Karen

FINANCE - IN - CONFIDENCE

CAPITAL METRO: GUNGAHLIN TO CIVIC LIGHT RAIL LINK

FUNDING AND FINANCING

PRINCIPLES, FRAMEWORK AND MODEL

Discussion Draft

Not for Circulation

Chief Minister's and Treasury Directorate

July 2013

Contents

Tables and Figures

EXECUTIVE SUMMARY

The Government has committed to establishing a light rail link for the Gungahlin to Civic transport corridor. The economic assessment of the project was completed in 2012 and compared Light Rail Transit (LRT) to a Bus Rapid Transit (BRT) option under a number of land use settings. It concluded that the benefit to cost ratio for BRT is around twice of the ratio for LRT.

Both the options, as analysed in the assessment, require public subsidy. This is not unusual; public transport projects are rarely self-funding. With limited budget capacity, the project will need to be funded through borrowings and increased taxation.

Viewed as a transport project, BRT will remain a more attractive option compared to LRT due to its relatively lower costs. A survey undertaken in 2012 indicates strong recognition of the need for a BRT or LRT link, but support for LRT drops significantly, and below BRT, due to costs.

It is clear the Government has envisaged much higher economic benefits from the LRT option. Analysis in this Paper highlights those benefits are real and realisable financially. Viewed as a public transport project, those benefits have not been captured in the economic assessment, or have received attention in public discussion. Indeed, public discussion has been shaped by BRT being a less costly transport link between two nodes, rather than delivering lesser economic benefit in the development of the transport corridor. Infrastructure Australia (IA) also appears to have viewed the project in similar terms, despite its submission under *Transforming Our Cities* category.

The project needs to be viewed differently – as an integrated land use, transport and planning policy project. High level analysis in this Paper indicates that real economic benefits of a project encompassing infrastructure investment and corridor development are significantly higher, in the order of 3 to 4 times the costs. Those benefits accrue in the form of increase in overall land value from densification, amenity and access.

Capture of land value uplift as an option to fund public infrastructure has been the focus of much attention and discussion recently. Although some jurisdictions have been investigating this approach, prospects of practical implantation are low.

The Territory, however, is in a unique position to capture land value uplift. It has the necessary and sufficient enablers:

- institutional arrangements with combined state and local government functions and access to land as a broad base for taxation;
- land tenure under leasehold system which is more conducive to betterment capture;
- taxation instruments specifically designed to capture land value uplift from planning decisions and public investment in infrastructure; and
- a progressive, broad based land tax with increasing marginal tax rates being established under taxation reform.

This Paper provides a framework for the capture of land value uplift, and a model for its implementation. The model has been tested under a range of assumptions on dwelling prices, building heights, footprints, plot ratios, open urban space, and dwelling sizes. These are but few of the tangible variables that would determine the quality of urban design, and its amenity, desirability, sense of 'place', and its contribution to more efficiently functioning communities and economy.

The Paper has not sought to determine urban planning. What it highlights is that, broadly, under the current planning policies, there are considerably higher economic benefits than have been captured in the business case so far. If pursued through investment in infrastructure, and captured properly, those benefits could be sufficient to fund the project. In addition, benefits of any strategic planning policy changes need to be captured early.

This is fundamentally different from selling land at one of the nodes (for example, the Exhibition Park) to fund the project. Such an approach will continue to frame the project as a transport link with its inevitable counterfactual of a lower cost option. Relocation of Exhibition Park and its conversion to a residential estate may indeed be desirable from a planning perspective. However, care should be taken in assuming that financial returns could fund the project. Experience with brownfield developments suggests site preparation and infrastructure costs could subsume substantial part of the returns. Planning outcomes and amenity may need to be compromised in turn.

The framework is quite different from Tax Increment Financing (TIF) as utilised in the Unites States. TIF has been preferred by the Property Council of Australia as means of funding infrastructure, although its application in the Australian context is as yet undefined. It is possible to highlight some concurrence between land value uplift capture and TIF, noting that both seek to direct growth benefits of urban development towards funding the infrastructure. The incidence of taxation, however, is fundamentally different. Property industry's opposition should be expected and will need to be managed.

It is noteworthy the land value capture benefits have been estimated at $2 million over 30 years. The project needs to be redefined and framed differently to highlight its relevance, as a first step, to urban development and a better functioning economy for the future. The business case needs to be revisited. This is not unusual for large and complex projects – scopes need to be refined, and sometimes, redefined – business cases develop iteratively. Indeed, this was the case for Majura Parkway project.

The business case is as yet incomplete in any event. It requires economic impacts analysis (a partial and indicative analysis has been undertaken for this Paper), a financial feasibility analysis and a funding plan. This is not a criticism of the decision or its underlying process – again, it is not unusual for strategic decisions to be taken, followed by business cases being completed.

The additional work is essential in framing the project in accordance with Government's intention (as apparent through statements by Ministers), and gaining not just general acceptance but desire for the project in the wider community. It will also assist in seeking support from Infrastructure Australia. The project is not contingent upon Commonwealth funding. However, its support, even if symbolic, will be of significant benefit in shaping the public discussion on the

project. This work can be undertaken at a relatively minor cost with the analysis undertaken for Stage 2 Business Case forming a useful base.

For the delivery of the project, partnership with the private sector needs to be considered carefully. It would be beneficial to convey to the market what the Government expects and let it respond, rather than letting it determine the form of the partnership. Objectives of the partnership should be defined and agreement sought from Government in advance of approaching the market. For the purpose of analysis for this Paper, some assumptions have been made on the nature of partnership. An operator led consortium, acquisition of the asset following reasonable time after completion, equity injections during the construction phase linked to milestones, retention of patronage risk by the public sector, provision of financial incentives to increase patronage are some key features.

Finally, it should be noted that this Paper suggests a strategy for funding to be pursued which has been tested to provide a 'proof of concept'. It should not be viewed as a funding plan. That would require considerable further work following Government's decisions on project definition, governance and objectives of partnership with the private sector.

1. INTRODUCTION

1.1 Background

The ACT Government has committed to building a light rail link between Gungahlin and Civic as part of its 2012 Election policy platform.

Prior to this commitment, a number of studies were undertaken to assess the economic cost-benefit of various options for the transport link[1], a concept design that formed the basis of costings and economic analysis[2], and stakeholder survey[3].

The ACT Government made a submission to Infrastructure Australia in August 2012 to seek support and funding for planning and design studies. The rail link's construction, however, is not contingent upon funding being provided by the Commonwealth Government[4].

To deliver the project, Capital Metro Office has come into operation from 1 July 2013. The Agency (and its predecessor, the Project Office) is to *coordinate* delivery of transit corridor projects and corridor redevelopment opportunities[5]. The Government has agreed to an Advisory Board being established for this project.

Further decisions will be required to develop the scope of the coordination role of the agency, and establish its responsibility, accountability, administrative powers, and its relationship with the range of other government agencies – in other words, more detailed governance arrangements. Those decisions will in turn be influenced by the scope of the 'project' and considerations of funding and financing.

1.2 The Business Case

The economic assessment of the light rail link for the Gungahlin to Civic transport corridor was completed in 2012 and compared Light Rail Transit (LRT) to a Bus Rapid Transit (BRT) option under a number of land use settings including a business as usual, low additional densification and medium additional densification settings respectively.

The study also analysed a staged bus to LRT option under business as usual and low densification scenarios.

---

[1] *Northbourne Avenue Rapid Transit Corridor Stage 2 Business Case*; Deloittes Touche Tohmatsu (Unpublished); March 2012.

[2] *City to Gungahlin Transit Corridor: Concept Design Report*; URS Australia; April 2012.

[3] *Results to a series of questions on the City to Gungahlin Transit Corridor*; Winton Sustainable Research Strategies; May 2012.

[4] Any funding will essentially be symbolic as (a) the amount of funding is unlikely to be significant compared to the overall project cost, and (b) unless the funding is excluded from the Commonwealth Grants Commission's assessments, it will be offset through adjustments to ACT's relativity for distribution of the GST Revenue Pool. Notwithstanding, any funding or even an in principle support is of significant benefit in establishing a financial case for the project. This is discussed in further detail later in this report.

[5] *Gungahlin to City Transit Corridor Project Update 3*; ACT Government; September 2012.

Of the multitude of combinations of options and scenarios analysed, two scenarios have been discussed publically and are relevant at this stage: the business as usual scenario and a scenario of higher residential population and employment, as described below:

- **Business as usual scenario**: assumes population projections at the normal growth of the corridor population based on the ACT Government's official population projections.
- **Higher density scenario**: assumes a higher rate of population growth within the corridor with 38 per cent more people and 21 per cent more employment by 2031. This is in line with the ACT's total population projections and the ACT Planning Strategy. The increased development is considered to be within the provisions of the existing Territory Plan and the recent Master Plans for Dickson Group Centre and Gungahlin Town Centre[6].

Table 1.1 below summarises the results of the economic cost-benefit analysis.

Table 1.1: Summary of Economic Assessment

	Bus Rapid Transit		Light Rail Transit	
	Business as Usual	**Higher Density Scenario**	**Business as Usual**	**Higher Density Scenario**
Benefit to Cost Ratio	1.98	4.78	1.02	2.34
Capital Cost	$279 million		$615 million	
Cashflow	($229 million)		($579 million)	

Two salient points from this table need to be discussed: first, the significant difference between the measures for LRT from BRT, and second, the negative cashflow for both the options with the (negative) cash impact of LRT being around 2½ times higher than the BRT.

Following a decision on the preferred option, the alternative option(s) should in principle be no more relevant in the implementation phase. Reference to the BRT option, however, is quite pertinent at least in the early stages of a project delivery strategy being developed.

Both the options, as analysed in the assessment, require public subsidy. The relatively larger funding requirement for the preferred option means that how general taxpayers value and compare the options becomes important. While properly designed Contingent Valuation studies are complex[7], some sense of the valuation can be gained from the results of the survey of Canberra community conducted in April-May 2012.

---

[6] ibid.

[7] The 'value' of goods and services that are not traded in the marketplace can be obtained by estimating preference parameters as "revealed" through people's behaviour relating to the good (or service), or through "stated" preferences for the good. The valuation estimate is contingent upon the information being provided to the respondents on the details of the "constructed" market, hence called "Contingent Valuation". Other terms such as, binary discrete choice, choice experiment etc. are also used to derive the economic value from stated preferences information. For an overview of theory and applications of such methods, see for example, Carson R T and Hanemann W M *in Handbook of Environmental Economics, Vol. 2* (eds Maler K G and Vincent J R); Elsevier, 2005.

The survey asked for the preferred mode for the corridor before and after providing information on costs of the two options. Table 1.2 below summarises the results of the survey.

Table 1.2: Survey Results

	Preferred Mode	
	Before Cost Information	After Cost Information
Light Rail Transit Option	68.5%	45.8%
Bus Rapid Transit Option	24.3%	46.5%
Neither	3.5%	5.7%
Unsure	3.7%	2.0%

The survey results highlight that around 93 per cent of the people recognise the need for either BRT or LRT, and more than two thirds of the people (68.5 per cent) prefer LRT before the information on costs is provided.

The support for LRT, however, reduces significantly once the cost information is provided with almost one third of the support shifting away to BRT option. In fact, support for BRT becomes marginally higher than LRT at 46.5 per cent compared to 45.8 per cent respectively.

Care should be taken in drawing conclusions on the economic value derived from this survey[8]. It is however reasonable to conclude that (a) a significant proportion of the people do not see the benefits of the LRT option accruing to them, or are not willing to pay for the costs involved, and (b) a financial case (further to an economic case) for LRT needs to be made.

1.3 Purpose and Scope of the Paper

Typically, business case for a project includes, apart from an economic cost-benefit analysis, a financial feasibility and funding plan among other information (such as, risk assessment and delivery options and methods).

It is also not unusual for decisions to be made on the basis of economic cost-benefit analysis, with further work focusing on the preferred option. Invariably, with such approach, the preferred option is developed iteratively as further information becomes available.

This paper supplements the economic analysis with a financial feasibility and funding[9] plan. The main question the paper seeks to address is: *how is the project to be funded?*

[8] While providing useful information, the survey was not constituted for Contingent Valuation of options and/or ascertaining Willingness To Pay (WTP). It is also unclear what, if any, information was uniformly available to respondents on the range of economic benefits quantified.

[9] It is useful to distinguish between 'funding' and 'financing'. The two terms are often used interchangeably in public discussions, and as such can be source of considerable confusion. The term funding refers to how the infrastructure is paid for. The term financing refers to how funds are raised for the delivery of the infrastructure. The former relates to incidence of costs, and the latter to the mechanism(s) through which costs are met.

The Paper explores capture of economic benefits external to the project as a funding source. The concept is tested from a practical perspective of the Territory's revenue instruments and administrative systems.

A framework is developed to estimate the benefits and the tools and mechanisms to capture those benefits into financing stream(s).

As a 'proof of concept' the Paper includes high level, but reasonably robust, modelling on whole of life costs (capital, services, maintenance and financing) and revenue streams from 'value capture'.

Practical implementation of this framework, and indeed the delivery of the project in any form, require decisions on project scope, governance, financing, risk management, and risk allocation. More broadly, decisions on the form of partnership with the private sector and engagement with stakeholders are necessary.

The paper and its modelling make a number of assumptions in these regards. Those are discussed in reasonable detail to highlight contingent decisions, but also to assist with scoping and developing advice to Cabinet for those decisions.

The paper is focused on developing a framework and implantation model not only from first principles but also from practical considerations. With regards to private sector involvement, its discussions, however, are not mediated through forms and structures of financing and contracts. This allows discussions and decisions on policy objectives and how they can be achieved, which can be lost in technical jargon understandable only to specialists.

This is not just a difference in how information is presented – although that is one of the principal benefits of this approach – but a different approach to partnership with the private sector.

It asks the question *what is required for the most efficient and effective delivery of the project?* rather than *what contract forms are currently in the private sector that can be utilised?* Each major project is different; has its own complexities and challenges; and needs to meet the expectations of its stakeholders. The former approach allows for innovation and new consortia to be formed. The latter accepts what is already being done, but may not perhaps be the best solution.

1.4 Structure and Organisation of the Paper

Section 1 (the current section) has sought to draw out the key issues and scope of the paper.

Section 2 provides a summary of the approach and methods adopted for analysis.

With limited budget capacity, traditional approach to funding capital works projects can not be adopted. The project needs to be funded differently. Section 3 develops a value capture framework for this project.

A funding plan for a project is determined by the scope and nature of the project, which in turn will influence its governance and delivery. Section 4 discusses these inter related issues on which high level decisions are required.

Sections 5 to 8 develop a funding model based on the value capture framework. A realistic funding model requires a robust estimation of costs. Of necessity, this entails assumptions on how the project is to be delivered, and how the infrastructure and services are to be maintained. It is certain that private sector will be involved in the delivery of the project. The nature of involvement of the private sector has an impact on financing and ownership of the project.

Section 5 discusses a framework for considering private sector involvement. The discussion in this part not only provides assumptions on costs but should also assist with advice to Cabinet for its consideration of policy objectives in a partnership with the private sector.

Section 6 outlines whole of life costs, and Section 7outlines land value uplift capture model for the corridor, based on the current ownership and property valuations. Section 8 provides a summary of results, and discusses the reasonableness of assumptions that may be implicit in the model, and the implications of its outputs.

2. APPROACH AND METHODOLOGY

The Paper is primarily concerned with developing strategy for funding the project. Its general approach is empirical, based on the work previously undertaken, albeit, underpinned by conceptual foundations.

Where necessary, the existing information has been tested, questioned and/or supplemented. This approach is adopted to ask what is the 'project' that needs to be funded and what are the appropriate and effective funding methods. Feasibility of funding models and methods is assessed conceptually, and from the practical perspective of capacity, and willingness to pay.

The paper has made a number of assumptions on project definition, funding strategy and governance. In essence, the project is assumed to be an integrated land use, transport and planning policy project for urban development along the corridor supported by investment in transport infrastructure.

A fundamental assumption is made in this regard that infrastructure investment creates new "assets" along the corridor.

The economic assessment undertaken in the Stage 2 Business Case is supplemented, with a partial economic impact analysis, which is limited to potential economic benefits that can be captured through revenue instruments available to the Territory.

The key strategy adopted is for the capture of land value uplift arising from public investment in infrastructure. This follows from the principle that any windfall gains from planning decisions or public investment should accrue to the community. In this case, they are directed toward funding the infrastructure.

Modelling on current and potential land values after the investment is based on the actual block level information along the corridor. In turn, this has been used as a proxy for the secondary area further away from the tracks.

Increase in the value of land is estimated through hedonic model of price with land value derived as a residual. Average dwelling prices are assumed at around 20 per cent higher than the average. This may be conservative as such prices are already being achieved.

There is considerable discussion nationally of value capture as a funding source for infrastructure. However, it is argued that a practical implementation in other jurisdictions is unlikely in the near future.

The model has relied exclusively on the existing revenue instruments in the Territory. These are demonstrably sufficient, however, some necessary adjustments have been highlighted.

For simplicity and ease of communication, all prices and costs are in 2013 dollars and future cashflows are not discounted.

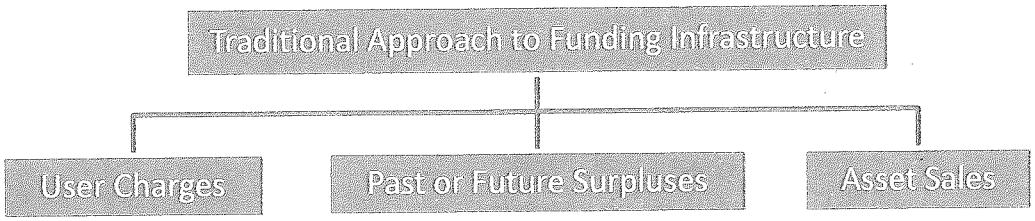
3. WHAT ARE THE FUNDING SOURCES?

3.1 Traditional Approach

Ultimately, there are two sources of funding for infrastructure projects: governments or user charges[10]. The financial costs of $579 million highlighted in Table 1.1 are net of the fare box revenue and land value capture benefits estimated over the assessment period of 30 years. These need to be funded.

A traditional approach to funding public transport or capital works projects could be adopted where the budget will meet the project costs from past and/or surpluses (in the form of cash on the balance sheet or operating budget capacity to meet financing payments), or asset sales, or increased taxation.

Figure 3.1: Traditional Capital Works Funding



While this approach has the benefit of simplicity, it has a number of problems. The balance sheet and operating budget capacities are limited. Opportunities for large scale asset sales are also limited and not without their potential adverse effects.

Financial returns from greenfields land sales would not be sufficient because of (a) the relatively lower yields of estates recently due to environmental and conservation requirements, and (b) the trunk and estate infrastructure costs largely offsetting the raw land sales revenue[11].

Potential revenue benefits from development opportunities in Civic should also be ruled out for a number of reasons. Major investments in infrastructure will be required to give effect to the City to Lake project including road works, aquatic centre and convention facilities.

Any suggestion of "selling" the Exhibition Park to fund the project frames it as a transport project. This in itself may be acceptable although opportunities for corridor development may be

[10] *Infrastructure Finance and Funding Reform*; Infrastructure Finance Working Group; April 2012.

[11] Even at raw land value of $80,000 per dwelling site, around 8,000 dwelling sites will need to be sold. Infrastructure costs will reduce the revenue quite significantly. Further, capacity to fund other infrastructure will be commensurately reduced.

relegated in such an approach. The proposal, however, may not be financially feasible[12]. Such a proposal also needs consideration from a planning perspective.

3.2 Tax Increment Financing

Tax Increment Financing (TIF) has been extensively used in the United States as an infrastructure funding mechanism for districts that are run down, and where developments would not have occurred, or would not have occurred at the same rate or extent but for the TIF scheme[13].

Typical governance arrangement involves issue of bonds with concessional tax treatment and direction of taxation growth to funding the infrastructure.

The Property Council of Australia has commissioned research[14] and argued for the adoption of TIF in Australia[15].

A detailed analysis of TIF is beyond the scope of this paper. There is extensive literature on this subject including individual case studies, as well as econometric analyses. Various studies argue for and against the use of TIF.

The main arguments in favour are that TIF schemes are better than the property charges because of the potential for property charges to be passed on to the home buyers (and the consequent equity concerns), and difficulty with quantifying and forecasting property charges.

Arguments against TIF include that all the growth in taxation being directed towards infrastructure financing leaves no capacity for other services, and that such growth would have occurred in any case. There is evidence that the non-TIF areas of municipalities that use TIF grow no more rapidly, and perhaps more slowly, than similar municipalities that do not use TIF[16].

---

[12] The concept has recently been foreshadowed in public hearings of the Select Committee on Estimates for the 2013-14 Budget, and discussed in the media. Financial feasibility of this proposal to fund the project does not appear to have been undertaken. Using the financial analysis of the Eastlake estate development as guide, it is reasonable to conclude that financial returns from land release would largely be utilised for the estate infrastructure. Density will need to be increased considerably for any substantial returns, which in turn may raise planning policy questions.

[13] See for example, *Spillovers from Tax Increment Financing Districts: Implications for Housing Pricing Appreciation*; Weber R, Bhatta S and Merriman D; Regional Science and Urban Economics, Vol. 37; 2007.

[14] *Tax Infrastructure Financing to Fund Infrastructure in Australia*; PriceWaterhouseCoopers; 2008 (Draft, Not Published).

[15] Submission by Property Council of Australia to Infrastructure Australia; October 2008.

[16] *Tax Increment Financing: A Tool for Local Economic Development*; Dye R and Merriman D; Land Lines, Vol. 18; 2006. The authors argue that TIF should be used with caution, as after all it is merely a financing mechanism that does not change the opportunities for development or the skills of those doing the development planning.

3.3 Value Capture Approach

Infrastructure Australia has recommended that Governments should utilise appropriate models to drive revenue from the broader benefits delivered by major infrastructure projects, such as value capture from transport infrastructure[17].

Although capture and conversion of economic benefits external to the project involve taxation and user charging instruments, this is a different source and approach to funding.

Investment in public transport infrastructure has benefits that go beyond the direct users. For example, the reduced congestion reduces travel times for other car users and has savings in accident and insurance costs. More broadly, employers will benefit if 'on the clock' or work related travel times are reduced.

Such benefits are captured in an economic cost-benefit analysis. Their direct capture through financial instruments is difficult, as the benefits are external and there are sound arguments for general taxation to be adopted as the benefits are broad and not limited to a particular group.

In addition to the above benefits, it is well recognised that proximity to transport infrastructure has the benefit of increasing property values[18]. Some studies provide statistically significant evidence of residential property price increases of up to 25 per cent[19].

Capture of land value uplift has been increasingly foreshadowed in the recent years as a potential source for funding infrastructure. While conceptually sound, its practical realisation has been somewhat problematic.

Obviously, establishing whether there is an uplift in land values and quantifying the uplift are prerequisites to designing and implementing mechanisms to capture the uplift. Practical implementation of the concept requires information in advance and after implementation[20].

---

[17] Recommendation 5 in *Infrastructure Finance and Funding Reform*; Infrastructure Australia; April 2012.

[18] For comprehensive reviews, see *Land value and public transport stage 1—Summary of findings*; RICS Policy Unit, Royal Institute of Chartered Surveyors; 2002; *The impact of railway stations on residential and commercial property value: a meta-analysis;* Debrezion G, Pels E, and Rietveld P; Journal of Real Estate Finance and Economics, Vol. 35; 2007; and *Financing transit systems through value capture: An annotated bibliography;* Smith J and Gihring T, American Journal of Economics and Sociology Vol. 65 (3); 2006. Together, these provide major reviews of more than a hundred studies on the impact of public transport on property values.

[19] See for example, *Assessing the impacts of urban rail transit on local real estate markets using quasi experimental comparisons*; Cervero R and Landis J; Transportation Research Part A: Policy and Practice, Vol. 27, 1993; *Impacts of commuter rail service as reflected in single-family residential property values*; Armstrong R; Journal of Transportation Research Record, Vol. 15, 1994; *Transit's value-added: effects of light and commuter rail services on commercial land values*; Cervero R and Duncan M; Proceedings of the 81st Annual Meeting of the Transportation Research Board; Transportation Research Board, Washington DC; 2001.

[20] For a discussion of implementation issues in the context of Scotland, see *Developing a Methodology to Capture Land Value Uplift around Transport Facilities*; Transport Research Planning Group; Scotland; 2004.

This, however, is not the only difficulty. Institutional and administrative arrangements in Australia generally militate against the capture of land value uplift[21].

Governments at the Federal and State level do not have ready access to a broad based land tax instrument. This is available to Local Governments where it is used to fund municipal services through generally single/flat tax rates. Finally, there is entrenched resistance to "taxing the family home" notwithstanding the inequitable and unfair taxation based on housing tenure.

3.4 Land Value Capture Framework for ACT

3.4.1 Institutional and Administrative Enablers

The ACT is in quite a unique position among the Australian jurisdictions because of a number of factors which make it an ideal place to implement arrangements for the capture of land value uplift arising from transport facilities.

The Territory has combined state and local government functions, giving it access to a broad based land tax base not available to other jurisdictions[22].

Land tenure in the Territory is leasehold which gives a recognition to, and framework for, the recovery of any windfall gains from the grant of privileges and rights to the use of land.

The principle is given practical effect through Lease Variation Charge (LVC) as a taxation instrument to recover part of the betterment value for application to 'common good'. The system was reviewed in 2010 and a number of reforms were introduced to improve the transparency and efficiency of the system.

From the view point of capture of land value uplift, the principal reform was the adoption of market value of land as the basis for estimating the betterment, exclusive of any other charges and costs.

The ACT commenced its long term taxation reform in the 2012-13 Budget. The main element of the taxation reform is to establish land as an efficient base for taxation to replace a number of inefficient and unfair taxes. Specifically, General Rates system has been adopted as a progressive revenue replacement base, with the introduction of increasing marginal tax rates for tax brackets based on land values[23].

In summary, the unique institutional arrangements of the ACT, and its taxation system following the reforms introduced in the recent years, is very well suited to introducing capture of land value uplift. Further, as discussed below the light rail project supporting the development of the corridor is an ideal candidate for such an approach.

---

[21] It could be argued that some capture already occurs in Australia through the existing taxation systems. The extent of such capture is limited and not uniformly applied to all property holders in any case. Land tax, which typically is applied under increasing marginal tax rates with increasing property values does not apply to principal place of residence.

[22] For an overview and analysis of the Territory's taxation system, see *ACT Taxation Review* Report; 2012.

[23] *A fairer, simpler and more efficient taxation system: 5 Year Reform Plan*; Australian Capital Territory; 2012.

3.4.2 Principles and Outline of the Framework

Recognising the existence of the necessary administrative arrangements and enablers, developing a framework is a relatively straightforward task. In principle, the framework should incorporate:

a. simplicity: reasonably simple and effective approach to estimating increase in land values;

b. exclusivity: isolation and exclusion of growth that otherwise would have occurred;

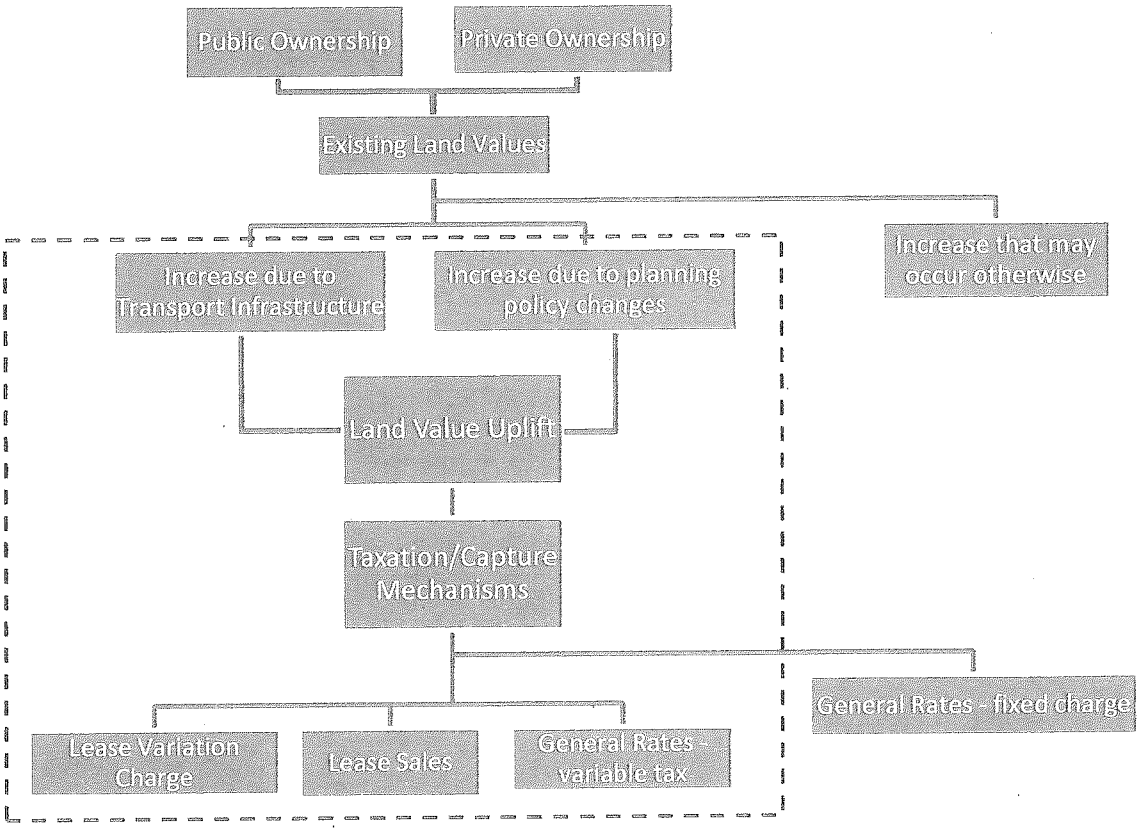
c. attribution: direct linkage between growth in property stock and values and investment in transport infrastructure and changes in planning policies;

d. predictability: ability to forecast revenue from growth in corridor for reasonable budget management; and

e. service capacity: that adequate revenue is retained to maintain capacity for service delivery to the increased number of households, rather than it being utilised for infrastructure funding.

These principles in essence address some of the concerns associated with schemes to direct growth benefits to fund infrastructure that supports the growth. Figure 3.2 depicts the framework.

Figure 3.2: Land Value Uplift Capture Framework



4. SETTING UP THE PROJECT

This Section discusses project definition and scoping to enable capture of land value uplift as a funding source. The scope of the project in turn would be a determinant of the governance for the project.

The discussion is structured around priority decisions on project definition, funding and governance. Together, decisions on these questions complete the business case, and set up the project on the path to delivery.

4.1 Project Definition

Perhaps one of the first questions to ask in preparing the business case is *what is the project?* The question does not just relate to the scope of the project; it centres on the framing and public narrative of the project.

As noted in Section 1.2, the project has been assessed and its business case prepared on the basis of it being a transport project. The difficulty with framing it as a transport project is that a relatively lower cost alternative is readily identifiable, that is, Bus Rapid Transit.

While on occasions references have been made to the project's "transformative" nature, it has largely been viewed as a public transport connection between two nodes (Gungahlin and Civic), with ready reference to bus lanes as lower cost options[24].

Public discussion has largely remained focused on the project being a transport solution, and even when questions of density have been raised they have invariably been viewed through the prism of costs and subsidies of the various public transport options, rather than (a) the economic, social and environmental benefits of well-planned urban densification, and (b) the relative merits of the various public transport options in achieving those benefits[25].

In summary, although Government's decision to proceed with the light rail option implicitly recognises its urban development and economic benefits, technical and public business cases for this option are yet to be made[26]. Both are important and mutually supportive of each other.

Technical business case assists in authentication of the project and its validation from third parties such as industry and the Commonwealth government. This in turn assists in a conversation with the community and influence (current and the future) taxpayers' willingness to pay for the project.

---

[24] The project was submitted to Infrastructure Australia (IA) for support in its 2012-13 update to priority list under the theme "Transforming our Cities". It has been assessed as an Early Stage project. In its report to the Council of Australian Governments, the IA has supported "low cost public transport measures such as bus transit lanes along Northbourne Avenue connecting the high growth area of Gungahlin with the Canberra central business district."

[25] *Density debate is overdue*; Stewart J; The Canberra Times; 24 June 2013. Apart from the IA's assessment, this article is a pertinent example of the 'problem' of project definition.

[26] There is considerable empirical analysis demonstrating the considerably higher preferences for light rail for transit oriented development and urban transformation projects.

In the following, it is assumed that the project is established as an *integrated land use, transport and planning policy* project.

It is not unusual for the scope of a large and complex project to be revisited, and the project redefined. In general, this does not involve discarding the earlier analysis; rather, it may simply require an expansion of the analysis at relatively minor costs.

4.2 Governance

Governance is a crucial element in the successful delivery of a project and implementation of funding strategy. It covers not only the roles, responsibilities, powers and accountabilities of individuals and entities involved, but also identifying and communicating with external and internal stakeholders, their involvement in decision making, allocation and management of risks.

Perfect governance is difficult to achieve; suitable governance involves (at least some) balancing of divergent if not conflicting objectives. Unsuitable governance can often be pointed as a cause of project 'failure'.

Links with project scoping and funding strategy are readily obvious – decisions on suitable governance need to be taken in conjunction with decisions on project scope and funding strategy.

A comprehensive analysis of suitable governance arrangements is beyond the scope of this paper. Some key issues are highlighted in the following to assist with developing advice to Cabinet. The Paper in the following assumes that suitable arrangement will be in place to:

a. prepare advice and seek decisions on policy question such as the scope of the project, funding strategy and governance;
b. complete the business case with economic cost-benefit analysis, economic impact analysis, and funding strategy;
c. deliver the project as an integrated land use, transport and planning policy project;
d. establish objectives and seek decisions on engagement with the private sector;
e. manage policy risks, financial risks and operational risks; and
f. manage stakeholders engagement and communication.

4.2.1 Ministerial Responsibility

It is understood that the key policy decisions will be made by Cabinet as a matter of course, and a Sub Committee of Cabinet will provide stronger oversight. The project cuts across a number of portfolios and as such, would benefit from Ministerial oversight being joint by the Ministers for Planning, Transport Policy, Economic Development and Infrastructure.

This may appear unusual, however, is not precluded under the Territory's legislative and financial management frameworks.

Besides being beneficial in resolving a range of divergent issues and developing coherent policy positions as the project is progressed, it gives a strong signal of the uniqueness of the project and its integrated nature.

4.2.2 Role of the Metro Project Office

Some specification of the role of the project office has been provided[27]. This may need consideration and refinement as the project scope and its business case are further developed.

Perhaps the key question at this time is whether the Office is only responsible for the delivery of the project, or if it also has the responsibility for strategic policy questions such as project definition and funding strategy. In turn, the role of central agencies needs to be clarified.

At this stage, the Office appears to have less of a direct responsibility for integration of urban development into the project delivery. Again, this may require further consideration with detailed analysis of alternative options.

4.2.3 Engagement with the Private Sector

The objectives of engagement with the private sector , and the nature of any engagement need to be carefully considered. At this stage, it is unclear where the responsibility for this work and advice rests.

Typically, this would be the responsibility of a policy agency, rather than a delivery arm. This, however, does not preclude the Office being responsible for such matters. The policy/delivery split has some well understood benefits and is usually the preferred basis of allocation of roles. Under suitable circumstances divergences from this normal approach can be adopted.

The Paper in the following assumes a specific form and substance of engagement with the private sector. It is important that Cabinet's decisions are sought on the objectives and form of engagement with the private sector.

4.3 Funding Strategy

In essence, a funding strategy allocates costs across groups of people dispersed geographically and over time. It should reasonably address questions such as *what proportion of the costs should be borne by passengers, other road users and the general community respectively?*; or *what proportion of the costs should be borne by direct beneficiaries of the project?*; and *what are the principles for deferring some costs to the future generations?*

Some of these questions can be the subject of divergent view points and intense debate. While objective analysis from sound social, economic and intergenerational equity principles can be made, ultimately, akin to budgetary considerations, their resolution will require value considerations best suited to the elected Governments.

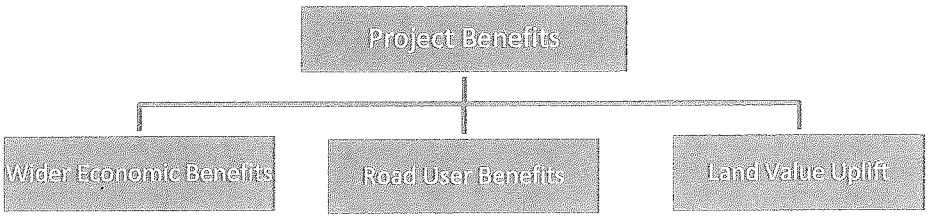
---

[27] *Capital Metro Agency – Roles and Responsibilities*; Capital Metro Project Update 4; June 2013, at http://www.transport.act.gov.au/.

From the perspective of this Paper, and in particular the assumptions required to develop a skeletal funding plan, the key question relates to the share of costs borne by general taxation compared to the capture of land value uplift, in other words, the relative distribution of costs between the general community and the property owners (of today and the future).

Figure 4.1 below depicts the scale (or broad magnitude) of the relative project benefits.

Figure 4.1: Relative Distribution of Project Benefits



Road user benefits include benefits to the user of the light rail service as well as benefits accruing to other road users. Wider economic benefits include environmental benefits and lower health costs. Together, these two constitute around $600 million in benefits[28].

A rough estimate of around $1.8 billion could be obtained for land value uplift for the current planning policies. The relative values of benefits could provide a basis for allocating, say, one quarter of the costs to the broader community through general taxation and the remaining three quarters to property taxation in the corridor.

Changes to land use and planning policies along the corridor will increase the land value uplift further, thereby reducing the costs to the general community.

The above discussion is to illustrate an option to spread part of the costs broadly. For the purpose of modelling in this Paper, it has been assumed that all costs (on a whole of life basis) will be funded through the capture of land value uplift.

[28] This conclusion can be simply drawn from the information in Table 1.1 on the capital costs and benefit to cost ratio.

5. PRIVATE SECTOR INVOLVEMENT

It is certain that private sector will be involved in the delivery of the project. The nature and form of private sector involvement, however, needs to be considered carefully.

5.1 Public Private Partnership (PPP)

A PPP is often the term used where private sector financing is involved. It is, however, quite specific procurement approach and financing mechanism.

Establishing a PPP does not mean that the private sector will fund the project. The public sector will still be required to fund the project through a stream of payments, or grant of time limited or enduring property rights.

This raises an obvious question: *should the private sector be asked to finance the project when the government could do so (borrow) at a lower cost?* The answer is not always in the negative – there may be circumstances where private sector financing, if properly structured, creates incentives for more efficient delivery, and higher financing costs being offset by efficiency benefits.

A more pertinent question is: *does private sector financing provides value for money?* This in turn leads to the question of value add expected from the private sector involvement. This is addressed in the following.

It is useful to note here that the history of PPPs is that of major failures. The precursors to the current form PPPs, the Private Financing Initiatives (PFIs) in the United Kingdom were particularly aimed at "off budget" funding from private sector. This was unrealistic and led to failures of PFIs in the UK.

In Australia, a number of large PPPs were established for roads, which involved either the patronage risk being divested to the private sector, or grant of panning and network controls (as de facto property rights to the private sector), or both.

While each project is different, and each PFI/PPP failure would have its own specific reason, a common thread is unrealistic or unclear expectations by one or both parties. The costs of failure, however, are invariably borne by the public sector, as after all the PPP involves delivery of infrastructure and services that are inherently public.

It is therefore helpful to approach the question of private sector involvement from first principles, rather than through procurement forms and contracts.

5.2 Objectives of Partnership with the Private Sector

In principle, each party in a partnership should contribute what the other party is unable to do, or could not do with same efficiency and effectiveness. A partnership based on mutual strengths is more likely to deliver value for money.

In general, for a public infrastructure project, the objectives of a partnership with the private sector should be:

a. **Innovation**: this is a particular strength in the private sector which can benefit infrastructure design, its delivery and even how services are delivered;

b. **Efficiency**: this not only relates to the delivery of the infrastructure project, but also to the whole of life costs. A properly structured partnership for example can reduce maintenance or service costs through upfront consideration and design;

c. **Risk allocation and management**: this is an area where both private and public sector may bring different abilities and skills, and as such, a partnership could be most beneficial in allocating and managing risks. Paradoxically, this where some of the major PPPs have failed as well. As a general principle, risk should be allocated to the party best able to understand and manage it; and/or

d. **Bundling**: there can be considerable benefits in bundling services with the infrastructure delivery. Those include service delivery considerations being incorporated in design and construction, relatively lower costs of labour and potential scale economies being brought by the private sector. The services to be bundled can range from maintenance of the infrastructure to full service delivery.

The above objectives exclude positions on funding, financing and ownership of the infrastructure. Appropriateness of ownership by the public sector or otherwise, and how the project is financed can be determined once the objectives of partnership have been established.

An often overlooked, and to certain extent underexplored, benefit of public sector's partnership with private sector is the potential for new consortia and partnerships to be formed within the private sector. This may open avenues for creativity and efficiency.

The extent to which such partnerships can be engendered depends on what is asked of the market. Care should be taken to clearly define objectives and outcomes. The market should not expected to do the necessary policy work or second guess government. However, if asked properly, the market can respond with products, services and innovation not readily available "on the shelf"[29].

5.3 Form of Partnership for the Light Rail Project

In the light of discussion in the previous Sections, key elements of potential partnership with the private sector are highlighted below. Once again, the purpose is to make some reasonable assumptions, as well as to draw out issues that should be analysed and discussed for decision making.

Scope: While it has been argued earlier that the project scope needs to be expanded beyond a transport project, contract with the private sector should be kept simple and focus on infrastructure delivery, and any bundling of services. Integration of broader project elements relating to land use, planning and urban development should be undertaken outside contract within the Metro Office, or coordinated by the Office across the relevant government agencies.

[29] A relevant and recent example is delivery National Rental Affordability Scheme. While this has not involved standard form PPPs, the delivery of the Scheme has forged partnerships that previously did not exist. Most notable is the involvement of not-for-profit community housing organisations.

Potential Consortium Partners: With the scope limited to construction and operation of transport infrastructure, the consortium would include firms with expertise in construction and engineering, light rail operator, maintenance of tacks and rolling stock and financial institution. It is important that the consortium is operator led or at least the operator has significant input to design.

Financing: There is a reasonable argument that with its AAA credit rating, the Government's cost of borrowing would be lower and as such the project should be financed by Government[30]. However, other than the penalty provisions in the contract, there will be limited risk and incentive for project delivery on time and budget. Private sector financing has the potential to enforce efficient delivery of the project. Once the construction is complete, the infrastructure could be acquired through Government borrowing[31].

Equity: There would be expectation in the market for some equity injection by the Government. This could be tied to achievement of specific project milestones, and would tie reduction of financial exposure of the private sector to delivery on time and budget. It is reasonable to assume equity contribution at around 20 per cent of the capital cost.

Fare Box Revenue: Based on the experience of road projects, and difficulty with forecasting patronage, there is limited appetite in the market for assuming patronage risk. Should the market be asked, the premium would be quite high. However, with the Government retaining fare box revenue and (its associated risk), there would be no incentive for the operator to pursue increased patronage. There could be benefit in creating an incentive for the operator through sharing of growth in revenue above a particular base level[32].

Under these arrangements, the ownership of the infrastructure would transfer to Government after its completion and once the services have been commenced.

Specific decisions from Cabinet on the form and substance of the private sector involvement will be necessary, and standard processes of market engagement, request for proposals/tenders, public sector comparators, tender assessments and negotiations will need to be followed.

[30] The cost of raising funds for banks has reduced recently and is within 0.2 per cent (20 basis) of the Government costs. It would be unreasonable to expect that the financial institution will finance the project at this margin. Discussions with financial institutions suggest that under current market conditions, margins of 2½ per cent (250 basis points) would be expected.

[31] Maintaining private sector financing beyond construction completion will add around $15 million to annual funding requirement with no additional benefit.

[32] Advice from the Department of Treasury and Finance in Victoria indicates that this approach has been recently adopted in the refranchising of some bus contracts.

6. COSTS TO BE FUNDED

This Section estimates whole of life costs that would need to be funded. It should be stressed that these are broad indicative estimates to establish scale of the funding task. More refined analysis of costs and modelling will be required as the project is progressed.

6.1 Upfront Capital Costs

Upfront capital costs are based on the analysis undertaken by Deloittes for Stage 2 Business Case[33]. Costs have been escalated to 2013 dollars as shown in Table 6.1 below.

Table 6.1: Upfront Capital Costs

Cost Category	2011 Dollars $'million	Annual Escalator	2013 Dollars $'million
Enabling works	28	5.0%	31
Bridges	14	5.0%	15
Separate transit lanes	25	5.0%	28
Median road works	10	5.0%	11
Utilities and drainage	33	5.0%	36
Foot and cycle paths	4	2.5%	4
Signalling	10	2.5%	11
Preliminary Design costs	113	2.5%	119
Below rail infrastructure	102	5.0%	112
Electrical supply	88	7.0%	101
Depots	91	5.0%	100
Fleet	55	5.0%	61
Communications	42	5.0%	46
Total Construction Costs	**615**		**675**

6.2 Replacement of Public Housing Stock

There are 593 public housing dwellings in the corridor. Their replacement costs are estimated at $297 million at $500,000 per dwelling. This analysis simply assumes a cost that needs to be funded. How the stock is replaced and tenants relocated will be subject to policy considerations.

With the price assumed, there should be some capacity to replace part of the stock in the corridor developments.

The modelling assumes all the public housing stock to be vacated at the rate of 40 per cent in the first years, and a further 30 per cent each in the subsequent two years. It is assumed that by the Year 3, all the sites will be available for catalyst developments.

[33] *Northbourne Avenue Rapid Transit Corridor Stage 2 Business Case*; Deloittes Touche Tohmatsu (Unpublished); March 2012.

6.3 Total Capital Costs Requiring Government Financing

Table 6.2 below summarises the total capital costs requiring Government financing.

Table 6.2: Total Capital Costs for Government

	Total $'m	Year 1 $'m	Year 2 $'m	Year 3 $'m	Year 4 $'m	Year 5 $'m	Year 6 $'m
Equity Injection at Milestones	135	0	34	68	34	0	0
Public Housing Replacement	297	119	89	89	0	0	0
Ownership and Debt Transfer	665	0	0	0	0	0	665
Total	**1,096**	**119**	**123**	**156**	**34**	**0**	**665**

Equity injections are assumed at 20 per cent of the total capital cost of $675 million. These are to be provided on the achievement of project milestones in Years 2, 3 and 4 (5 per cent, 10 per cent and 5 per cent, respectively).

The remaining upfront capital costs of $540 million are assumed to be financed by private sector during the construction phase with compounding interest at 2½ per cent above the long term bond rate.

It is assumed the Government acquires full interest in the asset in Year 6 at a cost of $665 million.

6.4 Debt Servicing

Table 6.3 summarises Government borrowing requirements for construction and post construction phases, and annualised debt servicing costs. Equal annual debt servicing payments are assumed over the project life of 30 years, after which the debt is fully extinguished.

Table 6.3: Summary of Debt Repayments

	Total $'m	Annual Payment $'m
Construction Phase Borrowing		
Interest Payment (a)	403	
Capital Repayment (b)	432	
Construction Phase Financing Payments (c=a+b)	*835*	*27.8*
Acquisition and Operating Phase		
Interest Payment (d)	574	
Capital Repayment (e)	665	
Operating Phase Financing Payments (f=d+e)	*1,239*	*49.6*
Total Debt Financing Payments (T=c+f)	**2,074**	**77.4**

6.5 Operating and Maintenance Costs

Annual vehicle kilometres have been estimated at around 700,000 based on an average frequency of 7 services per hour on week days and 5 services per hour for weekends and holidays.

The Stage 2 Business Case included $6.06 per kilometre in operating costs in 2011 dollars[34]. Escalated to 2013 dollars, annual operating costs are estimated at $4.5 million.

Maintenance cost estimates are derived from the light rail business case for Hobart which includes itemised cost estimates for maintenance of existing and new track[35]. Estimates based on maintenance cost per kilometre (for the existing track) and maintenance cost as a proportion of capital cost (for new infrastructure) are similar at around $2 million. Table 6.4 summarises annual operating and maintenance costs.

Table 6.4: Annual Operating and Maintenance Costs

Cost Category	2011 Dollars $'million	Annual Escalator	2013 Dollars $'million
Annual Operating Costs	4.240	2.5%	4.455
Annual Maintenance Costs	1.980	2.5%	2.080
Total Operating and Maintenance Costs	**6.220**		**6.535**

6.6 Total Budget Costs – Cash Outflows

Table 6.5 below summarises total cash costs to budget over the 30-year period, and annual costs in the earlier and final years.

Notably, capital and interest payments are the largest costs. Annual cash outflows are estimated at around $28 million during the construction phase, increasing to $84 million per annum once the project is complete and operational.

Table 6.5: Total Cash Outflows

	Total $'m	Year 1 $'m	Year 2 $'m	Year 3 $'m	Year 4 $'m	Year 5 $'m	Year 29 $'m	Year 30 $'m
Capital Repayments	1,097	21.3	15.7	8.0	6.6	6.9	69.5	73.4
Interest Payments	977	6.5	12.1	19.8	21.3	20.9	7.8	4.0
Service Payments	170	0.0	0.0	0.0	0.0	6.5	6.5	6.5
Total Cash Outflow	**2,244**	**27.8**	**27.8**	**27.8**	**27.8**	**34.4**	**83.9**	**83.9**

[34] ibid.

[35] *Hobart Light Rail Business Case: Optimum Operating Service Models*; Department of Energy and Infrastructure; 2011.

7. POTENTIAL REVENUE STREAMS

This Section describes a land value uplift capture model, and then utilises it to estimate (a) land value uplift, and (b) potential revenue streams, from developments along the corridor length between Dickson and Turner.

7.1 Land Value Uplift Capture Model

7.1.1 Choice of Capture Mechanisms

A framework for capturing land value uplift is described in Section 3.4. The framework is based on utilising existing administrative arrangements and taxation instruments.

This approach has the benefit of familiarity with the revenue raising instruments. Taxpayers expected to fund the project and the broader community will have a ready understanding of the system and the rules that are applicable.

There is a potential downside to using old and well established tax instruments. Over time, they become prone to gaming and exploitation of loop holes. For the capture of at least part of the uplift in land value, this risk is quite significant and will need to be managed actively.

It is possible to devise a new tax under a separate enabling legislation. This approach would have the benefit of alignment with other jurisdictions if and when they decide to pursue land value uplift capture. Although there is considerable interest and activity in this area, its practical implementation like taxation reform is expected to be quite problematic for other jurisdictions.

The uplift is essentially 'windfall' gains for land holders from public investments in infrastructure and services. In essence, capture of land value uplift is a 'betterment' charge. There is a strong philosophical and economic basis for such charges[36].

Their practical implementation, however, is problematic. If properly designed, the charge taxes economic rent, and as such is quite fiercely opposed by asset owners[37]. It is noteworthy that betterment capture schemes have been adopted at various times in the past in other jurisdictions but abandoned due to various difficulties[38].

In summary, although there is considerable discussion and interest, practical implementation in other jurisdictions is unlikely. At best, it may take the form of Tax Increment Financing which is fundamentally different from land value uplift capture.

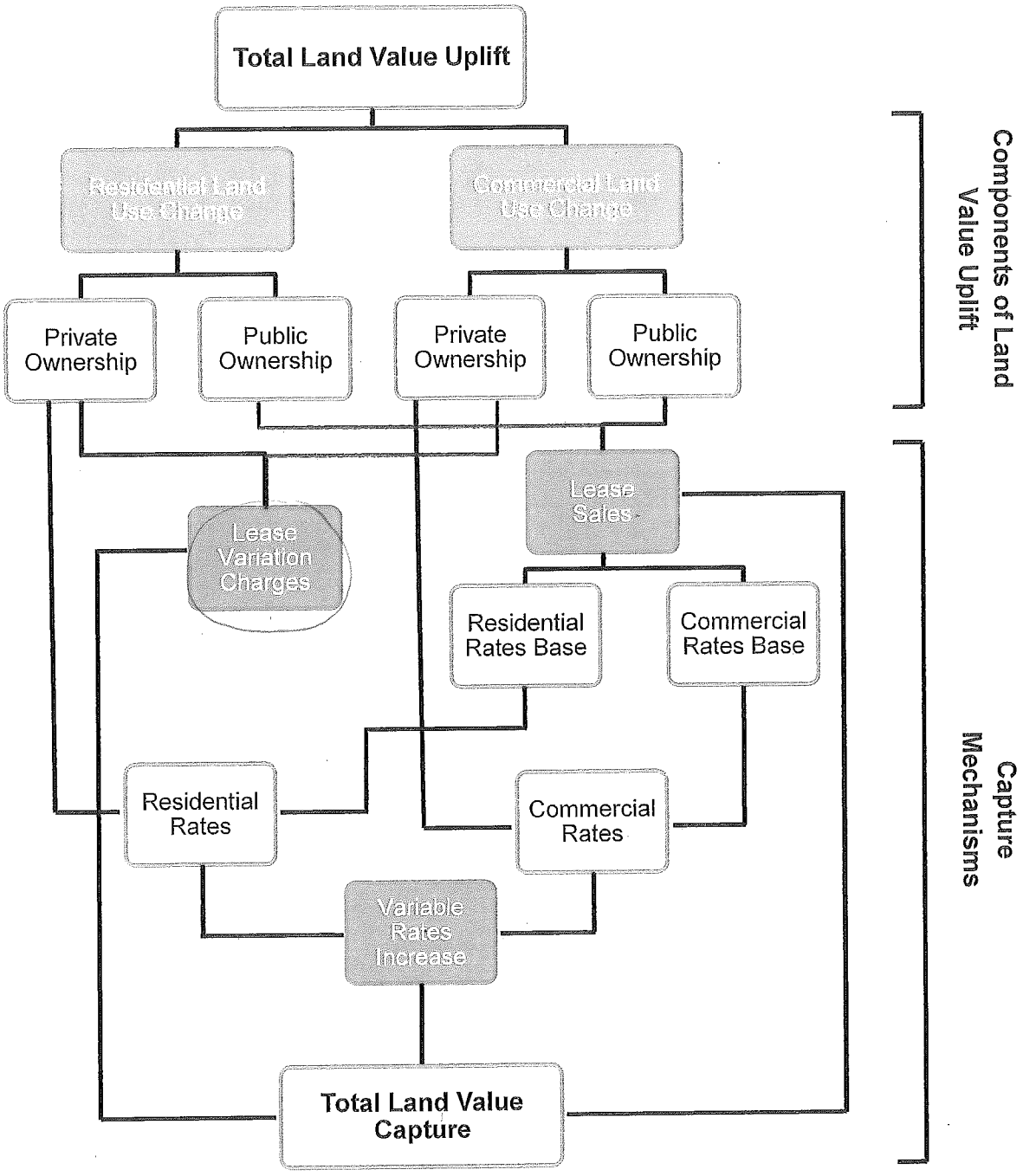
---

[36] For a detailed discussion of betterment charge, see *Final Report on the Review of the Change of Use Charge System in the ACT*; Macroeconomic.com.au; 2010.

[37] At the national level, the introduction of Mineral Resource Rent Tax (MRRT), or the Mining Tax, is a prime example of difficulties encountered in taxing economic rent.

[38] For example, in New South Wales, *Town and Country Planning Act 1945* later incorporated into the *Local Government Act 1919*; in Tasmania, *Local Government Act 1962*, S738, 739; in Victoria, *Town and Country Planning Act* S196K; in Western Australia, *Town Planning and Development Act* S11(2).

Figure 7.1: Land Value Uplift Capture Model



7.1.2 Model Implementation Area

The model implementation area is a length of the corridor along the Northbourne Avenue between Challis Street in Dickson and Braddon. The study area is divided in two parts: the primary study area includes blocks that adjoin either side of the Northbourne Avenue, and the secondary study area extends a block width outwards.

Land information on the primary study area is sourced from ACTMAPi and includes block reference, block size and current zoning. Current values and ownership status are sourced from the revenue systems. This provides a complete set of information to construct a micro model for the current land values, based on the current use under the planning policy, and a potential increase in land values if the number of residential dwellings and commercial Gross Floor Area (GFA) were increased.

The land area and the current land values are disaggregated by ownership. Properties that may not be subject to taxation, such as the ABC station, are excluded from modelling.

The current land value in the primary study area is $331 million. One quarter of the land value, and roughly one third of the land by area in public ownership.

Table 7.1: Current Land Value Estimates by Suburb and Ownership – Primary Area

Suburb	Land Area	Land Value	Private Ownership	Public Ownership
	Sq. m	$'million	$'million	$'million
Braddon	110,143	103	84	19
Dickson	94,310	52	29	23
Lyneham	104,015	65	50	15
Turner	116,309	110	84	26
Total	**424,777**	**331**	**248**	**83**

The information for the primary study area is used as a proxy for the secondary study area, with the exception of ownership status. It is assumed that all land in the secondary study area is privately owned. This is a reasonable assumption for the current purposes. Change in ownership status would affect the mix of revenue but not the overall revenue significantly.

Current land value in the secondary study area is estimated at $255 million, based on a value of $600 per square metre[39].

7.1.3 Estimation of Land Value Uplift

After development land values are derived using a hedonic price model and residual valuation method. A hedonic model of prices decomposes price into its constituent components. For the current analysis, estimated market price of dwellings is decomposed into construction costs, profits and risk premiums on developments, and land values as a residual.

[39] This estimate may appear conservative, and will require further refinement the detailed analysis stage.

Mixed developments are assumed with 15 per cent of the floor space in commercial use. For the commercial floor space, the market value is determined from the capitalisation of potential market rent.

An important question to address in estimating the land value uplift and potential revenue streams is quantum of growth that would have occurred in any case. In principle, this should be excluded from analysis and value capture instruments as it is not attributable to the investment in infrastructure.

It would appear that the base case in the Stage 2 Business Case would readily provide this information. This is, however, an incorrect assumption. The base case in that analysis needs to be revisited[40].

The base case in that analysis was constructed incorporating *some* transport solution. In other words, it was assumed that if either of LRT or BRT options was not implemented, some investment in infrastructure will be made under business as usual. That was a reasonable assumption for the purpose of *that* analysis. However, once a decision has been made to pursue a particular option, that counterfactual does not exist, and the investment under the preferred option encompasses all other possible investments.

The analysis does not seek to disaggregate the premium (or increase in dwelling price) from proximity to light rail. For the study area, this is not necessary. It can be assumed that all, or a substantially large proportion, of the increase in dwellings and commercial floor space would not have occurred if the project is not undertaken. This is a reasonable assumption noting that considerable increase in dwellings is possible under the current provisions of the Territory Plan as highlighted in the Stage 2 Business Case.

Table 7.2: Increase in Dwellings and Land Value – Primary Area

Suburb	Land Area	Gross Floor Area	Dwellings	Current Land Value	Potential Land Value	Land Value Uplift	Project Benefit
	Sq. m	Sq. m	Number	$'million	$'million	$'million	$'million
Braddon	110,143	484,629	4,440	103	634	531	425
Dickson	94,310	414,964	3,802	52	543	491	393
Lyneham	104,015	457,664	4,193	65	599	534	427
Turner	116,309	511,760	4,688	110	669	559	447
Total	**424,777**	**1,869,017**	**17,122**	**331**	**2,445**	**2,114**	**1,691**

While growth in the corridor is contingent upon investment in transport infrastructure, it is reasonable to assume that some redevelopment activity would continue as the stock ages. The model assumes around 20 per cent of the increase would have occurred under normal

[40] There is no in principle reason not to revisit a base case. What may be reasonable counterfactual to consider at a particular stage in a project, may not be relevant at all at a later stage due to change in circumstances, or decisions being made.

circumstances. Around $1.7 billion of the growth in land value in the primary area therefore could be attributed to the project investment.

Table 7.3 below combines the potential increase in land values and dwelling across both the primary and secondary study areas.

Table 7.3: Increase in Dwellings and Land Value – Total Study Area

Suburb	Land Area	Gross Floor Area	Dwellings	Current Land Value	Potential Land Value	Land Value Uplift	Project Benefit
	Sq. m	Sq. m	Number	$'million	$'million	$'million	$'million
Braddon	220,286	726,944	6,216	169	887	718	603
Dickson	188,620	622,446	5,322	108	760	651	545
Lyneham	208,029	686,496	5,870	127	838	711	595
Turner	232,618	767,639	6,564	180	937	757	635
Total	**849,553**	**2,803,525**	**23,971**	**585**	**3,423**	**2,837**	**2,378**

The reasonableness of these estimates and the assumptions underpinning the modelling is discussed in Section 8.

7.1.4 Capture Mechanisms and Revenue Bases

The estimated increase in land value attributable to the project is around $2.4 billion as shown in Table 7.3 above.

A part of this increase is in the value of land in public ownership, largely relating to public housing. Noting that capacity for replacement of public housing stock including land has been factored in the project costs (Section 6.2), it is reasonable to assume that this land can be resumed for lease sales or commercial developments.

Besides the ability to apply the land value increase to project funding, it will serve as a catalyst to development along the corridor. It is not necessary for the private sector partner, the Metro Office or indeed the LDA to undertake the development of public land. The land could be sold on the open market at suitable times with conditions that meet the strategic objectives of the project.

For privately owned land, Lease Variation Charge will be the capture mechanism. The revenue from this source will depend on the timing of developments. Incentives will need to be created as part of the project strategy for developments to occur progressively.

Besides the one-off revenues, albeit potentially spread over a number of years due to the timing of land sales and developments, an increase in the base for General Rates provides enduring source of revenue.

Table 7.4 summarises increase in revenue bases under the frameworks and assumptions of the model.

Table 7.4: Increase in Revenue Bases

Total Revenue	$'million
Lease Sales	575
Lease Variation Charges - Primary Area	880
Residential Sector	*874*
Commercial Sector	*6*
Lease Variation Charges - Secondary Area	542
Residential Sector	*461*
Commercial Sector	*81*
Increase In General Rates Base - Primary Area	1,821
Residential Sector	*1,799*
Commercial Sector	*22*
Increase In General Rates Base - Secondary Area	723
Residential Sector	*578*
Commercial Sector	*145*

7.2 Revenue Estimates

Of necessity, a number of assumptions have been made on the timing of lease sales, developments, infrastructure delivery and land value appreciation. All estimates are in 2013 dollars and undiscounted. As such, they provide reasonable estimate of the total revenue inflow over the project life.

It is assumed that all lease sales are accomplished by Year 10. Land value escalation is assumed to commence in Year 4 as the infrastructure project nears completion, and reach the full value by Year 8. This may be somewhat conservative as there is evidence of land values escalating once infrastructure investments have been foreshadowed.

For General Rates, care should be taken to retain capacity to deliver municipal services to the new households in the corridor. This is incorporated through the exclusion of the fixed charge components in the General Rates estimates. The modelling only includes the variable tax component for the study area.

Table 7.5: Total Cash Inflows Over the Project Life

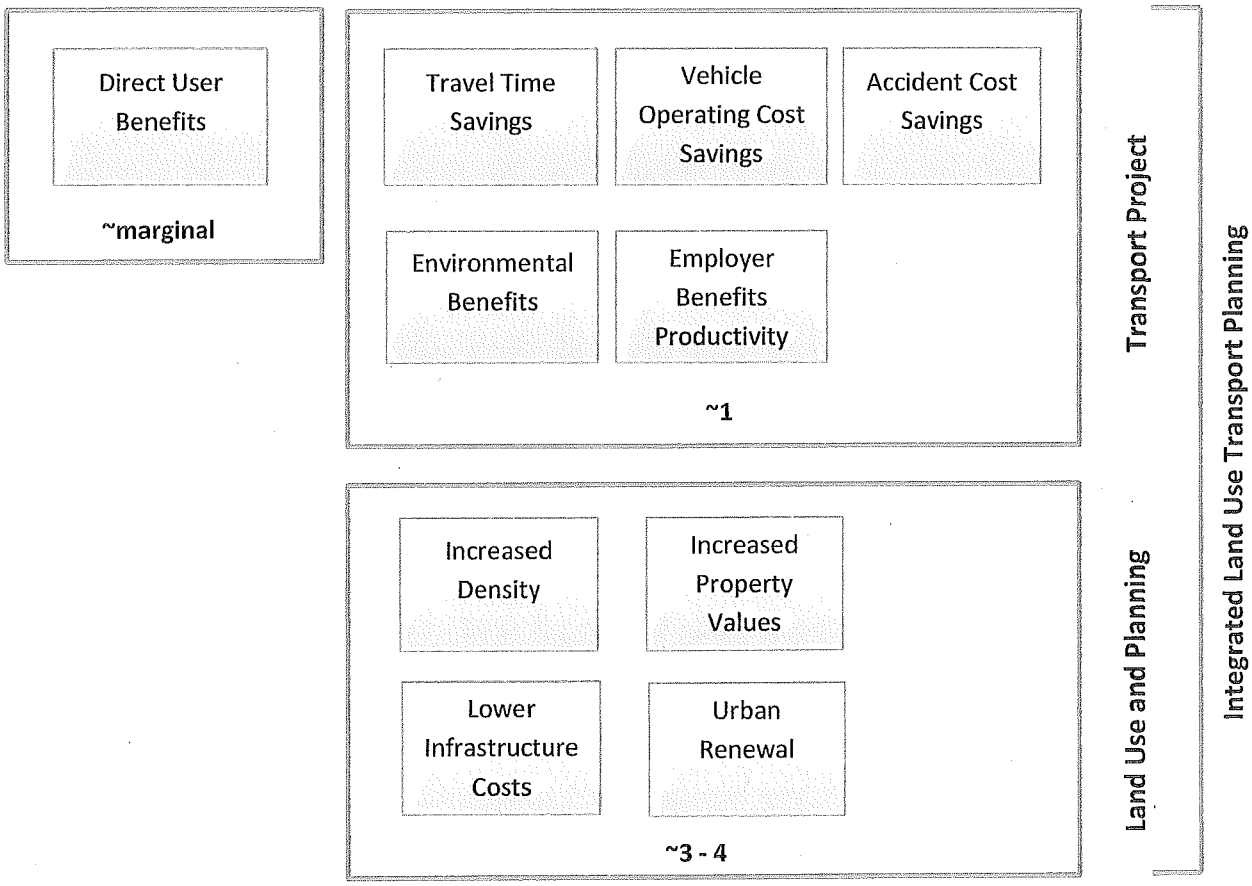
	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 29	Year 30
	$'m	$'m	$'m	$'m	$'m	$'m	$'m	$'m
Lease Sales	575	28.8	57.5	57.5	57.5	57.5	0.0	0.0
Lease Variation Charges	1,422	0.0	0.0	0.0	0.0	26.4	48.1	48.1
Incremental Land Taxation	280	0.0	0.0	0.0	1.7	3.9	11.3	11.3
Fare Box Revenue	26	0.0	0.0	0.0	0.0	1.0	1.0	1.0
Total Cash Inflow	**2,304**	**28.8**	**57.5**	**57.5**	**59.2**	**88.9**	**60.4**	**60.4**

8. CONCLUSIONS

8.1 Summary of Benefits

As a transport project, the economic benefits are roughly in the order of costs. However, as an integrated land use, transport and planning project, the benefits are around 3 to 4 times the costs. Project definition and business case need to be revisited. This is not unusual and indeed consistent with Government's stated objective of the project being transformative.

Figure 8.1: Benefits as a Multiple of Costs



8.2 Summary of Costs and Funding Sources

Table 8.1 below summarises costs and funding sources over the project life. It suggests it is possible to fund the infrastructure from development along a stretch of the corridor. A large part of this development is possible under the current planning provisions.

Further increase in value could be achieved through changes in planning provisions particularly relating to building heights. This is a major strategic decision. It is difficult to increase density

once developments have occurred, except through conversion of commercial space to residential.

Table 8.1: Summary of Costs and Funding

Costs	$'million
Equity Injections in Construction Phase	135
Public Housing Replacement	297
Asset Acquisition	665
Financing Costs	977
Service Payments	170
Total Costs	2,243

Funding Sources	$'million
Lease Sales	575
Lease Variation Charges	1,422
Incremental Land Taxation	280
Fare Box Revenue	26
Total Funding	2,304

8.3 Reasonableness of Assumptions and Estimates

As pointed out in Section 2, the modelling in this Paper is not meant to provide revenue estimates for project or budget management purposes. Its purpose is to provide proof of concept for a funding strategy.

Although the assumptions in this modelling are considered to be reasonably robust, they are subject to update, validation and refinement. A number of assumptions have been discussed earlier to provide some context to the results. Additional key assumptions are highlighted below.

High quality urban development: the developments are assumed to be high quality, with good amenity and creating a sense of place. Building footprints cover 55 per cent of the land. Around 38 hectares of the total 85 hectares of land is assumed to be in public open spaces. This represents just one hectare per 1,000 people. Comparatively, in the Pyrmont-Ultimo zone, planning documents suggest there will be 0.48 hectares per 1,000 people in 2021[41].

Dwelling supply: increase in dwelling supply in the total study area is around 24,000 over the project life. This equates to around 800 dwellings per annum, or just under a quarter of the total dwelling demand. There can be arguments whether this will be a substitution for supply elsewhere. There is also a question whether an equilibrium model is useful in this analysis. It is useful to note, however, that the infrastructure investment creates "assets" that would not exist otherwise.

Intensity of development: Average dwelling size is assumed at 90m^2, average building height is 8 storeys, and average plot ratio of 4 is assumed. These parameters are well below those for high

[41] *How green is Urban Consolidation?*; Searle G; Architecture Bulletin; 1998.

density inner city developments. Development in the secondary area is assumed at 50 per cent of the intensity of the primary area.

8.4 Implicit Policy Decisions

A number of policy decisions would be required to implement the funding model outlined in this Paper. Strategic decisions on project definition, scoping, governance, financing and partnership with the private sector have been discussed in Sections 4 and 5.

From an operational perspective, some changes to revenue systems will also be necessary. General Rates revenue is capped at the Wage Price Index (WPI) plus growth for new property. A substantial part of the project benefit is in growth in dwellings which will be captured under the existing system. The benefit of any growth in land values above the WPI, however, will be dispersed across the Territory.

There are two broad options for consideration. The existing system could be retained, with the benefit to general community (through the lower Rates than they otherwise would have been) providing a justification for the project to be funded in part by general taxation.

Alternatively, the WPI cap could be removed for the project corridor. This is an implicit assumption in the modelling.

There will need to be considerable reliance on land valuation in advance of and after the developments. The basis of valuation needs to be clear and entrenched in legislation. This would be necessary in any event for the reform of taxation system. Specifically, land valuation for General Rates needs to be market value. This approach is being adopted by other jurisdictions and even by the Territory for Lease Variation Charge.

The valuer's profession is closely involved in real estate transactions, ownership and development. As a profession it has deep conflicts of interest. Those need to be addressed through some regulation and reform. This could be undertaken in conjunction with the professional representative body (the Australian Property Institute).

Questions of skills and capacity within the public sector also need to be addressed. It may be beneficial to establish a Valuer General function and position.

Capital Metro Agency

Value Capture Options and Assessment

January 2014

CONTENTS

FIGURES

TABLES

DOCUMENT CONTROL

VERSION	DESCRIPTION	AUTHOR	READER	DATE
D1	Incomplete Draft	Adrian M-K	Glenn Bain	24/12/2013
DR1	Complete revised final	Adrian M-K	Glenn Bain	27/01/2014

EXECUTIVE SUMMARY

The ACT Government has committed to invest in a light rail transit (LRT) system as part of an integrated transport and planning strategy. The objective of this study is to contribute to the LRT project (the project) evidence base by assessing value capture opportunities as a financing option available to the project. The assessment of value capture options is a component of the overall value for money assessment framework development in a complementary paper. . The capture of value is an important element to build revenue to support project financing and is a nationally consistent infrastructure finance policy proposition.

VALUE CAPTURE

Generally, value capture occurs when gains made by a party from an investment made by an alternative party are transferred to the investing party in some fashion. There are preconditions for value capture such as having an actual increase in value, having an instrument in place to capture the value, value must be attributable to the project and in some cases the value capture is hypothecated to a project.

For a value capture instrument there are important considerations such as simplicity, exclusivity (only captures new value), having similar efficiency and effectiveness properties to other taxes and does not adversely harm whole of government revenue.

Equity and capacity to pay?

There are a range of instruments available to capture property value increases that meet these general requirements and the options assessed in this study are summarised below. Some are taxation based, some are not, and many already exist in the ACT.

TAXATION	NON-TAXATION
Rates	Transport utility fees
Land tax	Development impact fees
Lease variation charge	Negotiated exactions
Conveyance	Joint development
Direct levies	Land release
District levies	Air rights
Tax increment finance	

A review of the effectiveness of these instruments suggests that beyond the existing instruments (Rates, Land tax, Lease variation charge, Conveyance, Land release and Joint development) there is merit in assessing a District or Direct levy, Tax increment finance constructs, Development impact fees, Negotiated exactions and Air rights in the ACT.

VALUE CAPTURE ZONE

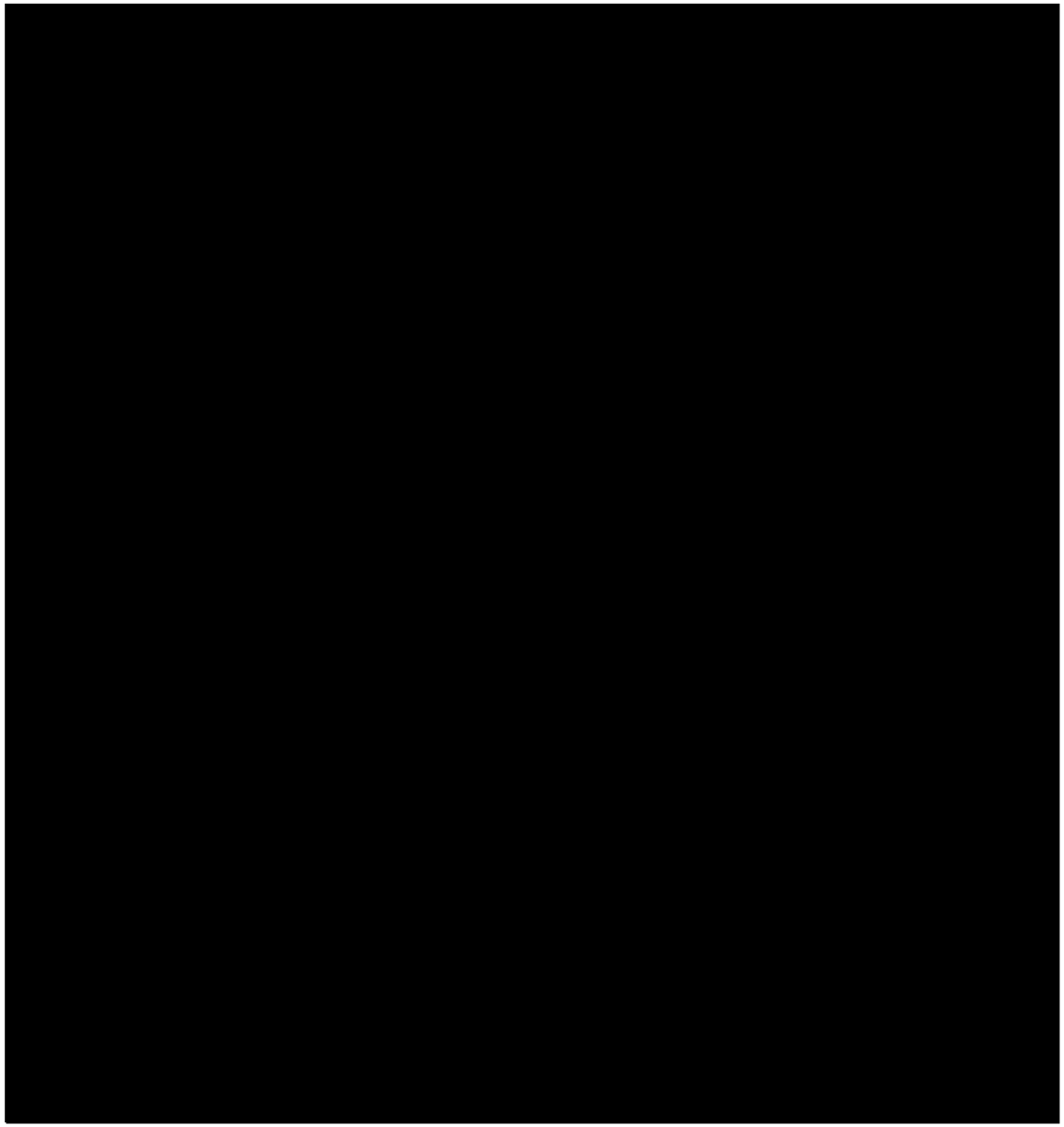
A value capture zone provides a definition about where and how an investment will be effected by, or effect, business as usual value settings. For this study the value capture zone is assumed as the Gungahlin-Civic length of the track, stratified at 200 metre buffers out to 1,000 metres from the project centreline.

Based on cadastral data, removing land parcels that will not affect taxation or value capture, there are around 8,000 land parcels in the full 1,000 metre capture zone valued in 2013 around $4.3-4.5 billion.

PRICE GAINS

Based on the experiences of other jurisdictions in Australian and internationally it is hypothesised that property values may increase in a defined value capture zone as a result of the ACT LRT project. Globally, where light rail or other integrated transport solutions have been developed general property price increases have occurred in a range from -12 to + 46 per cent. These price effects typically occur in specific geographic buffer zones from zero to in excess of 1,600 metres from the transport asset or nodes such as stops or stations.

For this study, based on the evidence from other jurisdictions a gradual price rise over five years to a peak of 25 per cent for residential properties that are 200-400 metres from the LRT centreline is the core assumption. All price rises are differentiated between zones and distances, such that the range of peak price rises assumed are between +8 per cent for industrial properties 800-1000 and +30 per cent for high densification potential properties with the 200-400 metre buffer.



BACKGROUND

The ACT Government has made a decision to implement an integrated land use, transport and planning system between Gungahlin and Civic based on Transit Oriented Design and Development principles. A component of this integrated system is a light rail transit (LRT) project (the project). Preparatory work towards the implementation of the project is detailed in the *Project Definition (1 July 2013 - 30 June 2014) Project Plan (PDPP)*, owned by the Capital Metro Agency (CMA). Two work packages outlined in that PDPP are a "Business case and project definition" and "Funding, value for money and affordability". These work packages will deliver decision making support in relation to the affordability and delivery methods for the project and will contribute to other Workstreams, including those delivering detailed project planning, programming and procurement.

This study identifies and assesses a range of value capture mechanism, including their constraints, and outlines additional steps that need to be taken to implement some of the options. A companion document sets out an assessment framework for further analyses to build a cost-effectiveness analysis business case to support ACT Government budget decision making. These packages seek to build the framework and evidence base to address a number of purposes outlined for the PDPP Workstream, including:

- Confirming the government can afford the project on a whole-of-life basis (capital and operating);
- Identifying potential revenue sources for the project and assess viability;
- Confirming the projects externalities and their effects on consolidated revenue; and
- Confirming which delivery method offers best value for money (PPP vs. PSC).

This study will not completely answer these questions. Other studies will address specific elements of these goals; however this study should build data around the revenue sources issue.

KEY ISSUES

To target this study, the main questions that will be addressed are:

- What is Value Capture?
- What instruments are available to capture value, particularly value induced form infrastructure investment?
- Which instruments that are available might be effective in an ACT context?
- Assuming there is value uplift, what are the revenue scenarios that are feasible?

Responding in full or part to these questions will strengthen the ex-ante evidence base and provide guidance on areas for further work.

INPUTS TO THIS ASSESSMENT

This study is not the first assessment of the financial or economic dimensions of the project, and it has benefitted from a number of prior assessments. There are also a range of concurrent processes from which inputs have been received. To that end, this study builds on those studies, including:

- a number of studies to assess the economic costs and benefits of various options for a transport link, including, *Northbourne Avenue Rapid Transit Corridor Stage 2 Business Case*; Deloittes (March 2012).
- concept design work that formed the basis of costings and economic analysis in *City to Gungahlin Transit Corridor: Concept Design Report*; URS Australia (April 2012) and stakeholder survey;
- ACT Government submissions to Infrastructure Australia to seek support and funding for planning and design studies, such as the *Submission to Infrastructure Australia: Northbourne Avenue Rapid Transit and Urban Renewal* (November 2011) and *ACT Light Rail: Proposal to Infrastructure Australia* (December 2008); and

- Internally developed and focussed Cabinet materials, such as the Corridor development, Property and Public Housing strategies (owned by stakeholders such as EDD and CSD-Housing).

As the project to deliver this study has evolved, there has been interaction with the inputs to and team developing *The Light Rail Integration Study* and early outputs from this study have provided input into the framing of an approach to market to deliver a project delivery business case.

Beyond these resources the study has relied extensively on extant materials that consider the financial, economic, policy and delivery issues associated with Light Rail generally, and integrated transport networks more broadly.

LIMITATIONS

Care and diligence has been exercised in researching, developing and estimating the results in this study, however there are limitations due to the assumptions adopted (including information), scope exclusions, and other factors beyond the control of the Capital Metro Agency or this project.

All financial and economic models are underpinned by assumptions, estimated parameters and modelled results that are sensitive to assumptions and parameters. Any assumptions used to develop reported results are specified through the report and in appendices. These assumptions set the context that results must be read against.

Other critical assumptions include:

- The project is not yet fully scoped from a capital rollout or operational perspective. This study assumes the inputs available now will be sufficient to undertake preliminary assessments, and that these assessments can be adapted when new information comes to light.
- Capital Metro does not 'own' any data or data systems *per se* and is reliant on other Directorates to deliver this and other assessments. The outputs will be as good as the inputs. Cooperation from ACT Government and other entities for source data has been good, but the data has been 'disconnected' in raw form. Continued support will be required to improve upon any preliminary estimates.
- Search costs have been minimised by drawing on extant assessments. Not all of these sources, particularly academic and third party research, relate to the ACT or its distinct features. This may affect the translation of those results to this assessment.
- Extensive internal or external stakeholder consultation was not a requirement for this particular study. To improve the framing of the study and to scope material inputs targeted engagement occurred within CMA and with CMTD, EDD, and ESDD.

In addition to these assumptions, due to time and resource constraints, the study has specifically excluded some aspects from consideration including:

- Assessing the merit of LRT against alternative mass rapid transit options. There is no ambiguity that LRT is the preferred option of the ACT Government.
- Detailed benchmarking of theoretical LRT models against alternative LRT system outcomes. That is, the actual project can learn from the findings from other LRT projects, but the focus of this study is very clearly on the ACT situation.
- The construction of GFS/AASB financial statements for Budget analysis. This study advances some generic modelling done to date, but remains in a modelling and decision making framework.
- Extensive academic or impractical analyses that may advance a knowledge base in relation to the topics covered, but not support LRT project implementation.

- Detailed review or recommendations about the ACT planning, taxation or other relatively fixed policy regimes (incidental assessment may be in scope). That is, to the extent possible the study has considered policy neutral options.
- Any cross-border or regional impacts or Australian Government policy settings.
- The potential expansion of the LRT beyond the current preference for Gungahlin to Civic. The concepts and models may be adapted if expansion is desired, but this is not currently in scope.
- The potential for, or likelihood of, Commonwealth funding or consequences on the Commonwealth revenue or GST grant relativities, beyond incidental consideration and discussion.

A fundamental issue for this study is that assuming or recommending Whole-of-Government policy changes is out-of-scope and entirely beyond the control of the Capital Metro Agency. There are substantial opportunities from changed policy settings; however these must be pursued through the appropriate channels.

Similarly, there are fundamental constraints that affect the viability to maximise all of the opportunities available in the project corridor in a policy neutral setting. The main constraints are legislative, policy and market constraints. While it is beyond the remit of Capital Metro to resolve these constraints, they are identified and the implications discussed in this study.

VALUE CAPTURE

The idea of value capture has multiple meanings with a common theme of generating revenues, whether from taxation, user charges or other transactional bases of activity, to fund some form of project. There is no globally accepted definition of value capture. The definition most closely aligned to the intention of this study is "the identification and capture of the increase in land value resulting from public investment in infrastructure".[1] This interpretation of capture is a well-established concept when applied to public transportation infrastructure.

Principles relevant to value capture are relatively straight forward. Conceptually, value capture is 'value transfer', whereby some proportion of gains made by a party from an investment made by another party are transferred back to the investing party. This follows from the notion developed in recent Lease Variation Charge (LVC) debates that any windfall gains from planning decisions or public investment should accrue to the community. With value capture the windfalls are usually directed toward funding infrastructure. It is important to observe value capture is not land taxation, whereas land taxation is a type of value capture. That is, there are many instruments that can generate value capture that are not taxation instruments.

Financially, value capture provides a means to monetise a project's potential positive economic benefits, or externalities, by generating a cash flow that may either be captured centrally or contributed directly towards project costs. In an environment of fiscal constraint, it is important to assess and understand value capture options that may be available to support a major transport project and to understand the true value created and possible returns to government available which may offset a portion of the cost of the project. Assessing value capture is a nationally consistent policy approach to infrastructure planning. Infrastructure Australia has recommended that Governments should utilise such models to drive revenue from the broader benefits delivered by major infrastructure projects, such as value capture from transport infrastructure[2].

In an applied economic sense, the value capture approach seeks to internalise positive externalities (externally conferred benefits). The alternative is also true for infrastructure projects, where the internalisation of positive externalities can be counteracted by the realisation of negative externalities as costs to a project. Some of the negative externalities in the wider economic sense are discussed in the companion assessment framework report. Those negative externalities will work as an offset to value capture gains, and should not be ignored in the overall ACT Government financial assessment.

Necessary elements for Value Capture

In order to generate a value capture event there are several preconditions.

Most importantly there must be some form of positive change in relative welfare from an investment for there to be 'value' to capture. So for example, road users must benefit from an improvement in travel, the facility users must realise a better experience from the project or properties in some defined zone must increase in price relative to the overall price pathway.

Second, there must be an instrument, or instruments, in place at the time value expansion is expected which can efficiently and effectively capture in-scope growth. This may mean that significant preparatory work is required to sequence non-taxation opportunities, legislate for new or expanded instruments and, most importantly, to engage with the targeted 'payer' community. In the event that the project is the direct recipient of a stream of cash flows through hypothecation, the governance of the project must be sufficient to enable the management of that cash flow within the prevailing compliance regime.

[1] Mathur and Smith May 2012, p1.

[2] Recommendation 5 in *Infrastructure Finance and Funding Reform*; Infrastructure Australia; April 2012.

A clear feature of much of the value capture experience internationally is that infrastructure returns are hypothecated directly to a project. The basic logic is that the value capture revenues allow 'self-funding' in a targeted area for activities such as regeneration, gentrification or similar 'negative to positive' shift. This is not a necessary condition to achieve value capture; in particular if the value to be captured is well defined and there are instruments already in place it is unclear why hypoth4ecationowuld be required. However some aspects of project funding may be dependent upon a reliable and defined stream of revenue. For example, under some public-private partnership (PPP) models the private partners may require an assurance of cash flows to achieve private financing, which would be underwritten by a hypothecated value capture stream. Direct attribution of value capture also removes a project from the annual budget cycle, while also introducing a risk of underfunding if revenues fall short.

Attribution is another key element of value capture. Without a direct link between a capture instrument and the potential relative growth path, there is potential for the instrument to be seen as an additional taxation or impost with minimal benefit. For example, in some literature parking fees, congestion charges and road tolls are linked to infrastructure value capture propositions. While each has some merit as a behavioural modifier in a general transport sense, they are not necessarily linked with an infrastructure investment. They may be 'investment associated' reforms or returns, but not value capture. In the ACT, for example, the Rates system is a form of value capture and is well and truly established, so care needs to be taken in defining what aspect of rates are value capture based and what aspect is business as usual.

Considering general value capture instruments, there are additional principles for assessing the relative effectiveness and efficiency of a proposal. Some of these include:

- Relative simplicity is preferred to minimise implementation and compliance costs, this includes a simple and effective approach to estimating in-scope increases in land values;
- Exclusivity of value capture, such that growth that otherwise would have occurred is not counted, rather specific new value is isolated and captured;
- Any instrument must pass similar tests to other tax effectiveness and efficiency measures (such as incidence, equity, efficiency, sustainability and feasibility)
- The capture of value, in particular any quarantining of value capture for infrastructure purposes, does not adversely affects reasonable Whole-of-Government budget management capacity. In effect, sufficient revenue needs to be retained to maintain municipal and public service delivery capacity to all households in the corridor, and beyond.

These principles are adopted in considering value capture instruments, potential revenue gains and in recommending options for the ACT Government in relation to value capture.

DEFINING A VALUE CAPTURE CORRIDOR

Consistent to all value capture instruments and concepts is that a particular area is advantaged from an investment relative to another area. Clearly this definition will change from jurisdiction to jurisdiction, even within areas of certain towns and cities. This is no different for the proposed project, and in order to effectively assess instruments and their potential for value capture, a specification of the value capture corridor is essential.

CENTRELINE DIMENSIONS

There is little ambiguity about the proposed Capital Metro Stage 1 (City to Gungahlin) north-south alignment. On current project assumptions the corridor commences at Hibberson Street in Gungahlin Town Centre, and completes at Alinga Street in Civic.

The intention is that this stage will be developed over an approximate 12km route between the start and stop location, with median alignment along Flemington Road and Northbourne Avenue. On current planning the route will run at stop-intervals of between 450 metres and 1.5 kilometres, with major stations at Gungahlin Town Centre, Dickson and Canberra City.

BREADTH DIMENSIONS

There is no unambiguous definition of how far a value capture zone extends in either lineal or radial dimensions. There are a number of ways in which the dimensions have been assessed in other LRT projects. Three common definitions are the physical distance from stations or interchanges; walking distance either to a station or to the line and specific frontage to the mass transit line (activated, integrated collocation). To build on this logic the study has assessed the distances over which property value changes occurred in more than 70 studies from overseas. Figure 1 illustrates the distance distributions. While 52 per cent of study results did not contain a specific distance, the remainder of studies define value capture zones of 200 metre[3] increments, out to in excess of 1000 metres. These results have been has been modified for this study, to define the dimension as up to 1000 metres either side of the centreline, with different experiences at 200 metre intervals.

Figure 1: Distances from centre line experiencing a price effect

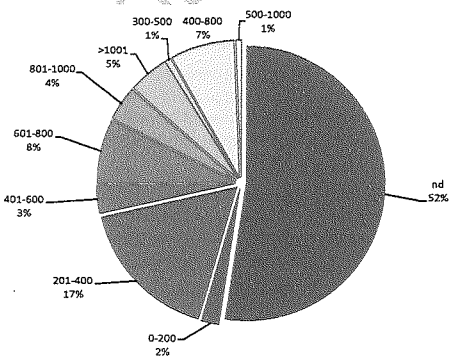
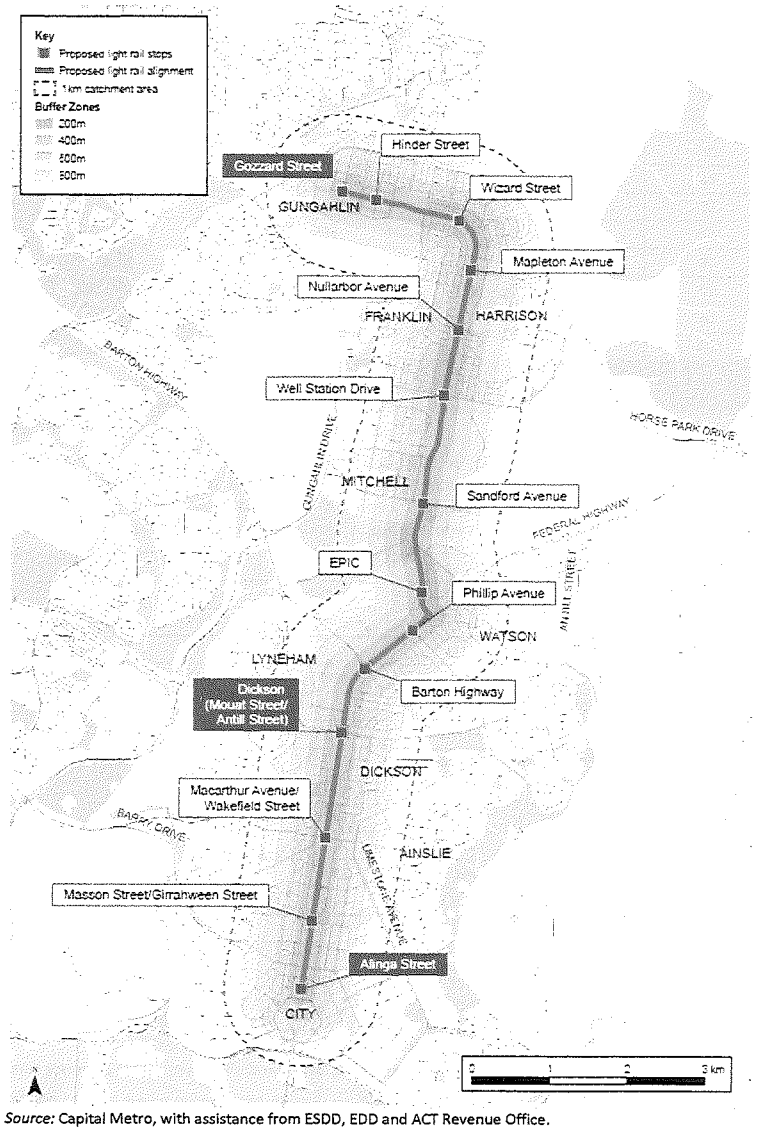


Figure 2 provides an illustrative map of how this assumption defines the capture zone for this study. In effect, the zones are 0-200, 201-400, 401-600, 601-800 and 801-1000 metres from the centreline. While it is not assessed, this is spatially similar to selecting the same radius from proposed stops.

[3] Many studies were in non-metric units. All values were converted from feet, miles and kilometres to metres.

Figure 2: Approximate value capture corridor



Source: Capital Metro, with assistance from ESDD, EDD and ACT Revenue Office.

THE CAPITAL METRO VALUE CAPTURE ZONE

Based on this definition the 'Capital Metro Value Capture Zone' (value capture zone) can be enumerated using a combination of cadastral and administrative data. The objective of this assessment is to identify the location, number, area and value of land that sits within the value capture zone. A substantial effort has been required to estimate a 'clean' data set, and several critical assumptions have been applied. This section should be read in conjunction with Appendix 1. The most important assumption is zone exclusions from the value capture assessment, where several zones have been excluded based on low probability of taxation or little likelihood of meaningful gains. Suburb selection has endogenously determined based upon the buffer zones.

The analysis of blocks and sections reveal there are around 8,000 unique blocks in the value capture zone. As at 1 January 2013 it appears the value of unimproved land in the capture zone is somewhere between $4.28 billion (average unimproved basis) and $4.53 billion (unimproved basis).[4] This is an underestimate of the full value of land, due to the exclusions of certain zones, boundary issues and missing data.

These 8000 blocks sit within 15 ACT suburbs. Table 1 outlines the location of the count of unique blocks by suburb. The table is cumulative, showing how the capture zone grows in the 200 metre increments from the centreline. Close to half of the blocks are within 0-400 metres, while the 'greater Gungahlin' area occupies the vast majority of blocks.

Table 1: Count of unique blocks in capture zone, by suburb

	DISTANCE TO CENTRELINE				
	200	400	600	800	1000
AINSLIE	0	0	21	148	315
BRADDON	107	273	323	390	419
CITY	109	214	251	254	254
DICKSON	100	261	386	523	600
DOWNER	273	557	806	958	1,079
FRANKLIN	177	482	779	1,036	1,036
GUNGAHLIN	217	693	1,142	1,379	1,379
HARRISON	197	525	862	1,289	1,316
LYNEHAM	109	175	185	355	355
MITCHELL	56	115	167	214	214
NGUNNAWAL	0	0	0	2	2
O'CONNOR	19	90	149	274	279
REID	0	0	0	10	10
TURNER	111	195	206	267	267
WATSON	62	189	358	477	477
TOTAL	1,537	3,769	5,635	7,576	8,002

These blocks cover approximately 22 square kilometres of ACT land mass. Table 2 identifies the land area occupied by the capture zone, by suburb. Again, these are cumulative values by 200 metre step

[4] There are 375 records that have no UV or AUV data, for 263 records the UV is assumed at the recorded AUV; while for 535 records without AUV data, UVs are substituted. In all there are 1,173 records (14.7 per cent) that have UV anomalies.

from the centreline. For these results not quite half the area sits in the area 0-600 metres, while the vast bulk of the area is occupied by 'greater Gungahlin'.

Table 2: Area of unique blocks in capture zone, by suburb

	DISTANCE TO CENTRELINE				
	200	400	600	800	1000
AINSLIE	0	0	21,224	137,819	302,497
BRADDON	229,008	424,841	522,598	607,426	640,970
CITY	105,418	281,525	375,920	399,003	399,003
DICKSON	194,230	354,451	451,932	589,951	659,044
DOWNER	210,406	421,615	609,796	730,270	830,744
FRANKLIN	210,654	357,661	489,045	600,757	600,757
GUNGAHLIN	457,662	4,900,794	5,206,753	14,778,273	14,778,273
HARRISON	206,834	492,807	633,622	845,094	860,620
LYNEHAM	176,989	280,580	409,466	531,428	531,428
MITCHELL	647,788	881,717	1,102,829	1,256,656	1,256,656
NGUNNAWAL	0	0	0	2,103	2,103
O'CONNOR	14,431	81,204	126,767	245,546	249,615
REID	0	0	0	40,444	40,444
TURNER	225,111	329,305	343,268	463,948	463,948
WATSON	52,805	149,979	282,953	399,759	399,759
TOTAL	2,731,337	8,956,479	10,576,172	21,628,476	22,015,860

Table 3 outlines the count of blocks by zone. For the in-scope planning zones, the largest group is 'RZ3:Urban Residential', followed by 'RZ1: Suburban'. The least number of blocks occur in the 'CZ6: Leisure and Accommodation' zone. In terms of densification, a total of 1,042 blocks are in 'CZ5: Mixed Use', typically with the highest development rights, and 'RZ4: Medium Density Residential'.

Table 3: Count of unique blocks in capture zone, by zone

	DISTANCE TO CENTRELINE				
	200	400	600	800	1000
CZ1	146	263	310	310	310
CZ2	50	82	97	97	97
CZ3	32	69	74	76	76
CZ4	3	5	5	32	33
CZ5	81	339	392	415	415
CZ6	0	0	5	19	22
IZ1	28	46	66	74	74
IZ2	30	69	101	140	140
RZ1	325	718	1,234	2,018	2,324
RZ2	0	0	85	282	370
RZ3	522	1,668	2,695	3,487	3,514
RZ4	320	510	571	626	627
TOTAL	1,537	3,769	5,635	7,576	8,002

Finally, Table 4 outlines the area of blocks by planning zone. The largest volume of area is 'RZ1: Suburban'. The least volume of area is in the 'CZ4: Local Centre' zone. Again, reflecting on densification opportunities, a total of 599,208 square metres (sqm) are in 'CZ5: Mixed Use' and 956,954 sqm are located in 'RZ4: Medium Density Residential', the majority of which for both zones occurs within 400 metres of the centreline.

Table 4: Area of unique blocks in capture zone, by planning zone

	DISTANCE TO CENTRELINE				
	200	400	600	800	1000
CZ1	332,281	534,169	608,823	608,823	608,823
CZ2	101,979	157,098	201,970	201,970	201,970
CZ3	53,911	127,115	181,676	187,147	187,147
CZ4	18,871	23,243	23,243	49,145	49,633
CZ5	471,157	563,572	585,813	599,208	599,208
CZ6	0	0	43,430	149,412	167,305
IZ1	686,012	817,362	951,874	999,334	999,334
IZ2	110,023	208,230	294,829	401,196	401,196
RZ1	265,314	4,804,222	5,302,640	15,426,975	15,707,576
RZ2	0	0	66,098	210,634	278,864
RZ3	230,914	883,723	1,430,554	1,842,323	1,857,850
RZ4	460,876	837,746	885,223	952,309	956,954
TOTAL	2,731,337	8,956,479	10,576,172	21,628,476	22,015,860

For completeness a count of blocks in the capture zone by zone and suburb is at Appendix 3.

One observation is that if a value capture zone is to be defined in a statutory sense, sensible selection and exclusions need to be applied. For example, two blocks were counted in Ngunnawal and 10 in Reid due to the blunt instrument counting approach, where it would appear that these properties would be sensibly excluded on intra-suburban equity grounds. The process of zone selection and mandating should achieve this kind of inclusion/exclusion decision.

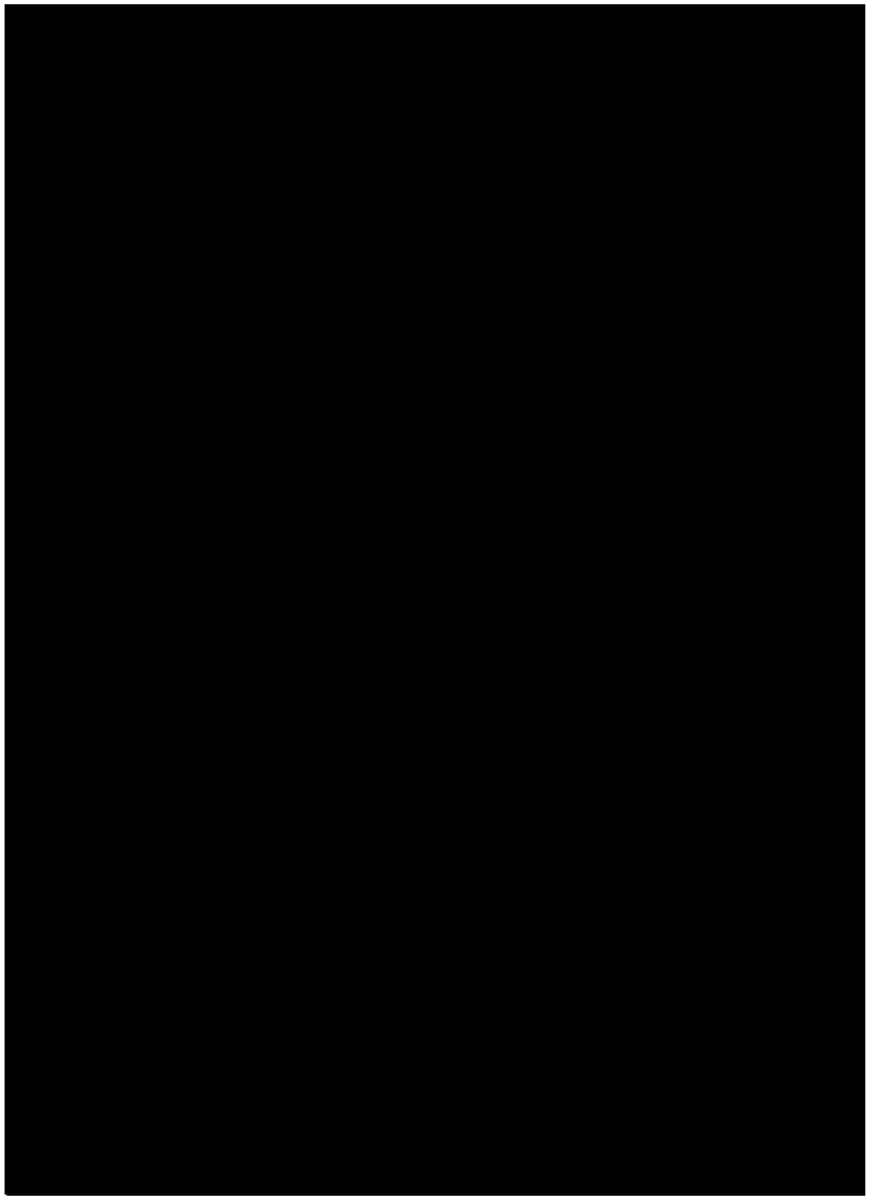
RECOMMENDATION

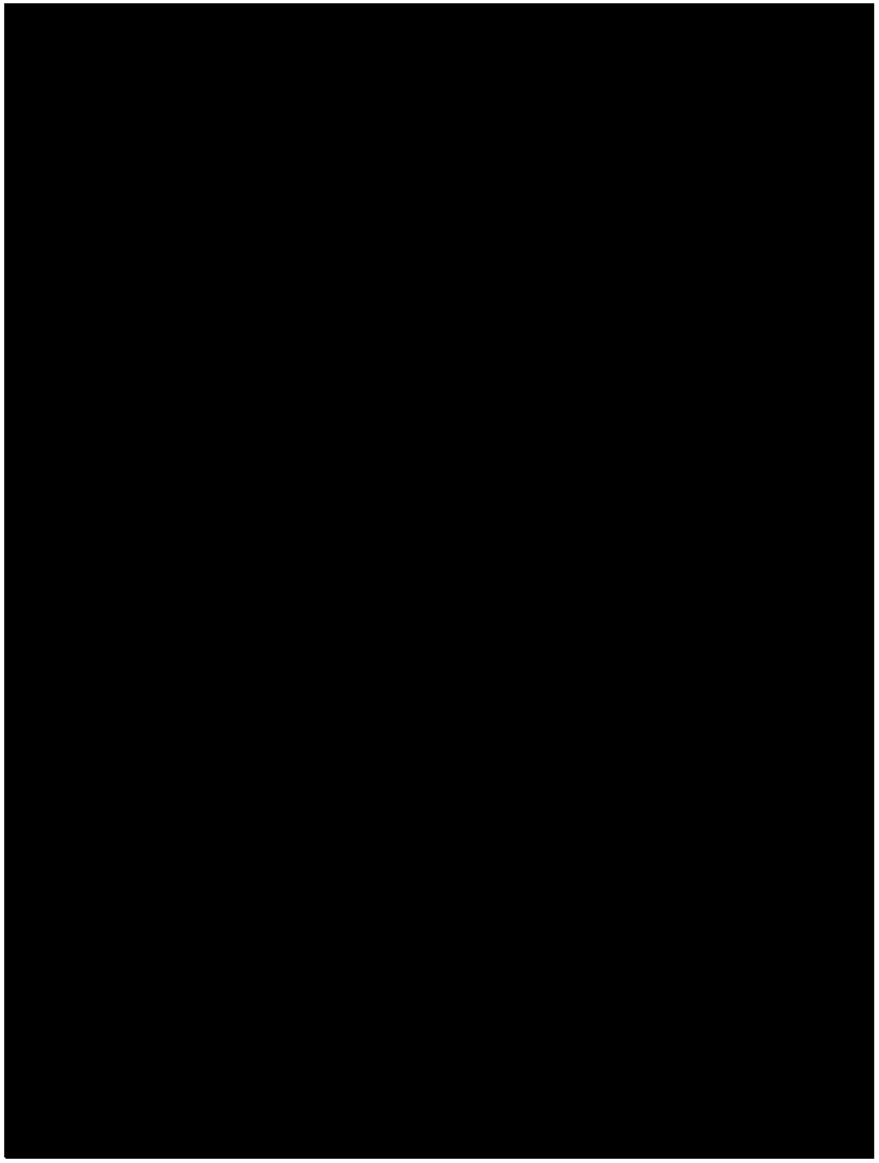
If the ACT Government wishes to adopt value capture, a zone should be defined. It is recommended the zone be defined as all relevant properties on the centreline distance (length) and +/- 1,000 metres from the centreline (width). This may be shortened to 800 metres given the low additionality of the 801-1000 metre zone.

FURTHER ASSESSMENT

Before agreeing to this recommendation, and to ensure the resulting definitions are meaningful, additional assessments are recommended:

- A working party of ACT Revenue, ESDD, EDD and Capital Metro determine a consistent dataset to define the corridor
- An agreed set of principles is developed for zone selection, exclusions and appropriate baselines within the consistent dataset;
- A thorough assessment of the unique land parcels to fill in missing parameters; and
- Delivering a Cabinet package that defines the corridor for statutory purposes.





BIBLIOGRAPHY

ACIL Tasman. "Hobart to Northern Suburbs Light Rail Business Case." July 2011.

ACT Government. "ACT Taxation Review." May 2012.

ACT Government. "C13/507: Capital Metro Property Strategy and Public Housing Properties." Cabinet-in-confidence, 2013.

ACT Government. "City to Gungahlin Transit Corridor: Infrastructure Australia Project Submission." August 2012.

ACT Government. *Government Response to the ACT Taxation Review.* Canberra: ACT Government, May 2012.

Alterman, Rachelle. *Is Capturing the "unearned increment" in land value still a viable idea? A cross national analysis.* The Klutznick Center for Urban and Regional Studies, 2011.

Arndt, Jeffrey, Curtis Morgan, John Overman, Terry Clower, Bernard Weinstein, and Michael Seman. *Transportation, Social and Economic Impacts of Light and Commuter Rail.* Texas Department of Transportation, 2009.

Australian Bureau of Statistics. "Consumer Price Index." Cat no. 6401.0, September 2013.

Australian Bureau of Statistics. "House Price Indexes." Cat no. 6416.0, March 2013.

Australian Bureau of Statistics. "National Regional Profile: ACT 2007 - 2011." Cat. No.1379.0.55.001, 2013.

Australian Bureau of Statistics. *Population Projections, Australia, 2012 (base) to 2101.* Cat. No. 3222.0, November 2013.

Batt, William. "Value Capture as a Policy Tool in Transportation Economics: An Exploration in Public Finance in the Tradition of Henry George." *American Journal of Economics and Sociology*, Vol. 60, No. 1, January 2001: 195-228.

Bird, Richard, and Enid Slack. *Land and Property Taxation Around the World: A Review.* University of Toronto, nd.

Center for Transportation Studies. *Harnessing Value for Transportation Investment: A summary of the Study 'Value Capture for Transportation finance'.* CTS 09-18PS: University of Minnesota, June 2009.

Center for Transportation Studies. *Value Capture for Transportation Finance: Report to Minnesota Legislature.* University of Minnesota, June 2009.

Deloittes. "Northbourne Avenue Rapid Transit Corridor Stage 2 Business Case." 2012.

Dueker, Kenneth J, and Martha J Bianco. "Effects of Light Rail Transit in Portland: Implications for Transit-Oriented Development Design Concepts." *1999 Annual Meeting of the Transportation Research Board*, 1999.

Ge, Xin Janet, Heather Macdonald, and Sumita Ghosh. "Assessing the Impact of Rail Investment on Housing Prices in North-Western Sydeny." *18th Annual Pacfici-Rim Real Estate Society Conference*, January 2012.

Government of Western Australia. "Metro Area Express (MAX) Light Rail Project: Light Rail on a Global Scale." Perth WA, 2013.

Infrastructure Finance Working Group. "Infrastructure Finance and Funding Reform." April 2012.

Jeffery, J Smith, A Gihring Thomas, and Litman Todd. *Financing Transit Systems Through Value Capture: An Annotated Bibliography.* Victoria Transport Policy Institute, August 2013.

Langley, Joe. *Realising New Funding for Infrastructure and Urban Renewal: Capturing Value.* Sinclair Knight Merz, October 2013.

Mandri-Perrott, Cledan. *Private Sector Participation in Light Rail-Light Metro Transit Initiatives.* Public-Private Infrastructure Advisory Facility, The World Bank, 2010.

Martinez, Miguel, and Jose Viegas. *Metrolpolitan Transportation Systems Financing Using Valure Capture Concept.* PhD Paper, Lisbon Technical University, nd.

Mathur, Shishir, and Adam Smith. *A Decision-Support Frameowrk for Using Value Capture to Fund Public Transit: Lessons From Project-Specific Analyses.* Mineta Transportation Institute, May 2012.

NSW Government. *CBD and South East Light Rail: Business Case Summary.* Transport for Sydney, November 2013.

O'Toole, Randal. "Defining Success: The Case Against Light Rail." *Cato Institute Policy Analysis No. 663*, March 24 2010.

Parsons Brinckerhoff. "The Effect of Rail Transit on Property Values: A Summary of Studies." February 2001.

Siemens and the City of Turku (Finland). "Light Rail Impact Study: An Ecological and Economci Assessment." February 2012.

Tourism and Transport Forum Australia. "TTF Transport Position Paper: The Benefits of Light Rail." 2010.

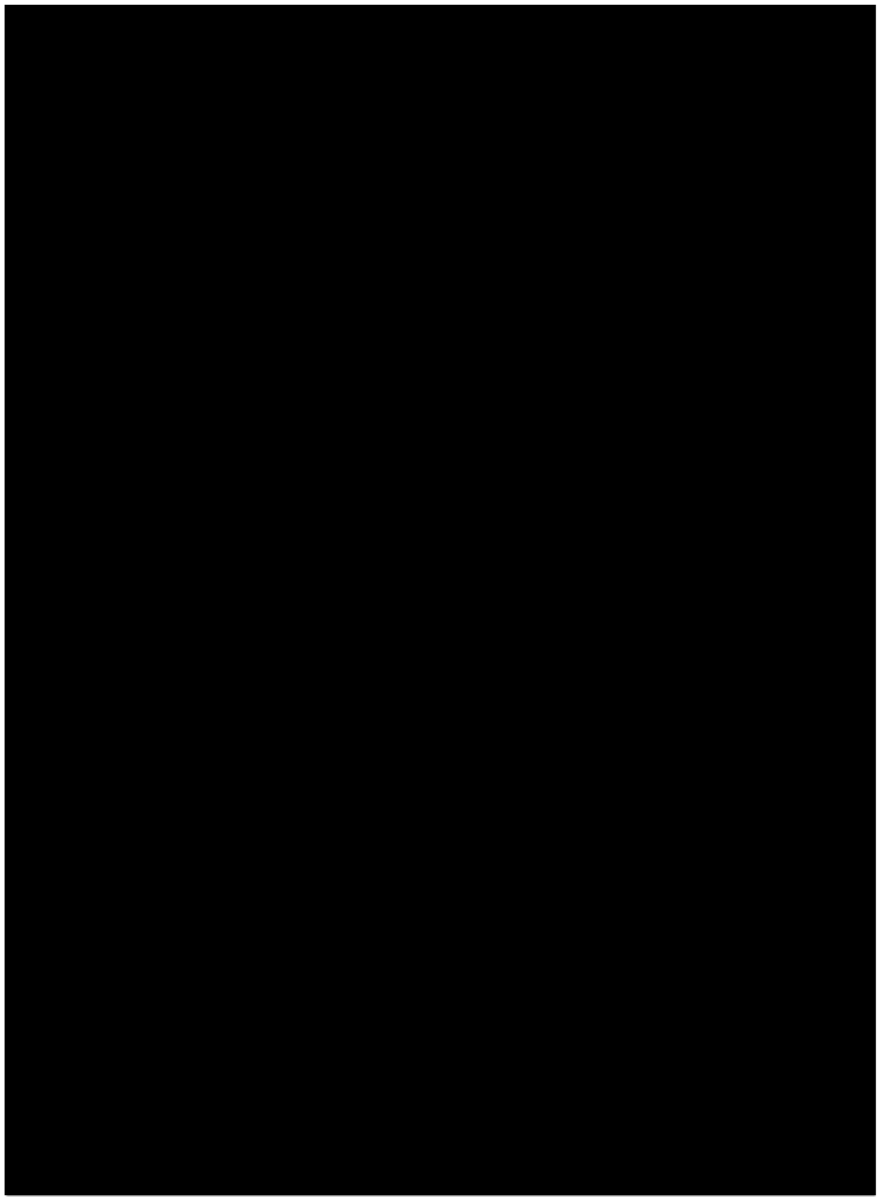
URS. *City to Gungahlin Transit Corridor: Concept Design Report* . Prepared for ACT Environment and Sustainable Development Directorate, URS, April 2012.

Weinberger, Rachel. *Commercial Property Value and Proximity to Light Rail: A Hedonic Price Application.* PhD Paper, University of California (Berkeley), 2001.

Wightman, Andy. "A Land Value Tax for Scotland." 2009.

Wood, Gavin, Miranda Stewart, and Rachel Ong. "Housing Taxation and Transfers: Research Study for the Review of Australia's Future Tax System." nd.

Zegras, Christopher, Shan Jiang, and Christopher Grillo. "Sustaining Mass Transit through Land Value Taxation? Prospects for Chicago." Draft for comment, May 2013.



1 4 9 5 UNIVERSITY OF ABERDEEN

THE UNIVERSITY OF SYDNEY

Performance and benefits of Bus Rapid Transit

Professor John Nelson
Centre for Transport Research
University of Aberdeen, UK
Visiting Professor, ITLS-Sydney

http://www.abdn.ac.uk/ctr/

CENTRE FOR Transport Research

ITLS Sydney

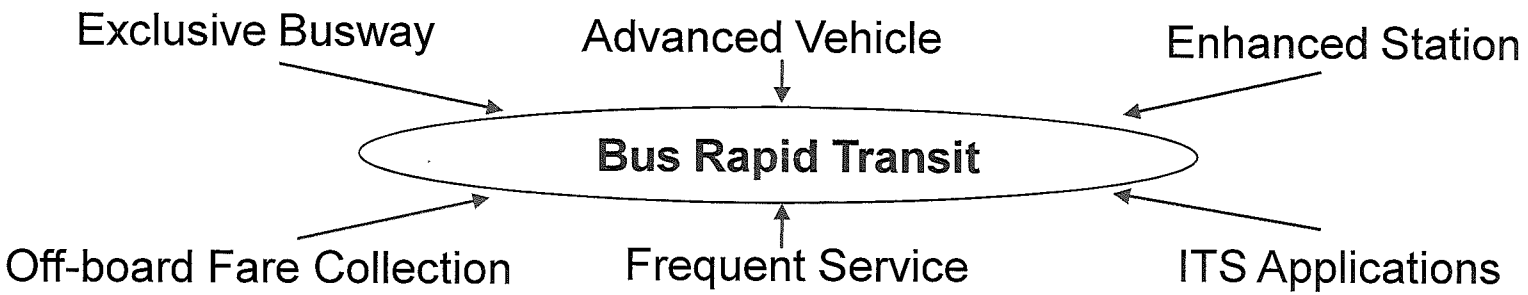
Overview

- Concepts and components of BRT
- BRT within the mobility offer
- Evolution of BRT systems – global diffusion
- Evaluation:
  - Passenger feedback
  - Technical performance
  - Costs, externalities and impacts on land development
- Conclusions

Concept and components of BRT

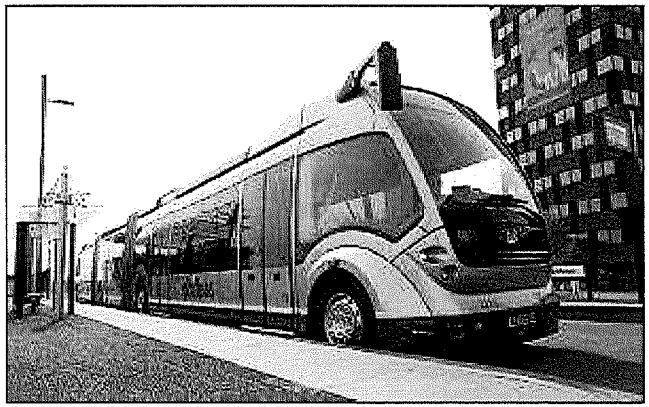
Definition

"Rapid mode of transportation that can combine the quality of rail transit and the flexibility of buses". --- Federal Transit Administration (FTA)



Concept and components of BRT

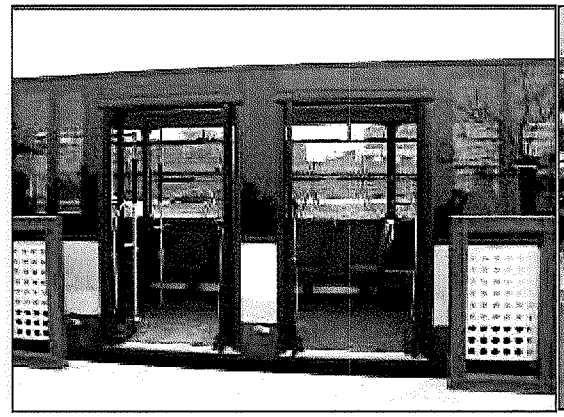
Busway



Advanced Vehicles

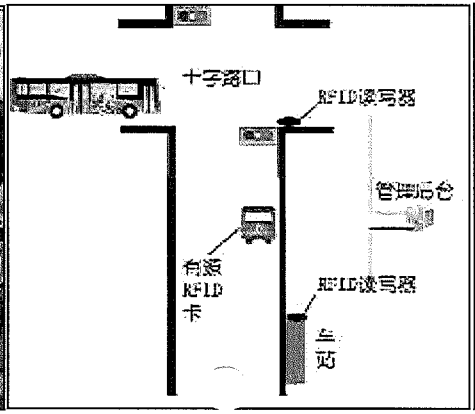
Enhanced Stations

Fare collection



Frequent service

ITS Applications



System identity

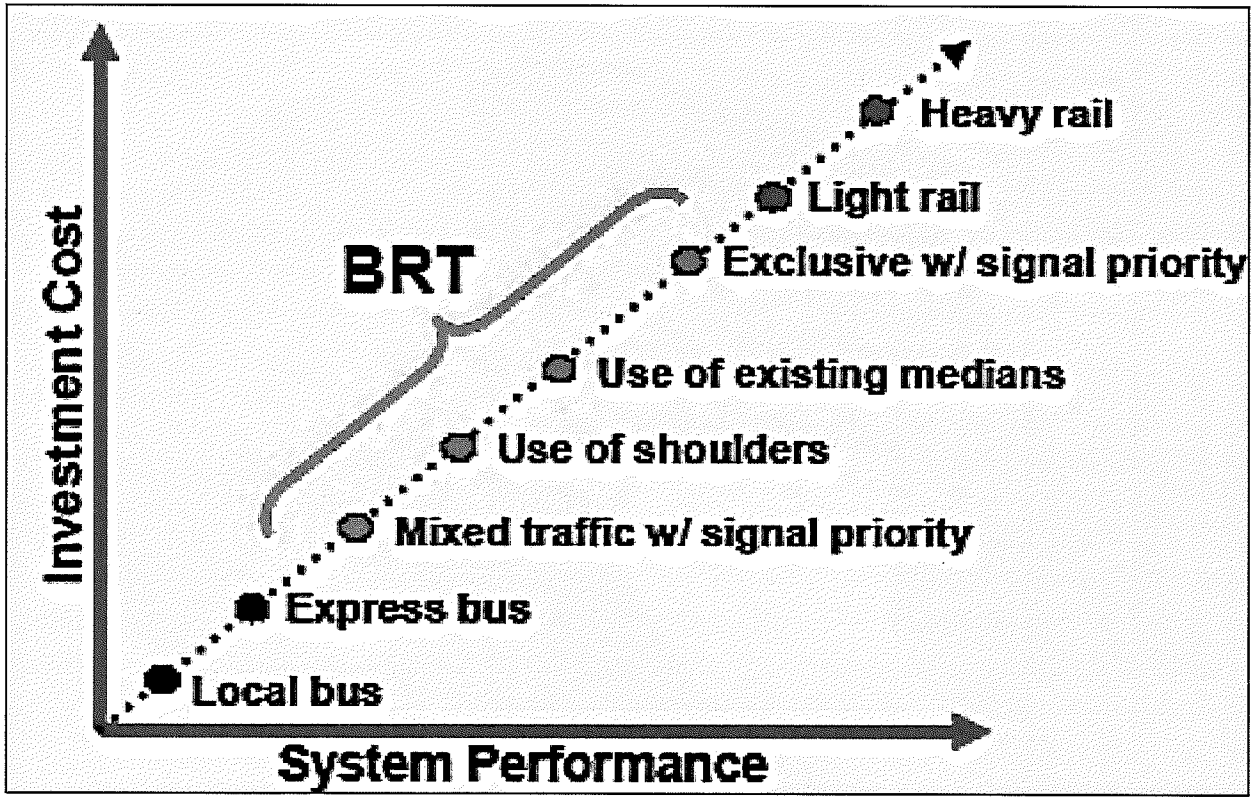
Definitions of BRT

BRT Definitions	Source
BRT is "a rapid mode of transportation that can combine the quality of rail transit and the flexibility of buses".	Thomas, 2001
BRT is "a flexible, rubber-tired form of rapid transit that combines stations, vehicles, services, running ways, and ITS elements into an integrated system with a strong image and identity".	Levinson et al., 2003, p.12
BRT is "a rubber-tired rapid transit service that combines stations, vehicles, running ways, a flexible operating plan, and technology into a high quality, customer focused service that is frequent, fast, reliable, comfortable and cost efficient".	McCormick Rankin Corporation, 2004, p.16

Main components of a BRT system

Components	Levinson et al., 2003	Canadian Urban Transit Association, 2004
Running ways	BRT vehicles operate primarily in exclusive transit-ways or dedicated bus lanes. Vehicles may also operate in general traffic.	Three types of busways, including exclusive busways, dedicated lanes and mixed traffic.
Stations	BRT stations, ranging from enhanced shelters to large transit centres.	Sufficient shelter from inclement weather, seating, customer information, appropriate lighting and ample platform space for boarding, alighting and waiting are the minimum requirements.
Vehicles	Quiet, high-capacity vehicles use clean fuels to protect the environment.	The ideal BRT vehicle has a level of passenger comfort, is visually attractive, and is environmentally friendly.
Services	High-frequency service. The integration of local and express service can reduce long-distance travel times.	A variety of service alternatives, including all stops route(s), limited stop service, feeder services.
Route Structure	BRT uses simple, often colour-coded routes.	
Fare Collection	Pre-boarding fare collection. They allow multiple door boarding, reducing time in stations.	Multi-door boarding for customers with pre-paid fare media.
ITS	Applications of ITS technologies include automatic vehicle locationing (AVL) systems, passenger information systems, and traffic signal preference at intersections.	A collection of computer and communications technologies that can enhance the convenience, safety and reliability of a BRT service.

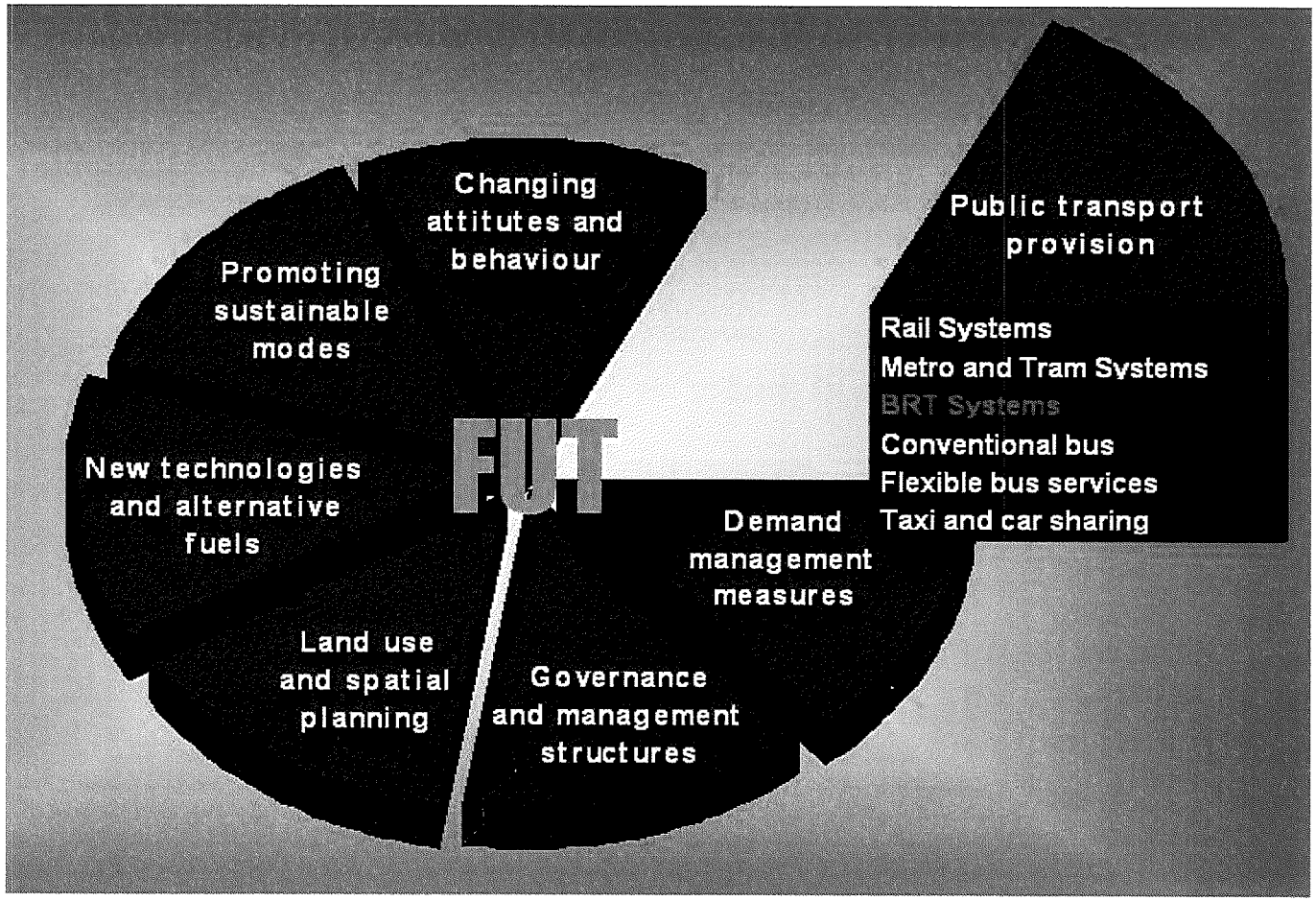
The spectrum of different BRT applications



Source: Tindale Oliver & Associates, Inc; Cited by Cain et al., 2009, pp.3

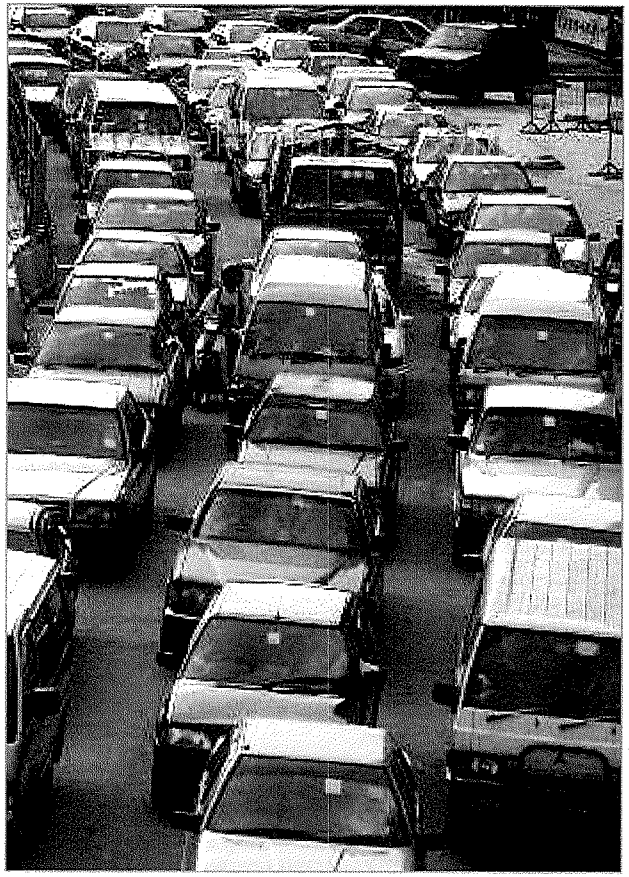
Note: It has been argued that BRT can match or even surpass the performance of LRT in some circumstances, but this is not reflected in the Figure.

“Future Urban Transport” (after VREF)



Motivation to introduce BRT

Is there an alternative to these conditions?



Motivation to introduce BRT

- Widening roadways
- Building flyovers
- Expanding highway network

} A temporary relief

- Growth rate of vehicles is much faster than that of the road network.
- These means alone are not capable of solving the complicated congestion problems.

Limitations of rail-based transit

High investment costs

High operating costs

Long construction period

- Rail-based transit is recognized as a good solution to the growing traffic congestion problem, but the construction investment and operating deficits have caused an enormous debt burden on the city.
- Cost-effectiveness??? Affordability???

✓ Bus Rapid Transit (BRT) is considered as a lower cost rapid transit *solution*.

Evolution of the BRT concept (Deng and Nelson, 2011)

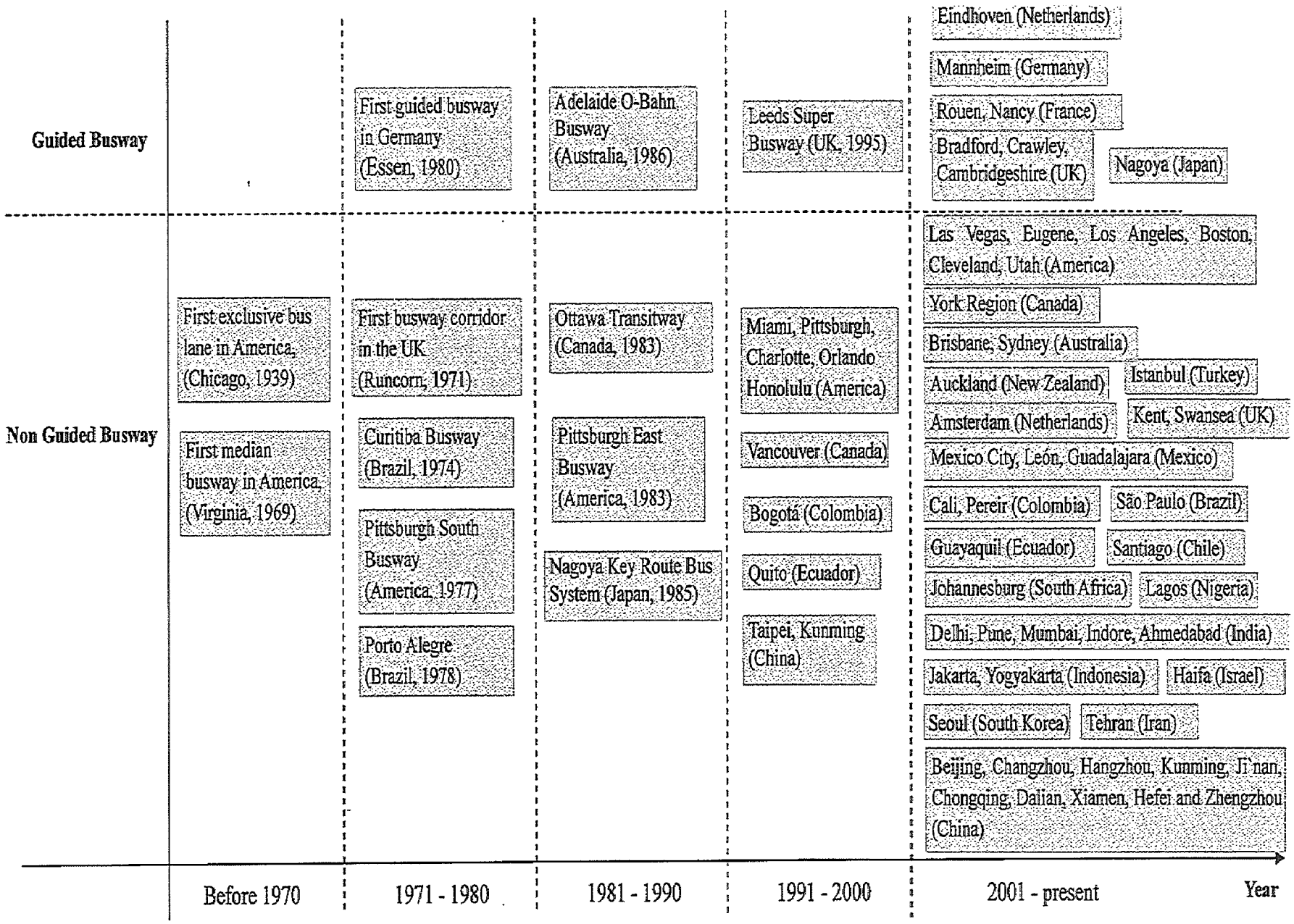
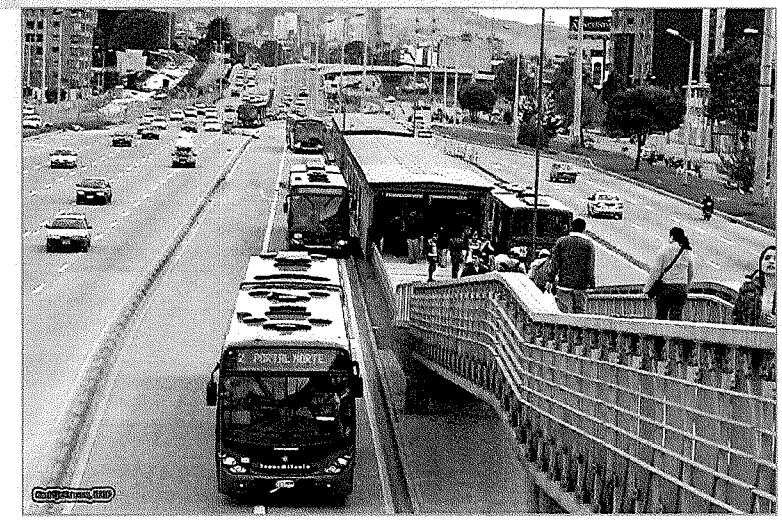


Figure 2: The global diffusion of BRT systems

Application of BRT across the Globe

- 40 years of experience
- From Latin America to North America, Oceania, Europe and Asia
- Handout: Overview of selected BRT schemes
  - System overview
  - System performance
  - Key reference

Examples of BRT



Bogotá (Colombia)

Changzhou (China)

Brisbane (Australia)

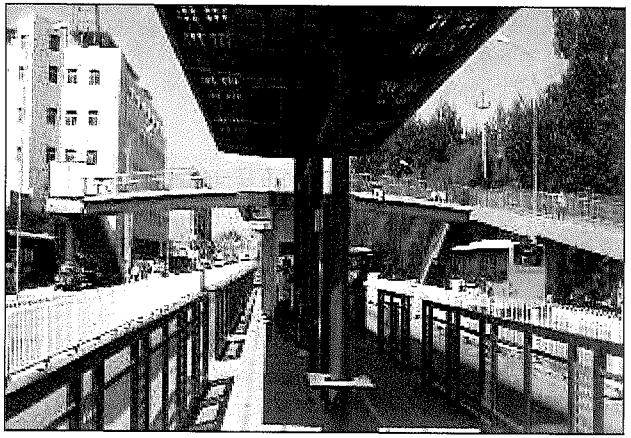
Quito (Ecuador)

Source: Karl Fjellstrom, ITDP

Beijing Southern Axis BRT line 1

Exclusive busway

Advanced vehicle



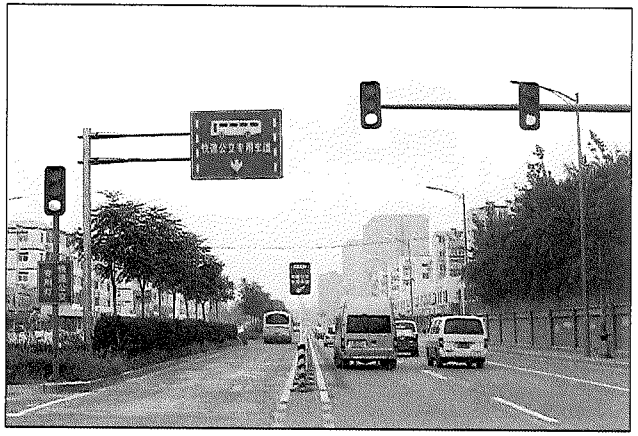
Enhanced Station

Bus Rapid Transit

Pre-board fare collection

Frequent service

ITS Applications



BRT in Europe

Nantes (dual carriageways used to introduce BRT)

Castellon (Optical Guid ce)

Swansea (city centre bus priority network)

cost

Buses with a high level of service (BHLS) - http://www.bhls.eu/

Pho s: Brian Masson

What the passengers think

Evaluation of the BRT service in Beijing (Deng and Nelson, 2010)

- Seven attributes, including speed, reliability, safety, convenience, frequency, comfort & cleanliness and overall service quality, were measured.

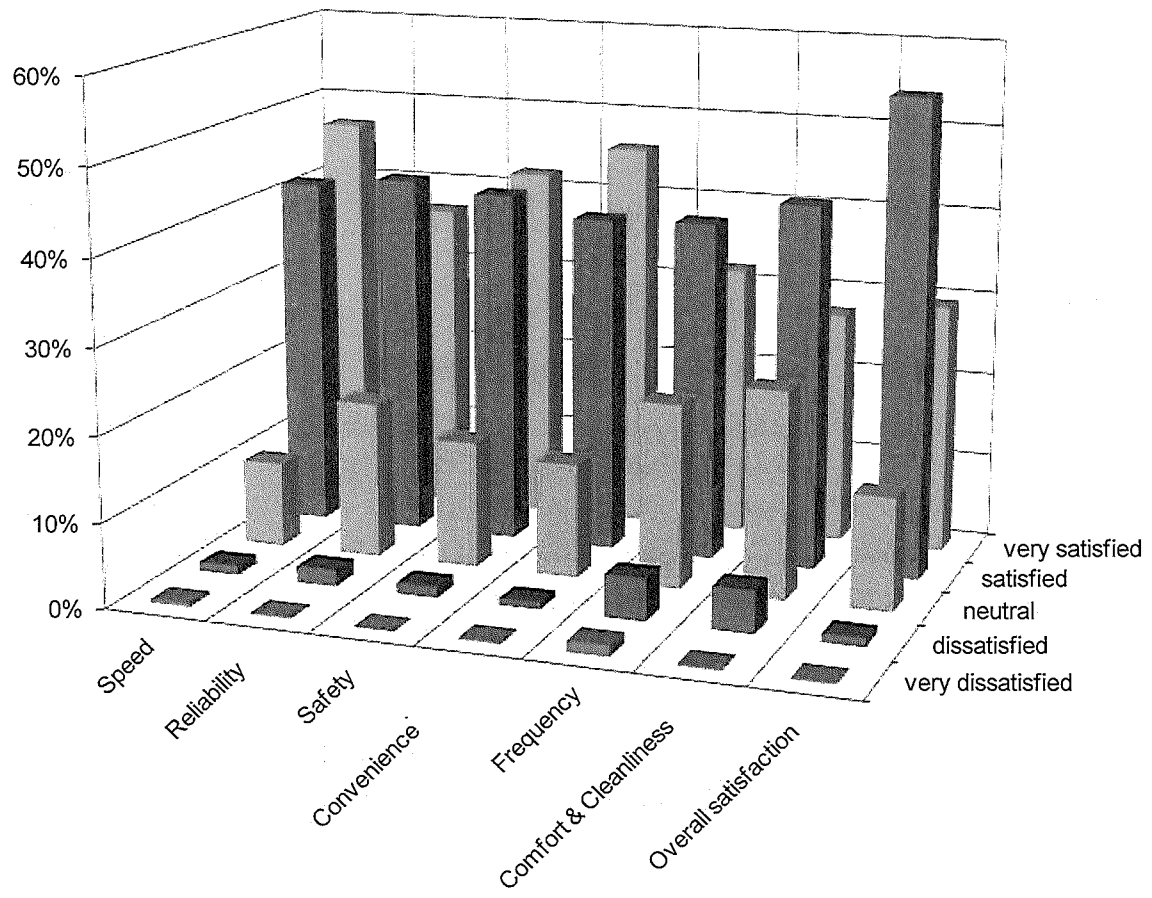
  --- respondents have strong positive opinions on the BRT service.
  --- 85.5% of passengers rated overall satisfaction of BRT service as "very satisfied" or "satisfied".
  --- in particular, respondents thought BRT was fast and convenient.

- Choice users have a higher expectation on BRT than captive users in terms of reliability, comfort & cleanliness and overall satisfaction

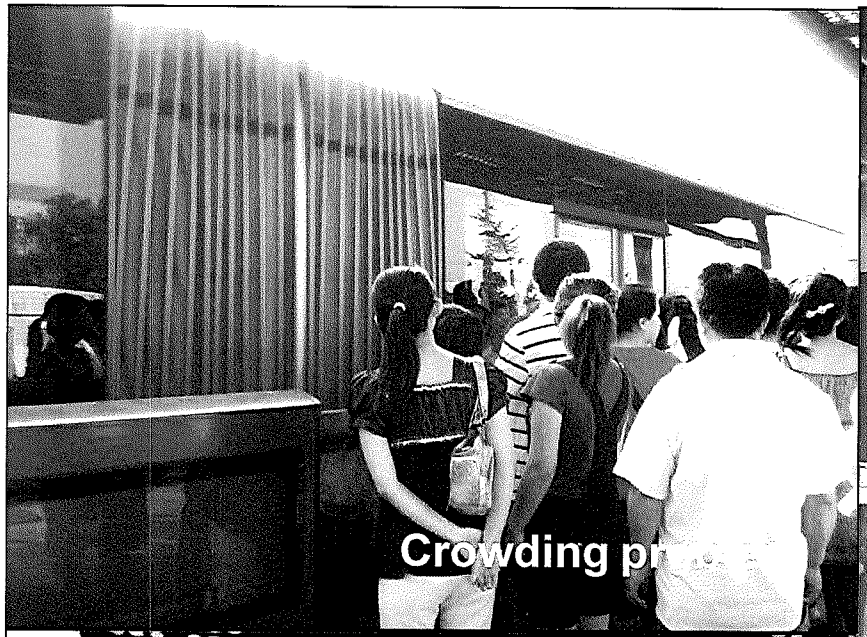
- Suggestions for improvement:

  - Address overcrowding problem
  - Vehicle interior: not always kept clean
  - Shelter: does not provide passengers effective protection from the bad weather.

Satisfaction with the BRT service in Beijing (N=525)



Travel-related characteristics: some problems (Beijing)



Crowding pr

Vehicle interior

Station problem

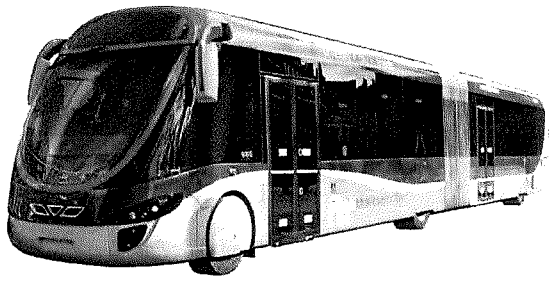
How does BRT compare with other Mass Transit Systems?

(*Sources:* Vuchic (2005); Zhang (2009); International Energy Agency (IEA) (2002)

Transport Mode	Bus Rapid Transit	Light Rail Transit	Metro
Right-of-way Requirements	Mainly shared right-of-Way (at-grade) or exclusive right-of -way or arterial lanes	Exclusive right-of-way (elevated) or shared right-of-way (at-grade)	Exclusive right-of-way
Support	Roadway	Steel track	Steel track
Vehicle propulsion	Internal combustion Engine	Electric	Electric
Vehicle control	Mainly visual	Sign control	Sign control
Construction time	< 18 months	2 to 3 years	4 to 10 years
Space requirement	2-4 lanes taken from existing road	2-3 lanes taken from existing road	Little impact on existing road
Flexibility	Flexible in both implementation and Operation	Limited flexibility, somewhat risky in financial terms	Inflexible and financially risky
Direct impact on traffic flow	Depends on design/available space in roadway corridor	Depends on design/available space in roadway Corridor	Does not take space away from Roadway
Maximum Capacity (passenger/unit)	160	170 – 280	240
Minimum headway (seconds)	12 – 30	75 – 150	120 – 150
Maximum frequency (Transit units per hour)	120 – 300	24 – 48	24 – 30
Line capacity (passenger/hr)	Medium 9,000 - 30,000	Medium 12,200 - 26,900	High 67,200 - 72,000
Maximum Speed (km/hr)	60 – 70	60 – 80	70 – 100
Commercial Speed (km/hr)	15 - 25 (higher for some commuter systems)	15 – 25	30 – 40
Average Capital Cost (2000 $/mile) (millions)	$13.46	$34.70	$168.51
Average Operation Cost (2000 $ per vehicle revenue mile)	$4.73	$12.22	$8.54

Performance issues

- Improving vehicle speed is probably the most fundamental goal
- BRT systems that operate on exclusive busway generally experience the most travel time reliability
- Most advanced BRT systems utilize fast boarding techniques
- Vehicle design is important, especially in high demand periods
- It is possible to create a high perception of BRT amongst the general public
- How “permanent” is BRT?



Cost issues and externalities of BRT

- Typically, the overall capital and operating costs for BRT systems are less than similar rail-based systems

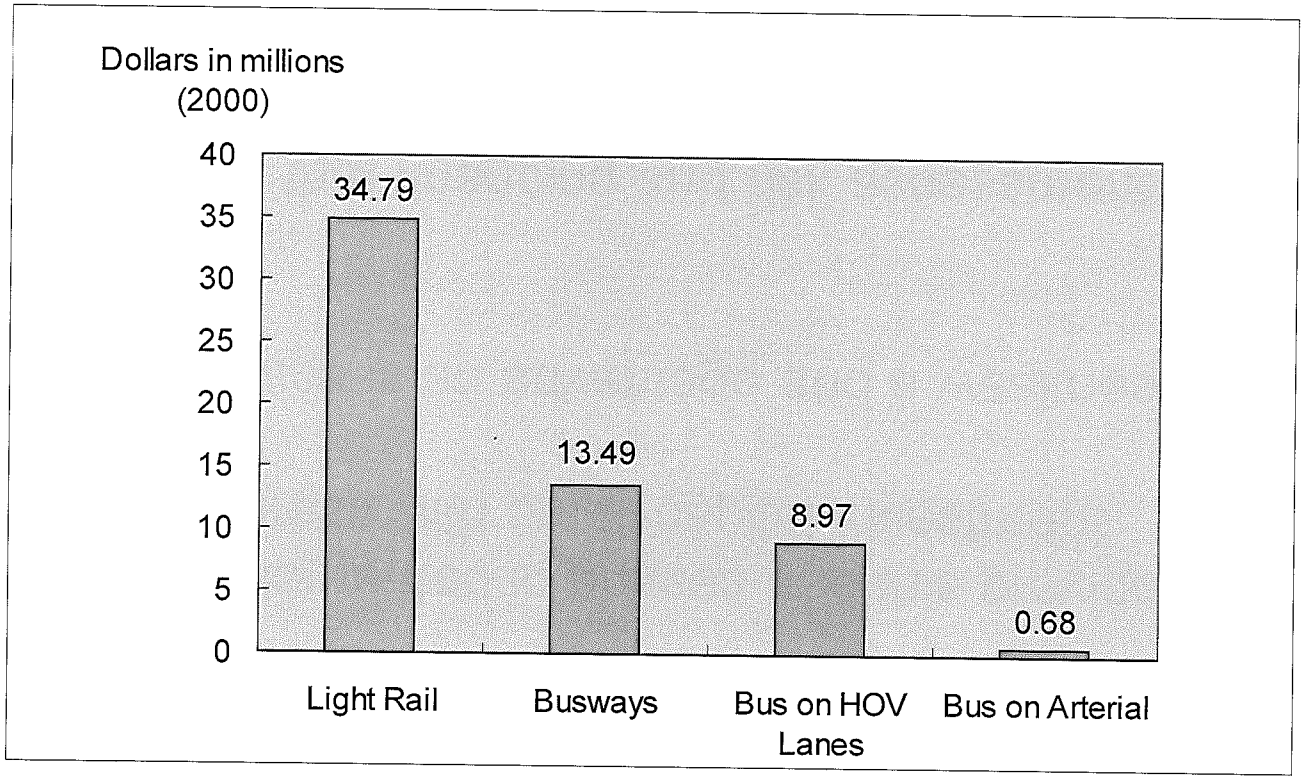
- BRT has the ability to deliver a high-quality mass transit system but impose less burden on subsidy

- Extensive BRT systems can be built within a short period

- Evidence relating to operating cost is mixed

- As with any form of public transport there are concerns about negative impact on urban life

Capital cost per mile for LRT and BRT



Source: U.S. Government Accountability Office, 2001, p17

Note: Cost adjusted to fiscal year 2000 dollars

BRT and Land Development

- It is widely appreciated that mass transit systems may have a positive effect on the timing or probability of land development

- BRT can be implemented in phases and this provides a good opportunity to show early progress with small capital investment

- Flexibility of service is an advantage and a weakness; issues of permanence

- It can be argued that financing and risk assessment are the main factors affecting "Transit Oriented Development" (TOD) policy rather than rail versus bus

- Growing body of evidence that BRT systems have a positive development on land value uplift

Impact on Land Development of Selected Bus Rapid Transit Systems

Authors	City	BRT system	Land Development Impact
Rabinovitch and Hoehn (1995)	Curitiba	Surface Metro	High density residential and commercial development occurred along BRT corridors.
Rodríguez and Targa (2004)	Bogotá	TransMilenio	After only 2-years of operation of BRT, residential rental costs increased between 6.8% and 9.3% for every 5 minutes walking time to BRT stations.
Diaz et al. (2009)	Boston	Silver Line	Development has accelerated along the corridor. Silver Line Phase I has generated at least US $ 93 million in new development, involving a mix of retail, housing and institutional uses.
Diaz et al (2009)	Los Angeles	Orange Line	The transit agency is considering joint development with large multi-unit developers to construct over two million square feet of development at several stations.
Diaz et al (2009)	Las Vegas	MAX	One casino operator has already invested in pedestrian facilities and an additional station.
Diaz et al (2009)	Orlando	LYMMO	The local authority has used the BRT as a tool to promote development. 5 new office buildings with about 1 million square feet per building and 6 new apartment communities have been developed in downtown, possibly resulting from BRT.
Levinson et al (2003ab)	Pittsburgh	East Busway	59 new developments within a 1500-ft radius of station. $302 million in land development benefits, of which $275 million was new construction.
Levinson et al (2003ab)	Ottawa	Transitway	The construction of the Transitway has led to up to U.S. $675 million in new construction around transit stations
Levinson et al (2003ab)	Adelaide	Guided Busway	Tea Tree Gully area is becoming an urban village.
Levinson et al (2003ab)	Brisbane	SouthEast Busway	Property value near BRT stations grew 2 to3 times faster than those located in non-busway suburbs.
DFT (2008)	Kent	Fastrack	The second Fastrack route was fully funded by the developer (ProLogis), as part of the first major mixed-use regeneration project in the Thames Gateway.
Cervero and Kang (2009)	Seoul	BRT	Land use along BRT corridors was intensified. Within 300 metres of BRT stations, residential land values gained premiums ranging from 5% to 10%; within 150 metres of BRT stations, non-residential land values gained premiums varying between 3% and 26%.

Conclusions

- Rapidly worsening traffic congestion has prompted policy-makers to look for environmentally friendly transport modes to mitigate traffic problems.

- For many years rail-based transport systems, such as Metro and LRT, have been the preferred transport improvement options. However, the high capital cost and consequently high operating cost have limited their development in many budget-constrained cities.

- BRT presents a cost-effective and flexible alternative for high-performance transit services, which have increasingly gained interest to policy-makers. In order to improve sustainable mobility with less expenditure, many cities across the world have launched ambitious programmes of BRT system implementation with varying success.

Conclusions

- An appropriately designed BRT system offers a high-quality transport service, comparable to a rail service but at a relatively low cost and short implementation time.
- In common with other forms of Mass Transit, a BRT system has the potential to offer positive impact on land development.
- Bus services are conventionally perceived as slow, polluting, and unreliable by the public, which in turn causes stakeholders to hesitate to consider investing in BRT.
- Understanding the full impacts of BRT is becoming increasingly important, especially as land value uplift conferred by BRT could be part of a strategy contributing to BRT project funds.

Suggested References

- References in these slides may be found in: Deng, T and Nelson, J D (2011) Recent developments in Bus Rapid Transit: A review of the Literature. Transport Reviews, **31**(1), 69-96.

- The National BRT Institute is hosted by the University of South Florida, http://www.nbrti.org/

- Across Latitudes and Cultures - Bus Rapid Transit (ALC-BRT) is a Centre of Excellence for Bus Rapid Transit development implemented in Santiago, Chile, and financed by the Volvo Research and Educational Foundations (VREF), http://www.brt.cl/

- The EC-funded COST Action Buses with a high level of service (TU0603) has been established to better understand sustainable mobility in urban areas and to promote a useful way to enhance the bus image, http://www.bhls.eu/

- For a review of BRT vehicle types: http://citytransport.info/Buses03.htm

ITLS
Sydney

Thank you for your attention.

Questions and Comments?

Contact details:

Prof John Nelson:

j.d.nelson@abdn.ac.uk

John.D.Nelson@sydney.edu.au

CENTRE FOR
Transport Research