is for the rail line to be terminated West of Stewart Avenue, and for development of a transport interchange at this point, which would become the central hub for transit travel in the region. Under the proposal, bus services would run along Hunter Street to the retail precinct near Newcastle Station, or possibly beyond to the beaches.

Given that several of the catalyst projects are in some way contingent on what happens to the rail line, HDC and its stakeholders are seeking to understand the financial implications associated with the choice to implement or not to implement the preferred rail option, as assessed by PB.

Specifically, HDC and its stakeholders are seeking to understand the following:

1. The economic benefits that would accrue as a result of the preferred rail option proposed by PB
2. The point at which the economic benefits out-weight the costs of the changes to the rail infrastructure, as per the preferred option (threshold analysis)

The analysis will provide a sound basis upon which HDC, and its stakeholders including the Ministry of Transport, can determine whether the proposed changes to the rail infrastructure should be further investigated.

1.1 Study Approach

The approach that we will adopt to undertake the assessment is follows:

1. Review of findings from Urbis' March 2009 *Newcastle CBD Strategy* report : to understand the extent to which the catalyst projects are contingent on the movement of the rail line; how the timing of the removal of the rail line would affect if / when the organisations proceed with the projects; and positive and negative impacts of the preferred rail options, as perceived by stakeholders
2. Cost Benefit Assessment: quantification of the economic, social and environmental costs and benefits that would accrue as a result of removing the rail line versus not removing the rail line
3. Threshold Analysis: analysis to determine the point at which the benefits of implementing the preferred rail line option outweigh the costs.

2 Cost Benefit Analysis of Preferred Rail Option

2.1 Cost Benefit Analysis Methodology

The objective of cost benefit assessment (CBA) is to assist in decision making that is consistent with **'efficiency'** in the allocation of resources in areas where, for one reason or another, market forces do not achieve an appropriate outcome.

The power of CBA as an analytical tool rests in two main features:

- Costs and benefits are each, as far as possible, expressed in monetary terms and hence are directly comparable with one another.
- Costs and benefits are quantified in terms of the claims they make on and the gains they provide to the triple bottom line as a whole, so the perspective is a 'global' one rather than that of any particular individual, organisation or group.

While a detailed discussion about CBA is not provided here, the following points should be noted with respect to its application:

- CBA takes a society wide perspective, including costs and benefits that accrue to the community as a whole, not transfers of wealth (i.e. transfer payments) between individuals/ entities. As a result, items such as interest payments, taxes, rates, etc. and other transfers that do not reflect the saving or consumption of resources are excluded. This assessment has been undertaken at the NSW State level.
- CBA uses the concept of 'opportunity cost', which reflects the value of resources due to their scarcity and their demand elsewhere in the economy.
- CBA includes the range of economic, social and environmental costs and benefits attaching to a project rather than simply accounting for financial transactions, as would occur in a commercial investment analysis. This means that costs and benefits that are traded and non-traded, and which are third party effects (i.e. externalities) are included in the analysis. Often it is necessary to value costs and benefits where market prices do not exist. This often invokes the need to apply various 'non-market' techniques to measure a benefit.

2.1.1 Mechanics of the CBA

Using these principles, the triple bottom line costs and benefits of a project are quantified where possible and are then contrasted over the life of the project, which is assumed to be 20 years; reflecting the economic life of the infrastructure.

Discounted cash flow (DCF) analysis is used in this process acknowledging the time value of costs and benefits. That is, $1,000 of net benefits in five years time is not as valuable to the community as $1,000 of net benefits now. Community investments have an opportunity cost, as budgets are constrained and therefore the cost benefit stream provided by one investment effectively comes at the expense of an alternative. Discount rates capture this trade-off through the 'discounting' of future costs and benefits.

Through the DCF assessment various project performance measures can be generated. Of most relevance are each project's:

- Net Present Value (NPV);
- Benefit Cost Ratio (BCR).

Basically when choosing between different options the option with the higher BCR is superior to ones with lower values. If only one option exist then any project that has a positive NPV and a BCR greater than 1:1 is considered worthy of investment, as the benefits provided by the project exceed the costs.

This does not mean that the project provides an economic rate of return, but that the social and economic benefits derived from the project exceed the cost of provision.

It is acknowledged that some costs and benefits cannot be adequately quantified. These intangibles therefore sit outside of the quantitative assessment process. Nonetheless, these intangibles do have some implicit value to the community and should be referenced in the interpretation of the project performance measures listed above.

Finally, because CBA takes a society wide approach (i.e. ignoring transfer payments), it implicitly assumes that either the costs and benefits are distributed evenly throughout society or, at least theoretically, it is possible to 'tax' the project beneficiaries and 'compensate' any geographic or demographic groups that are adversely affected by the project. Of course this is not always possible. Therefore, it is important that an understanding of the '**equity**' of the spread of costs and benefits is developed.

In undertaking this assessment we have adhered to the guidelines produced by NSW Treasury in Economic Appraisals.

2.2 Summary of Options

The two options evaluated in this report are:

- Retain rail line in its current position with additional station option proposed by the Save Our Rail Group and overpass at Stewart Avenue
- Preferred rail option – rail line to terminate West of Stewart Avenue
-

2.3 Retain Rail Line Option

2.3.1 Description

This option refers to retaining the railway line in Newcastle along its current alignment with some improvements responding to urban growth. This option in based on Ministry of Transport's *Preliminary Rail Options and Costs Assessment (April 2009).* The 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
- An additional Station at Hunter Street Mall (as per the Save Our Rail Group recommendations)

2.3.2 Benefits of Current Wickham to Newcastle Rail Service

The key benefit of maintaining the current rail service from Wickham to Newcastle is the convenience it can offer passengers in being able to travel to Newcastle from Sydney, Central Coast, Maitland and other locations without having to change mode of travel.

2.3.3 Critical Assumptions

The critical assumptions with regard to this analysis are:

Assumption	Description
1. Total capital cost	$170m [*Ministry of Transport, Preliminary Rail Options & Costs (April 2009; Save Our Rail additional station with PB Costings (May 2009)]*
Stewart Avenue upgrade	$77m
Landscaping of corridor	$3m
Additional Station at Hunter Street Mall	$45m *[Parsons Brinckerhoff, Newcastle CBD Integrated Transport - Identification of Preferred Transport Scheme, (April 2009)]*
Contingency and un-priced items	$20m
Easy access at Wickham & Civic stations	$25m
2. Annual recurrent operating costs	- $13.4m 2009 in constant prices from year one to year five, increasing to $17.9m from year 6 onwards due to the introduction of another station at Hunter Street [*Lower Hunter Transport Working Group 2nd Report (November 2003)]*
3. Annual benefit of railway service	- $8m in constant 2009 prices from year one to year 5; increasing to $10.7m from year 6 onwards due to the introduction of another station at Hunter Street [*Lower Hunter Transport Working Group 2nd Report (November 2003)]* - Assumes revenue collection approximates value of benefit of Newcastle line rail service based on "willingness to pay" principle
4. Annual average rate of inflation 2003-2009	3%
5. Share of Wickham to Newcastle station costs and benefits	- 75% of Newcastle branch line - Excludes Hamilton station of Newcastle branch line defined in *Lower Hunter Transport Working Group 2nd Report (November 2003)* Report - Proportionate increase in station costs with the introduction of the new Railway Station at the Hunter Street Mall.
6. Real discount rate	7% [*NSW Treasury NSW government Guidelines for Economic Appraisal]*
7. Time period for discounting	20 years assumed economic life of asset

2.3.4 Assessment of Costs and Benefits That Can be Quantified

Appendix A1 contains the estimate of the costs and benefits of running the current Newcastle railway line from Wickham to Newcastle based on the assumptions contained in Section 2.3.3 A summary of this analysis is contained below:

Metric	Result
Real Discount Rate	7%
PV of Costs	$285.8m
PV of Benefits	$103.6m
NPV	-$182.2m
BCR	0.36

On the basis of the assumptions, continuing to operate the Wickham to Newcastle rail service would generate a benefit cost ratio (BCR) of 0.36. Thus, since the costs outweigh benefits, continuing to operate the rail line in its current position should be regarded as a poor investment of community capital.

2.3.5 Scenario Analysis

Given varying views of the need for an overpass at Stewart Avenue, the CBA for retaining the rail line has been conducted under a second scenario which assumes that the overpass is not constructed. The outcomes of this analysis are:

Metric	Scenario 1 – Stewart Avenue Overpass is not Constructed
Discount Rate	7%
PV of Costs	$234.5m
PV of Benefits	$103.6m
NPV	-$130.8m
BCR	0.44

2.3.6 Sensitivity Analysis

In order to assess the sensitivity of the rail option, the CBA was performed under varying discounts rates as follows:

1. A higher more conservative discount rate of 10%
2. A lower more optimistic discount rate of 4%

The resultant net present values (NPV) and benefit cost ratios (BCR) under these different discount rates were:

Metric	Sensitivity Analysis 1	Sensitivity Analysis 2
Discount Rate	10%	4%
PV of Costs	$231.2m	$361.9m
PV of Benefits	$81.2m	$136.7m
NPV	-$149.9m	-$225.2m
BCR	0.35	0.38

Retaining the current Wickham to Newcastle rail service does not seem justified based on a cost benefit analysis approach even at higher or lower discount rates, and even if the Stewart Avenues overpass is not constructed.

2.4 Preferred Rail Option

2.4.1 Description

The preferred rail option has been taken from Ministry of Transport's *Preliminary Rail Options and Costs Assessment (April 2009).* This option involves terminating the heavy rail west of Stewart Avenue. This option could potentially 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. This option includes the following:

- Replacement of rail with an alternative public transport system based on low emission buses (utilising some existing excess capacity in the bus network).
- Additional north-south pedestrian and vehicular links across disused rail corridor east of Stewart Avenue.
- Landscaping and pedestrian cycleway of disused rail corridor.

2.4.2 Catalyst Projects that Are Contingent on Removal of the Rail Line

GPT's plan emphasises the importance of removing the barriers to the waterfront, especially the rail line, and reconnecting the urban environment to the waterfront. GPT has explicitly stated that its retail development is contingent on the removal of the existing rail line and train stations at Newcastle, Civic and Wickham.

Implementation of the preferred rail option, as assessed by PB, would satisfy this requirement, thus allowing the project to proceed subject to other conditions being met, as detailed in our initial report. These include Department of Lands granting approval for road closures, and owners of sites which fall within GPT's site agreeing to the development.

Apart from the removal of the rail line, the project is of course also primarily dependent on GPT's decision to continue with the development in the current economic climate. At this stage, GPT has put the development on hold till at least 2012. Given that GPT's retail development is the largest catalyst project expected to have the greatest economic impact, and given the uncertainty around the development, we have undertaken sensitivity analysis to consider the net social benefit of removing the railway line and GPT does not proceed with the development in 2012.

The University of Newcastle perceives the removal of the rail line to be a key success factor for development of a CBD campus. To this end, if the rail line is not removed this may jeopardise the development of the CBD campus going ahead. Thus, the economic benefits associated with the CBD campus development are also only considered realisable if the rail is removed. These benefits are therefore incorporated into the CBA analysis of the preferred rail option.

2.4.3 Critical Assumptions

The critical assumptions with regard to the preferred rail option are detailed as follows:

Capital Costs

Assumption	Description
Total capital cost	- $600m [*Ministry of Transport, Preliminary Rail Options & Costs (April 2009; Save Our Rail (May 2009)]* - Costs based on higher order cost estimate provided by MoT ($650m), less MoT's higher order cost estimate for signalling ($50m) which would be required if the rail line is retained in its current position
Stations	$150m
Train stabling	$150m
Trackwork and signalling	$140m
Contingency and unpriced items	$160m

Operating Costs and Revenue

Assumption	Description
Annual recurrent operating costs	- $8.9m in constant 2009 prices - Costs are lower than retaining the rail option due to two stations being terminated [*Lower Hunter Transport Working Group 2nd Report (November 2003)]*
Annual recurrent operating revenue	-$5.4m in constant 2009 prices - Revenue is lower than retaining the rail option due to two stations being terminated [*Lower Hunter Transport Working Group 2nd Report (November 2003)]*

Retail

Assumption	Description
Employment gains from GPT development	- $20m in constant 2009 prices - Assumes a net creation of 1,000 new jobs after accounting for job losses from other shopping centres
Savings of households from shorter travel time to a shopping centre	- $502,492 in constant 2009 prices - Benefits quantified by determining potential time savings for Newcastle residents if they have the option of shopping at a centre in Newcastle, instead of alternative centres such as Charlestown and Kotara. Opportunity costs of travel time applied to quantified time savings *[ABS (2006); AustRoads (2005), DoL (2005)]*
Decline in crime rates around Hunter Street Mall from more active retail precinct	- $62,500 in constant 2009 prices - Assumes one less incident of vandalism occurs per week due to the activation of Hunter Street mall and the surrounding retail precinct - Costs of crime derived from incidence and costs of crime statistics *[NSW Bureau of Crime Statistics & Research (2006), Australian Institute of Criminology (2005)]*

Education

Assumption	Description
Employment gains at University of Newcastle	- $14.5m in constant 2009 prices in additional salaries accruing as a result of the creation of 200 additional jobs at University of Newcastle *[University of Newcastle, Rates of Pay (2009)]*
Study fee revenue from additional international students	- Up to $26m per annum in additional international student study fees, in constant 2009 prices - Assumes 400 additional international student enrolments per annum, from year 1, stabilising at 2,000 additional international student enrolments from year 5 onwards *[DEEWR, (2007); [Australian Education International (2009)]*
Additional student accommodation revenue	- $3.12m in additional rental revenue, in constant 2009 prices - Assumes demand for additional 500 student accommodation beds - Assumes a new student accommodation development would take several years to enter the market, therefore additional rental revenue would be realised from year 3 onwards.
Retail and services revenues from additional international students	-$2.5m in year one, increasing and stabilising at $12.5m in year 5, in constant 2009 prices
Salary gains from increased University enrolments	- $1.5m in annual salary gains in year 1, increasing and stabilising at $6.75m in 2010, in constant 2009 prices - Assumes that there is potential for 150 additional Newcastle residents to attend University of Newcastle as a result of the new CBD campus (these are people which would not attend University of Newcastle in its current location) - Assumes salary gains will be realised after year 3 - the standard duration of an undergraduate degree
Salary gains from improved law curriculum	- $1m in annual salary gains, in constant 2009 prices - Assumes that 100 University of Newcastle law graduates achieve an increase in salaries as a result of an actual and perceived improvement in the University of Newcastle law curriculum. This would mean that the gap between University of Newcastle law graduates' salaries and top tier university law graduates' salaries would become smaller *[Hays Salary Survey, (2009); Graduate Careers Australia (2009)]*

Tourism

Assumption	Description
Tourism Revenues	- Up to $100,000 in constant 2009 prices - Assumes that Newcastle could have the potential to attract an additional 500 visitor days (comprising a mix of day trippers, interstate and international visitors) in year one, increasing and stabilising at 1,000 additional visitor days in year 5. *[Tourism Research Australia (2008)]*

Travel

Assumption	Description
Savings to travellers from removal of level rail crossings	- Up $2.67m in constant 2009 prices saved due to traffic delays being reduced as a result of the removal of three level crossing at Stewart Avenue, Merewether Street and Railways Street *- Assumes that removal of crossing will result in a time saving of 2 minutes per car.* Opportunity costs of travel time applied in order to quantify the monetary benefits *[ABS (2006); AustRoads (2005), DoI (2005, RTA 2006)]*

2.4.4 Assessment of Costs and Benefits That Can be Quantified

Appendix A2 contains the estimate of the costs and benefits under the preferred rail option based on the assumptions contained in Section 2.4.3. A summary of this analysis is contained below:

Metric	Result
Real Discount Rate	7%
PV of Costs	$657.7m
PV of Benefits	$821.0m
NPV	$163.4m
BCR	1.25

On the basis of the assumptions, the preferred rail option would generate a significantly higher NPV and BCR compared to maintaining the current railway line. Furthermore, the preferred rail option can be expected to result in significant net benefits. Thus, since the benefits outweigh costs, and the BCR and NPV under this option exceeds the first option, investing in the termination of the rail line west of Stewart Street should be regarded as a good investment of community capital.

2.4.5 Scenario Analysis

Given that the proposed investments by GPT and University of Newcastle are not guaranteed, the preferred rail option CBA was conducted under two alternative scenarios:

1. The GPT shopping centre development in the Newcastle CBD does not go ahead
2. The University of Newcastle does not go ahead with their development

The outcomes of these analyses are as follows:

Metric	Scenario 1	Scenario 2
Discount Rate	7%	7%
PV of Costs	$657.7m	$657.7
PV of Benefits	$617.4m	$284.1m
NPV	-$40.2m	-$373.5m
BCR	0.94	0.43

2.4.6 Sensitivity Assessment

In order to assess the sensitivity of the rail option, the CBA was performed under varying discounts rates as follows:

1. A higher more conservative discount rate of 10%

2. A lower more optimistic discount rate of 4%

The resultant net present values (NPV) and benefit cost ratios (BCR) on these three scenarios are:

Metric	Sensitivity Analysis 1	Sensitivity Analysis 2
Discount Rate	10%	4%
PV of Costs	$622.8m	$702.4m
PV of Benefits	$629.1m	$1.1b
NPV	$6.3m	$402.4m
BCR	1.01	1.57

Even though the costs and benefits are almost equal at a higher discount rate, the NPV and BCR are still substantially higher than retaining the rail line option. Therefore, the preferred rail option is justified based on a cost benefit analysis approach at higher or lower discount rates.

2.4.7 Non-Quantifiable Benefits

There are a number of important benefits attributable to terminating the rail line west of Stewart Avenue which are difficult to monetise and therefore not included in the CBA analysis above. These benefits include the following:

1. *Facilitate the evolution of a more integrated Newcastle CBD*

The Newcastle CBD is elongated East-West and extends approximately four kilometres in length from Wickham to Newcastle East. The CBD comprises of at least three distinct areas – Wickham in the west, Civic in the middle and Newcastle East. Furthermore, Honeysuckle is isolated from the rest of the CBD by the train line. The steep Hill behind the Hunter Street Mall is another source of North-South division. These natural and man-made topographical barriers have resulted in poor permeability between different areas within the CBD and have prevented the area reaching an adequate scale of activity to be a competitive destination.

As discussed in our previous report, the agglomeration of economic and social activity within a geographically compact space is a key quality of vibrant, lively and safe CBD. However, you find almost the converse in Newcastle. The termination of the railway line west of Stewart Avenue can play an important role in creating a more integrated and this vibrant CBD.

2. *Facilitate linkages and the agglomeration of economic activity in the Newcastle CBD*

The GPT and University of Newcastle developments are contingent on implementing the preferred rail option. These developments would go a long way in facilitating the agglomeration of economic activity in the CBD and households adopting multi-purpose trips to the CBD. Economic benefits from a managed approach to growth, via a centres policy, are principally generated through increased agglomeration, resource savings (such as lower travel times and distances) and more efficient use of infrastructure. Agglomeration leads to increased competition, collaboration and innovation among businesses from clustering.[1]

[1] NSW Department of Planning, 2005; SGS Economics and Planning.

As mentioned in our earlier report, the benefits of concentrating economic activity within a certain geographical space are well known. For example, evidence of increase in productivity from agglomeration in the United States, the United Kingdom and in Europe has been documented. The doubling of population density in centres has been found to have led to a 5% increase in productivity in the US, 4% in Europe and 3.5% in the UK.[2]

This approach to managed growth helps to reduce emissions from travel by locating trip generating development in places that reduce the reliance on cars, encourage multi-purpose trips and provide suitable accessibility by public transport or on foot. Furthermore, a centres policy can result in more economic use of finite land resources than urban sprawl and in turn lower the extent of land use and have positive impacts on reducing greenhouse gas emission.

Furthermore, the site selected for terminating the rail line is accessible to the regional north/south route as well as the west/east corridor so it will improve the linkages to the Newcastle Airport and the Port Stephens and Lake Macquarie growth areas. Implementing the preferred rail option would eliminate the perceptual and physical barrier through the CBD.

This benefit would apply regardless of the GPT and University of Newcastle Development proceeding and the connections throughout the CBD would benefit all CBD activities.

3. *Facilitate investor confidence*

The removal of the railway line would facilitate the GPT and University of Newcastle developments. These developments combined with a more scenic Newcastle CBD should attract skilled workers to move to Newcastle which combined can be expected to draw increased investments in the area.

4. *Increased Revenue Base for Newcastle City Council*

Related to the previous point, an increase in the quantum of investments and development in Newcastle would translate to increased revenue collection and room for discretionary spending by the Newcastle City Council from rates and development contributions.

5. *Higher and better land use*

Removing the rail line through the 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. The removal of the rail line might also lead to an increase in the value of sites which are currently close to and affected by the rail line.

6. *Improvement in residential amenity*

The GPT development, that is contingent on implementing the preferred rail option, would improve residential amenity by increasing nearby retail options, reducing crime, and improving access and view of the water. These positive developments in turn will have a positive effect on residential development.

7. *Externalities*

The preferred rail option would also reduce noise and vibration levels in the heart of the CBD and reduce the per capita greenhouse gas emissions given the low utilisation of the Newcastle rail line.

8. *Legal Sector Access to University of Newcastle Law Library*

If the University of Newcastle Law Faculty relocates to the CBD, legal professionals could benefit from the additional resources available to them through the University of Newcastle law library. This would facilitate development of the legal sector and benefit the community at large.

[2] A. Ciccone and R.E. Hall, "Productivity and the density of economic activity", American Economic Review, 86 (1996); A. Ciccone, "Agglomeration effects in Europe", European Economic Review 46 (2002); P. Rice and A.J. Venables, "Spatial determinants of productivity: analysis for the regions of Great Britain", CEP Discussion Paper #642 (July 2004).

2.5 Conclusion

Terminating the rail line west of Stewart Avenue clearly provide a net community benefit, while continuing with the current railway service post a net cost to the community. Although the extent of benefits from the preferred railway option is influenced by risks, the sensitivity analyses show that the benefits from this investment still outweigh costs.

The costs of the preferred rail option will outweigh the benefits if GPT does not proceed with its investment, however, the NPV will still be higher than the retain the rail option under this scenario. However, if GPT proceeds with its investment but the University of Newcastle does not proceed with its investment, the costs of the preferred rail option will outweigh the benefits and the NPV of the preferred option would be less than the retain the rail option.

Thus, based on quantifiable benefits for NSW, the preferred rail option would only be a positive investment of community funds if the University proceeded with its major city campus development as a result of the rail lines removal. We note however there are a number of significant local benefits that will accrue as a result of the removal of the rail line to Wickham that can't be measured because of transfer effects at the state level.

Important society-wide non-quantifiable benefits of the preferred rail option will also occur regardless of the University or GPT developments, including the facilitation of a more integrated CBD, higher agglomeration of economic activity in the CBD, positive signal to investors, congestion relief and better traffic access, higher and better land use of those abutting the railway corridor and prevention of externalities associated with noise and high greenhouse gas emission per capita from low rail line utilisation.

As such, we recommend that the proposed termination of the Rail west of Stewart Avenue should be further investigated as the potential benefits may exceed the costs and may provide a better economic outcome than retaining the rail in its current position.

Appendix A CBA.

A.1 Retain Rail Line Option

Retain Rail Line Option - Indicative Cost Benefit Analysis **Appendix A1**

	Year 0	Year 1	Year 2	Year 3	Year 5	Year 10	Year 15	Year 20
Cost								
Constuction	-	-	-	-	170,000,000	-	-	-
Ongoing	13,416,246	13,416,246	13,416,246	13,416,246	13,416,246	17,888,328	17,888,328	17,888,328
Total	**13,416,246**	**13,416,246**	**13,416,246**	**13,416,246**	**183,416,246**	**17,888,328**	**17,888,328**	**17,888,328**
Benefits								
Rail operating revenue	8,059,853	8,059,853	8,059,853	8,059,853	8,059,853	10,746,471	10,746,471	10,746,471
Total	**8,059,853**	**8,059,853**	**8,059,853**	**8,059,853**	**8,059,853**	**10,746,471**	**10,746,471**	**10,746,471**

Retain Rail Line Option CBA Base Case Scenario

Discount Rate	7%
PV Costs	285,791,288
PV Benefits	103,637,807
NPV	-182,153,481
Benefit Cost Ratio	*0.36*

Retain Rail Line Option CBA Excluding Stewart Avenue Overpass Scenario

Discount Rate	7%
PV Costs	234,482,937
PV Benefits	103,637,807
NPV	-130,845,130
Benefit Cost Ratio	*0.44*

Retain Rail Line Option CBA Higher Discount Rate Sensitivity Analysis

Discount Rate	10%
PV Costs	231,194,165
PV Benefits	81,242,019
NPV	-149,952,145
Benefit Cost Ratio	*0.35*

Retain Rail Line Option CBA Lower Discount Rate Sensitivity Analysis

Discount Rate	4%
PV Costs	361,868,417
PV Benefits	136,680,338
NPV	-225,188,079
Benefit Cost Ratio	*0.38*

A.2 Preferred Rail Option

Preferred Rail Option - Indicative Cost Benefit Analysis **Appendix A2**

	Year 0	Year 1	Year 3	Year 5	Year 10	Year 15	Year 20
Cost							
Constuction	600,000,000						
Ongoing	8,944,164	8,944,164	8,944,164	8,944,164	8,944,164	8,944,164	8,944,164
Total	**608,944,164**	**8,944,164**	**8,944,164**	**8,944,164**	**8,944,164**	**8,944,164**	**8,944,164**
Benefits							
Rail operating revenue		5,373,235	5,373,235	5,373,235	5,373,235	5,373,235	5,373,235
Employment gains in retail	-	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000
Decline in crime rates around Hunter Street Mall from more active retail precinct*		62,500	62,500	62,500	62,500	62,500	62,500
Savings of households from shorter travel time to a shopping centre	-	502,492	502,492	502,492	502,492	502,492	502,492
Tourism revenues	-	50,000	70,000	100,000	100,000	100,000	100,000
Employment gains at UoN	-	14,500,000	14,500,000	14,500,000	14,500,000	14,500,000	14,500,000
Study fee revenue from additional international students	-	5,200,000	15,600,000	26,000,000	26,000,000	26,000,000	26,000,000
Retail & services revenue from additioanal international students		2,500,000	7,500,000	12,500,000	12,500,000	12,500,000	12,500,000
Additional student accommodation revenue	-		3,120,000	3,120,000	3,120,000	3,120,000	3,120,000
Salary gains from increased University enrolments	-	-	1,500,000	3,000,000	6,750,000	6,750,000	6,750,000
Salary gains from improved Law curriculumn	-		1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Savings to travellers from removal of level rail crossings		2,669,000	2,669,000	2,669,000	2,669,000	2,669,000	2,669,000
Total	**-**	**50,857,227**	**71,897,227**	**88,827,227**	**92,577,227**	**92,577,227**	**92,577,227**

Preferred Rail Option CBA Base Case Scenario

Discount Rate	7%
PV Costs	657,662,397
PV Benefits	821,037,067
NPV	163,374,671
Benefit Cost Ratio	*1.25*

Preferred Rail Option CBA Higher Discount Rate Sensitivity Analysis

Discount Rate	10%
PV Costs	622,809,885
PV Benefits	629,135,891
NPV	6,326,006
Benefit Cost Ratio	*1.01*

Preferred Rail Option CBA Lower Discount Rate Sensitivity Analysis

Discount Rate	4%
PV Costs	702,402,184
PV Benefits	1,104,787,571
NPV	402,385,388
Benefit Cost Ratio	*1.57*

CBA Excluding University of Newcastle Investment Scenario

Discount Rate	7%
PV Costs	657,662,397
PV Benefits	284,115,289
NPV	-373,547,107
Benefit Cost Ratio	*0.43*

Preferred Rail Option CBA Excluding GPT Investment Scenario

Discount Rate	7%
PV Costs	657,662,397
PV Benefits	617,424,155
NPV	-40,238,241
Benefit Cost Ratio	*0.94*

Source : Urbis