

9-21-2011

Transit mode and route decisions enabling transit oriented development

David Mepham

Bond University, David_Mepham@bond.edu.au

Follow this and additional works at: http://epublications.bond.edu.au/sustainable_development



Part of the [Urban, Community and Regional Planning Commons](#)

Recommended Citation

David Mepham. (2011) "Transit mode and route decisions enabling transit oriented development" 4th International urban design conference: Resilience in urban design. Surfers Paradise, Gold Coast, Australia.Sep. 2011.

http://epublications.bond.edu.au/sustainable_development/125

Transit Mode and Route Decisions Enabling Transit Oriented Development

Abstract

The contemporary approach to realising integrated land use and transit oriented development has focussed on the role of the land use planner and urban designer but the key enabling activities for integrated land use and transit oriented development can be seen as being realised in the transit planning process. The key enabling factors of interest here are the mode and system characteristics and the route and station locations.

This paper is focussed on the transit mode and system characteristics and their impact on integrated land use and transit oriented development outcomes. Flexibility versus permanency, transit corridor permeability versus segregation, open versus closed systems, urban penetration, short term transport versus longer term land use benefits and the project vision and image are explored as notable mode impacts on the urban environment.

The research is based on a review of policy and planning documents and a series of semi structured interviews with Council and GCRT staff involved in the planning and design of the Gold Coast Rapid Transit project between 1998 and 2008. This paper is based on a sub set of the authors PhD research which addresses how integrated land use and transit oriented development objectives shape the urban transit planning structure and process.

Acknowledgements

I would like to acknowledge the support of management and officers of Gold Coast City Council and the Gold Coast Rapid Transit project for their generous time and support for interviews, Bond University and Associate Professor Daniel O'Hare, GB Arrington and Gordon Price for their advice and support.

David Mepham
Post Graduate Fellow
Institute of Sustainable Development and Architecture
Bond University, Gold Coast, Australia.

Introduction

Delivering integrated land use (ILU) and transit oriented development (TOD) outcomes has primarily been the responsibility of land use planners and urban designers yet the critical enabling decisions are made in the transit planning process, mainly by civil engineers. The two key enabling factors in this process are the Mode and System Characteristics (MASC) and the Route and Station Location (RASL) decisions.

Decisions about MASC highlight the way in which the issues of vehicle capacity, frequency, speed and associated levels of corridor permeability/segregation have consequences for the RASL. Decisions about the RASL determine where the transit is going and where stations can be located. The route connects the stations which may be on the urban edge; in old rail corridors or adjoining other edges, rivers, arterial roads or freeways. Alternatively the route may be integrated into local road corridors enabling the positioning of transit stations where people work, live, shop or play and where a dense, mixed use urban environment or future urban renewal supports accessibility and future patronage for the transit system.

The decisions about MASC and the RASL are key transit planning decisions but they have important consequences for city building and ILU/TOD outcomes. In the Gold Coast Rapid Transit (GCRT) it can be seen that the MASC and RASL decisions are influenced strongly by the ILU/TOD objective and the related land development benefits in the corridor. This research is based on the planning and design experience of the GCRT project, a light rail project which was an initiative of Gold Coast City Council in the 1998 City Transport Plan (CTP). This one billion dollar, thirteen kilometre transit project will operate along the dense Gold Coast lineal corridor and is planned to be operational in 2014.

This paper forms one component of the authors PhD which examines the way in which integrated land use and transit oriented development objectives influence the transit planning process. The research is based on semi structured interviews with people involved in the design and planning of the Gold Coast Rapid Transit project between 1998 and 2008. The research is intended to highlight the way in which the urban transit planning process has important consequences for ILU/TOD outcomes.

Concept Design and Mode and System Characteristics (MASC)

The Terms of Reference developed in the initial planning stages of the project set the criteria to be met by the GCRT to ensure that it would provide a service that was fast, frequent and reliable and could meet initial and projected demand. The criteria included capacity, operational ability, vehicle design and characteristics, reliability, safety, sustainability and environmental impacts. The GCRT vehicles were required to satisfy standards of patronage, passenger comfort and accessibility and be economically viable in capital and operating costs (GCRT 2009c: 46). Mode options were investigated based on system capacity, proven technology, future demand, city building, value for money, level of service and community preference (GCRT 2009c: 51). Both Bus Rapid and Light Rail Transit met the criteria but light rail was able to realise the criteria with significantly less risk.

There is strong international evidence of the relationship between light rail and city building benefits such as a positive urban image and higher quality development at key nodes (TCRP Synthesis Report 20, TCRP Report 102) but when these benefits were assessed as part of the Business Case they were invalidated due to inconclusive data (GCRT 2009c: 56).

1998 – 2008 The Answer is Light Rail

The light rail concept on the Gold Coast can be traced back to the planning aspirations of the Albert Shire Council who, in the mid 1990's, invited light rail and TOD experts, including GB Arrington, from Portland Oregon to discuss the light rail potential for their rapidly growing centres (Power: 4.1). Following an amalgamation of councils in 1995 the idea carried over into the new Gold Coast City Council.

At that time the light rail was also being considered for the inner Brisbane area and was a mode option flagged in both the 1995 Regional Framework for Growth Management and the 1997 Integrated Regional Transport Plan. The Gold Coast Line Haul Foundation and Feasibility Study in 1998 determined mode and route options for the city and in September 1998 the Gold Coast City Council release the CTP which outlines the light rail project attracting national attention. Council and the State commence the "Gold Coast Light Rail Feasibility Study" in 2004 and this informs the formal investigation for the GCRT from 2006.

The advocacy for the light rail project is a consistent theme through the commentary of senior Council land use and transport planning officers. The Director of Planning Environment and Transport, Warren Rowe notes that from the beginning "... the answer was always light rail, and very early in the piece we adopted the, whenever anyone asked, whatever the question was, it was always light rail" (Rowe: 7.18). The first manager for transport planning and architect of the CTP, Ken Deutscher (1997/98), explains that the light rail concept had a practical and symbolic function, "... to send a message that things were going to be different it [CTP] was launched always as a light rail project because transport planning knowledge was pretty clear that this was the appropriate mode" (Deutscher: 3.2).

The second manager for transport planning, Rod Grose (1998/2010), establishes the project financial case and funding framework demonstrating Council's serious bid for the project. Council's proactive role on the light rail can be contrasted with that of the State, where the light rail was being 'pushed from the Gold Coast end and ignored at the Brisbane end' (Grose: 1.14). The State's position is shaped by their experience in Brisbane where there had been success with the busways whilst a series of light rail proposals for the city had failed.

The State's position was reflected in the Concept Design and Impact Management Plan (CDIMP) and Business Case process which required a detailed evaluation of both Bus Rapid Transit (BRT) and Light Rail Transit (LRT). Earlier investigations had established that in principle both BRT and LRT met the transport needs of the corridor. Other modes such as monorail were evaluated and eliminated as was the option of tunnelling.

Connecting the mode to a higher level vision

Whilst the CDIMP and Business Case tend to deal with the mode as a transport issue the commentary reflects a wider range of factors in the mode decision (Deutscher: 3.15, Case: 12.15, Kozlowski: 10.10). Council has tied the light rail, from its conception to a bigger, wider 'city building' vision for the city (Grose: 1.3, Deutscher: 3.9). The light rail is a vehicle for change and was always about realising a range of policy objectives (Rowe: 7.2) and it is these City Building objectives that become a key feature of the successful bid for \$365 million of Infrastructure Australia funding from the Federal Government (Boersma: 9.6).

Council's advocacy for light rail in the urban environment is well supported by international research such as the TCRP Synthesis Report 20 which highlights the symbiotic relationship

between rail transit and positive land use outcomes (TCRP 1997). The shaping of the project from the mid to late 1990's is also a time when the ideas of New Urbanism, Smart Growth and Transit Oriented Development are developing and it is evident that these ideas are influential in the thinking of leading Gold Coast planners. This is also reflected in Council's significant contribution to regional land use and transport policy at this time (Power: 4.8, Rowe: 7.8, Papageorgiou: 6.10).

GCRT Project Director, Tim Poole notes the way in which the mode characteristics came into play with the land use objective and the economic costs and benefits associated with the permanency of the system (Poole: 13.6). The issue of residual land value comes into this equation in an unprecedented way when Treasury count the residual land value in the business case (Grennan: 13.4).

The evolving theme around the mode and system characteristics is the growing focus on a higher level vision to enhance the corridor environment and to realise the significant, albeit longer term redevelopment opportunities. In this respect the design approach may be more aptly described as "Development Oriented Transit" (DOT) with the active focus on the mode as a catalyst for development and urban renewal. This is in contrast to the TOD approach which is by definition development oriented to transit.

The corridor was seen as "good territory to put the transit in" (Deutscher: 3.10), the power of the beach as a real estate anchor is important (Bitzios: 2.49) and there is already "heaps of development" (Grose: 1.18) and it is the right type of development (Papageorgiou: 6.18). Sections such as Southport are seen as sites for urban renewal and the light rail capacity for redevelopment in Southport is an important political driver for the project (Baildon: 5.11). The faith in light rail as a catalyst for change in this environment is highlighted by the support of the development industry (Power: 4.14).

The distinction between DOT and TOD clarifies the particular approach to the design of the light rail transit in the Gold Coast urban environment, one where the development is not subordinated to transit; rather, it shapes the transit design.

The project can be seen to evolve in response to its unique urban environment and the unusually strong planning and urban design values. However this underpins a view that those outside the project space were not understanding the higher level vision, that they were not 'getting it' (Bitzios: 2.39, Brooke: 2.40, Power: 4.4, Rowe: 7.9, Carroll: 8.7, Chang: 11.9, Molhoek: 14.10). People did not understand the light rail because they had not seen it (Bitzios: 2.39, Brooke: 2.40, Chang: 11.9) or they were not looking to the future (Molhoek: 14.4) they were uninformed about the problem (Carroll: 8.7) or they do not understand the scale of change in the city associated with the project impacts (Rowe: 7.19).

The views of those involved in the planning and design of the project develop over time and Council's advocacy for the land use objectives becomes an evolving theme as the project develops but it is evident that many outside the project space do not "get it" reflecting the growing realisation that the GCRT was going to be more than just a transport project.

Image of the Mode

The higher level vision for the project, that is a vision of transit beyond its pure transport function, poses a challenge with people 'getting it', alternatively the public attention is focused more on the visual imagery of the mode in the urban environment.

The consultation results show community support for the light rail (GCRT 2009d). As the CDIMP and the mode debate progress firstly Queensland Transport and then the bus lobby respond to the image issue with visuals of the BRT looking very similar to the LRT, "almost building a light rail system with a motor and tyres" (Brooke: 2.25),

In the imagery of the project they looked similar, the vehicles looked similar the stations looked similar. The other day there was an article about the extensions of the light rail and the vehicle in it was the bus... (Chang: 11.11)

On the whole the imagery associated with the system is not a major driver within the project but it is seen as an important issue for the community and the project can be seen to have responded to this. The issue of light rail over bus is also seen as symbolic for the city, its meaning in terms of the value of the city, what the city deserves (Molhoek: 14.16).

GCRT Communications Manager, Anna Carroll notes how the 'sophisticated' and 'sexy' transit image is considered very important to the wider community (Carroll: 8.12). The light rail is seen as fitting with a desirable image for the city and this resonates with politicians and in the community (Poole: 13.10, Molhoek: 14.15, Power: 4: 16, Papageorgiou: 6.30).

The light rail capacity is associated positively with improved traffic impacts and a better pedestrian experience in Surfers Paradise (Gross: 1.10) although this can be contrasted with the scenario being promoted by opponents to the light rail which focussed on the older tram systems where trams congest the road space (Power: 4.6, Seymour Smith: 16: 10).

The overall image and perception of the light rail resonates with the wider community and shapes the project over and above its transport task as part of a desirable vision for the city, even if the project and the community have different understandings of what that actually is. The light rail image is seen as a good fit with the desirable image of the city, one supporting transport and tourism and the wider city building objectives for the city.

Mode Cost, Flexibility and Permanency in the Urban Environment

The mode debate was substantially shaped in the early days of the CDIMP process by two leading Australian transport academics, Professor Peter Newman and Professor Graham Currie who were each invited to address Councillors on the benefits of LRT and BRT options respectively. In April 2007 Newman spoke on the light rail transit benefits emphasising its permanency and positive impact on land use and the urban environment (Newman: 2007). In May 2007 Professor Graham Currie spoke of the benefits of Bus Rapid Transit noting that it was cheaper at one fifth of the LRT construction cost and cheaper to operate, as an open system would require no forced transfers and had flexibility benefits with the ability for on street running compared to the permanency of light rail (Currie: 2007). In these two key presentations the mode debate was significantly defined.

The issues of cost, flexibility and permanency are consistent themes in the debate but it is apparent that the respective strength of the bus/BRT option as cheaper and flexible is viewed negatively in the context of Council's vision for urban change, "one of the

advantages of the bus, also one of its key disadvantages, is in its flexibility” (Bitzios: 2.29). Alternatively it is the permanency of light rail that supports the longer term land investment objective (Case: 12.12, Molhoek: 14.11, Power: 4.15). GCRT Project Director, Tim Poole, notes that light rail permanency underpinned the confidence about the business and land use planning benefits in the mode evaluation process (Poole 13.6). After the mode evaluation is complete the LRT and land use relationship is then a key element in the projects funding submission to Infrastructure Australia (Carroll: 8.6, Boersma: 9.6).

The advocacy for the BRT as a cheaper and flexible transport alternative to the LRT can be seen as out of alignment with the objectives of Council, and later the Federal Government, to realise the project not only as a transport project but to also realise wider city building and urban transformation outcomes.

Transit Corridor Permeability as a TOD enabler

The permeability of the transit corridor is a feature of the MASC impacting on route and station locations (RASL). Transit Corridor Permeability (TCP) refers to the way in which the transit corridor integrates into an active urban environment and the ability for people to move through and over the corridor space so that the transit is not a barrier to other activities. TCP can be seen as a key factor in the RASL on the edge versus the urban centre.

TCP is related to MASC through capacity and frequency characteristics. The normal light rail capacity of 250 to 300 plus people compared to a traditional bus carrying 50 to 70 people, or a larger BRT carrying 100 to 150 people result in different capacity outcomes and different frequencies. Low capacities require higher vehicle frequencies hence a higher degree of segregation (Gross: 1.22, Chang: 11.13, Seymour Smith: 16.9). The frequency and speed of vehicles and the importance of time efficiency and reliability in the system can be a consequence of the system being open or closed, i.e. does the system cater for a set number of vehicle movements or can all vehicles access the system? In the GCRT the BRT system was proposed to be closed however the thinking about BRT design options is influenced by the open Brisbane and Adelaide BRT systems and international BRT where the transport objective has been efficiently realised in highly segregated corridors.

A fully segregated system is associated with greater system capacity (Seymour Smith: 16.10) and there are “far greater efficiencies” associated with the open bus system to the point that “it is very difficult to see how it would stack up as a closed system’ (Bitzios: 2.31).

The idea of a permeable transit system was embraced as one of the key objectives within the project from an early stage: “... we had already got rid of the overhead monorail concept, we had got rid of any notion of tunnelling and got rid of the idea of creating any strong barriers” (Poole: 13.11). This is a response to the vision of a transit system running substantially in a dense and active urban environment (Deutscher: 3.16, Seymour Smith: 16.13) and to provide access to the centre so that city building and land development objectives can be realised (Seymour Smith: 16.14).

Looking at international case studies there are many light rail systems that run into dense urban centres but the project found it difficult to find BRT systems that achieved the same level of urban penetration (Chang: 11.14). The Brisbane bus experience is an international best practice transit system but its efficiency is a consequence of its segregation and was not seen as unsuitable for the Gold Coast project (Poole: 13.11). GCRT Engineering Design

Leader, Leon Seymour Smith notes the problems of segregating the system, and the need “to support active modes and look at more sustainable travel patterns by integrating it at ground level” (Seymour Smith: 16.18). Corridor permeability is also associated with the capacity to have other social and economic activities adjoining the system:

... the important thing is that station is permeable and the station itself is a public space... There are a few examples in Strasbourg and Amsterdam. I saw tram station that was absolutely adjacent to a vegetable shop the guy had the stalls outside and you stepped of the tram right into that shop and I thought oh my god this is fantastic... it is critical not to segregate and to make it a public space with active frontages and people congregating, sitting (Kozlowski: 10.17).

The importance of the transit integrating into and enhancing the social and economic life of the city ties into the European imagery that was important in the community support for the project. The commentary shows the land use objective evolving through the course of the project development with civil engineering objectives aligning with the preferred urban design outcomes. The city building objective is realised in the commitment to the permeability of the system to recognise complementary activities that can occur in close proximity to the system (Bitzios: 2.24, Seymour Smith: 16.13, 16.14).

Centre versus the Edge

A key issue in the discussion following the TCP and MASC discussion is the importance of mode penetration into the centre of the urban environment. The urban design objective was a significant factor in ensuring that transit would run in the urban centre, not the edge.

Council realised this objective partly through the shaping of the urban design framework for the CDIMP which emphasised three key objectives: Transit Oriented Community, Placemaking and Green Boulevard. Chapter Five of the CDIMP drives the urban vision for the project. GCCC Urban Design Team Leader, Dr Marek Kozlowski, notes the significance of the mode in this vision: “Trams are a mode that integrate much better than bus. You have heaps of good examples of trams in Europe, and they have very good integration with pedestrians, with the surrounding uses, you cannot picture that with a bus...” (Kozlowski: 10.7)

The issue of mode integration in the urban centre is tied to walkability, accessibility and lifestyle objectives (Brooke: 2.36, Deutscher: 3.15, Case: 12.13). The walkability defines the development catchment (Baildon: 5.11, Papageorgiou: 6.19) and the qualities of the light rail: fixed track, manoeuvrability and amenity, are qualities cited as factors in achieving urban penetration and accessibility (Grose: 1.27, Brooke: 2.36).

The issue of mode penetration into urban centres was a key design issue for the project but it is in Southport, the business hub for the Gold Coast, that the mode and route issues came to a point for the project and the community. One route option, Marine Parade, ran on the outer edge of the centre with fewer impacts, costs but provided low accessibility and development potential. The second route option, Scarborough Street, was the main street of the centre with significant costs, risks and impacts but higher accessibility and significant development potential. GCRT Project Director, Tim Poole, highlights the significance of this decision and the relationship between the mode and route:

Our first real test of the design of the system, the integration with light rail, was making the tough decision about going through the centre of Southport rather than on the edge and that is where we introduced the notion to the community that this is about taking people to where they want to go, and Council's planning in the heart of Southport around very dense land use, and this was a way of activating that. That is when, certainly within the project team and to a lesser extent within the community, we started to understand that this was being designed as part of the future of the city and then when it came to justifying why light rail instead of BRT it started to become easier (Poole: 13.7).

The commitment to light rail as a vehicle for land use change becomes very clear within the project at this stage but communicating this to the wider community runs up against vested interests and genuine concerns. The Southport Chamber of Commerce campaigned strongly for bus/BRT and they wanted the route to run around or even under the centre: "Some of them [Southport] thought that transport is better at the back of the city, rather than the centre of the city... If it was a BRT maybe there could be an argument behind that but with a light rail it should go in the central part of the city" (Kozlowski: 10.13). PET Director, Warren Rowe, asked if he could see BRT running down Scarborough Street, states: "I can, but it is the lesser by a long way to get the sort of land use outcomes" (Rowe: 7.20). The determination to run to in centre is also associated with an appropriate level of accessibility: "It's about putting the transit where people want to be and where people want to use it. There is no sense putting a system that stops ten or fifteen minute walk out of Southport, because people just will not walk the ten or fifteen minutes" (Gross: 1.29).

To resolve the route decision for the project the community were invited to participate in consultations on the options and to vote on the two route options. The matter was decided in favour of Scarborough Street but this raised an interesting problem as the mode issue had not then been resolved and the vision was for LRT to run in that constrained corridor to realise the accessibility and the land development potential in that space and to ensure an appropriate level of permeability (Chang: 11.14).

In the Southport debate it becomes clear that the mode, route and land use objectives are inextricably linked for those shaping the planning and design of the project. For Council the permeable light rail running in a "Main Street" urban environment is the key to the bigger vision of urban renewal, supporting an accessible transit oriented, walkable lifestyle.

Mode and System Characteristics Conclusion

This research finds that Council has a firm view in favour of light rail underpinned by the need to realise integrated land use and transit oriented development outcomes and this shapes the transit project from its conception. The integrated land use objective can be seen to evolve and shape the project in its mode and system characteristics and route and station locations.

The modes are promoted differently, BRT as cheaper and flexible, LRT as more expensive but higher capacity, fixed and permanent. Within the project the issue of permanency underpins the confidence that the light rail is able to be a catalyst for land use change and is considered more favourably than the flexibility of the bus. The 'city building' vision is not perceived to be well understood but the positive LRT image with its European look and feel aligns with the desirable image for the city and supports the urban nature of the project.

References

- Bentley, Ian, Alcock, A., Murrain, P., McGlynn, S., Smith, G. (1985) "Responsive Environments – A Manual for Designers", Architectural Press: London.
- Carmona, Mathew & Tim Heath, Taner Oc, Steve Tiesdell. (2003) "Public Places, Urban Spaces", Architectural Press: Oxford.
- Gold Coast Light Rail Feasibility Study, (2004) Parsons Brinckerhoff/PPK, Website: <http://www.pb.com.au/gclightrail/>
- Gold Coast City Council, (1998) "Thirty Year Transport Plan", Gold Coast. http://www.goldcoast.qld.gov.au/t_standard.aspx?pid=7644
- Queensland Government, (2009a) South East Queensland Regional Plan 2009-2031: Brisbane.
- Queensland Government, (2009b) South East Queensland Infrastructure Plan and Program (2009-2031: Brisbane.
- Queensland Government, (2010) Transit Oriented Development: Guide for Practitioners in Queensland, Growth Management Queensland: Brisbane.
- Queensland Government, Department of Transport Queensland, (2009c) Concept Design and Impact Management Plan – In Brief Document: Gold Coast.
- Queensland Government, Department of Transport Queensland, (2009d) Concept Design and Impact Management Plan, Chapter Five – Urban Design and Landscape: Gold Coast.
- Queensland Government, Department of Transport Queensland, (2009d) Concept Design and Impact Management Plan, Volume 2 - Impact Assessment, Chapter 22 – Consultation and Communication Report: Gold Coast.
- Queensland Transport (2009e) CDIMP Report, Volume 2 - Impact Assessment, Chapter 2 - Alignment Selection: Gold Coast.
- TCRP Synthesis Report 20. (1997) "Transit-Focused Development, A Synthesis of Transit Practice" <http://onlinepubs.trb.org/onlinepubs/tcrp/tsyn20.pdf>
- Transit Cooperative Research Program (1997), Synthesis Report 20, "Transit Focused Development". Website - http://www.trb.org/Publications/Blurbs/TransitFocused_Development_153675.aspx
- Transit Cooperative Research Program Report 102, "Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects". Website - http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_102.pdf
- Personal interviews conducted between February and June 2011:
Arrington, GB; Baildon, G; Bitzios, A; Boersma, A; Brooke, S; Carroll, A; Case, B; Chang, M; Deutscher, K; Grennan, P; Grose, R; Kozlowski, M; Molhoek, R; Papageorgiou, M; Poole, T, Power, D; Price, G; Rowe, W; Seymour Smith, L.