

Key elements of city shaping projects: A practitioner's perspective

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Abstract

For most of the 20th Century, transport planning focused on the 'predict and provide' approach, where transport investment responds to transport demand alone. More recently, there have been a number of city shaping transport projects in Australian cities where an integrated transport and land use approach could be considered in project development. However, integrated transport and land use planning for major infrastructure projects has the potential to be more widespread and well understood by practitioners. These city shaping projects change where people choose to live, work and play, and where businesses choose to locate - ultimately influencing urban form. Moving from the traditional 'predict and provide' approach to a vision-led, integrated transport and land use planning, enables the broader land use and economic vision to be realised, providing a better outcome.

This paper explores three key elements to be considered to improve the development of integrated transport and land use (or city shaping) projects. The Sydney Metro West project is explored as a case study to demonstrate its city shaping potential. The paper will touch on the (1) transport and land use drivers, (2) justification for long term outcomes, and (3) partnerships required for success. This paper provides practitioners with a better understanding of key elements to consider when planning for city shaping projects and outlines further considerations on the way forward.

1. Introduction

Many rail projects in the 19th and 20th century were developed to open up new areas for advancement including expanding city boundaries and linking country areas back to the city and ports. Post World War II, the advent of relatively cheap mass produced motor vehicles enabled roads to be more effectively used, to open up more areas for city development. As the cities developed and roads began to fill, there became a need for more congestion busting projects. Modern economic appraisal techniques together with advances in computers and predictive transport modelling enabled detailed assessment of the most efficient approaches to manage congestion.

This now traditional approach of 'predict and provide' has been the norm in transport planning whereby future demand is forecasted and the transport infrastructure is built to meet this demand. This traditional approach focuses on the transport benefits predominately from public transport and road user benefits. However there has been a growing need to deliver projects from an integrated transport and land use perspective, to showcase that integrated transport and land use planning creates a more sustainable city and supports the city's vision from more than just a transport perspective. This paper explores three key elements to be considered to improve the development of integrated transport and land use (or city shaping)

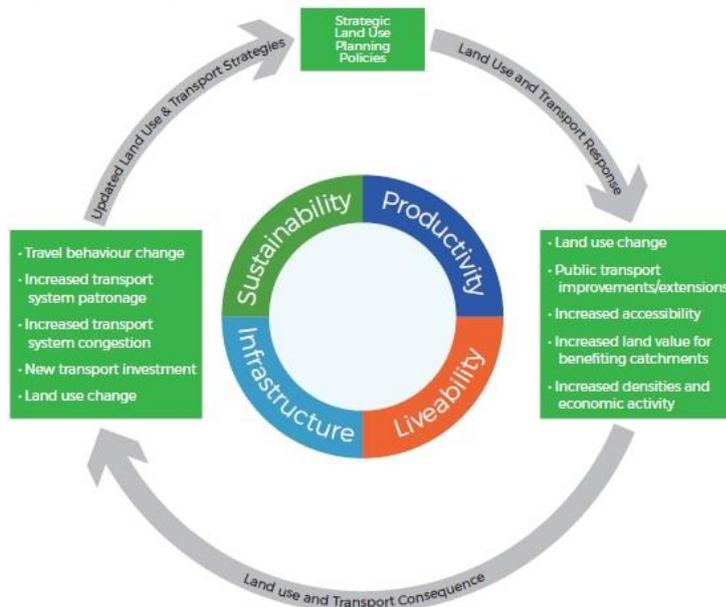
projects. These include defining the transport and land use drivers, justifying long term outcomes, and developing partnerships required for success. More recently, city shaping projects, such as the program of Sydney Metro rail projects, transform the city not only by providing a transport solution but unlocking land capacity and place-making to support a future city vision. The Sydney Metro West project is explored as a case study to demonstrate its city shaping potential. The need for more guidance in developing city shaping projects is also explored.

2. Strategic context

2.1 The transport and land use relationship

There is a strong nexus between transport and land use. Changes in land use in an area will increase pressure on the existing transport network, increasing demand for new transport infrastructure. Conversely, the provision of new transport infrastructure unlocks development, attracts jobs, increases population, and changes the urban form. Integrated planning means that transport decisions take account of (and support) land use considerations, and land use decisions take account of (and support) transport system considerations (Government of South Australia, 2015). The transport and land use relationship is explained in Figure 1. Transport infrastructure is delivered as a result of transport and land use planning decisions. The new transport infrastructure provides improved accessibility generating demand for additional development and providing land value uplift as well as rezoning land to its highest and best use. This facilitates a change in travel behavior and increases demand on the transport system which then feeds back into the review of transport and land use planning policies. Throughout the process, the benefits of integrated transport and land use planning are realised through increased economic activity and more sustainable and liveable communities.

Figure 1: Integrated transport and land use (courtesy, Mecone 2018)



Major transport infrastructure in particular can have significant implications for land use outcomes. Rawnsley et al. (2014) identifies the importance of strategic infrastructure:

Strategic infrastructure comprises a relatively limited number of projects, almost exclusively in the transport domain, which have the power to shift relative accessibility. These projects drive the location decisions of households and firms, and can create agglomerations that boost productivity.

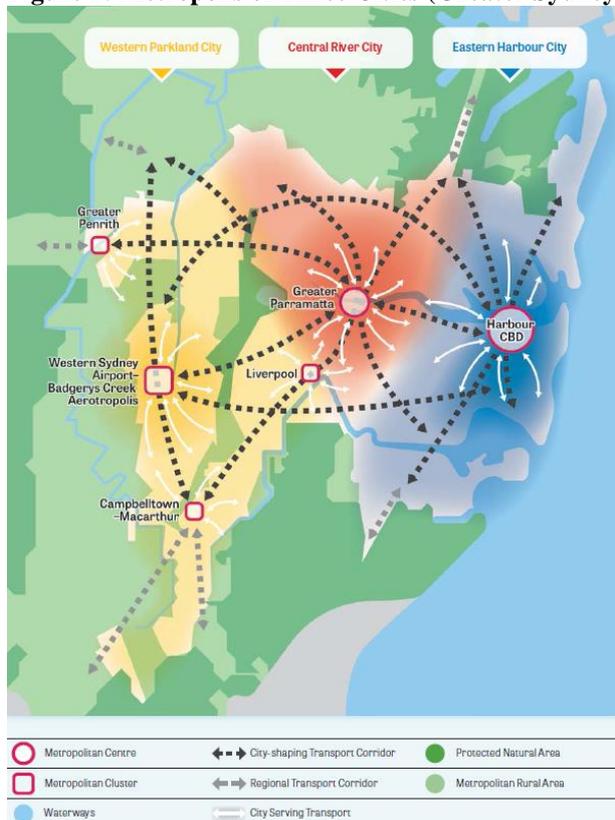
Failure to adopt an integrated approach for projects with great city shaping potential will be at the expense of achieving typical city visions for a more liveable, compact, sustainable and well connected city. The challenge for city shaping projects is to explore the role of transport infrastructure not only to serve the city whereby it responds to changes in land use, but instead takes a more active role to achieve the city's vision.

2.2 NSW Integrated transport and land use strategic plans

By 2056, it is forecasted that there will be 12 million residents living in NSW, making about 28 million trips a day (Transport for NSW, 2018). To accommodate this growth, various strategic plans have been developed in NSW. The Future Transport Strategy 2056 is an overarching strategy, supported by a suite of plans to achieve a 40 year vision for the NSW transport system. It acknowledges the vital role transport plays in land use planning by working closely with various government agencies such as the Greater Sydney Commission, Infrastructure NSW, the Department of Premier and Cabinet and the Department of Planning and Environment (Transport for NSW, 2018).

Planning and investment for Greater Sydney is centred on a vision for a Metropolis of Three Cities: The Western City (Western Sydney Airport), the Central City (Greater Parramatta) and the Eastern City (Sydney CBD), as shown in Figure 2 (Greater Sydney Commission, 2018). Delivering this vision requires integrated transport and land use planning where people can access jobs and services in their nearest metropolitan and strategic centre.

Figure 2: Metropolis of Three Cities (Greater Sydney Commission, 2018)



The Metropolis of Three Cities vision identifies an integrated network of corridors, each with a land use vision and infrastructure required to facilitate the efficient movement of people and freight. Identifying the role of corridors will enable specific transport planning and infrastructure to guide the way development should occur and provide outcomes that align to the role of each corridor. The hierarchy of corridors is further expanded in the Future Transport Strategy 2056 to include:

- **City-shaping corridors** - Major trunk road and public transport corridors moving a critical mass at high speed and volume between cities and centres that shape locational decisions of residents and businesses eg. Metro service;
- **City-serving corridors** - Higher density corridors within 10km of metropolitan centres providing high frequency access to metropolitan cities/centres with more frequent stopping patterns; and
- **Centre-serving corridors** - Local corridors that support buses, walking and cycling, to connect people with their nearest centre and transport interchange.

Understanding the role of the corridor can shape the type of transport infrastructure required. For example, investment in strategic (city shaping) transport infrastructure such as a metro rail system supports the city-shaping corridor as it has the capacity to move a critical mass between cities, as opposed to light rail. Strategic transport infrastructure has the power to change accessibility across the metropolis, driving where people choose to live and where businesses are located. They also create new agglomeration economies, boosting productivity (Transport & Infrastructure Council, 2016). These strategic plans provide the context for the development of city shaping projects.

3. Three key considerations critical for successful city shaping

3.1 Transport and land use drivers

City shaping projects require consideration across multiple disciplines – both transport and land use drivers. Most importantly, having a clear vision for the city guides decision making. The Metropolis of Three Cities provides a clear vision and direction for the future of Greater Sydney. There is an evidence-based need for city shaping transport infrastructure to help achieve this vision, along with land use change. But often major transport infrastructure is seen out of context or part of a political rhetoric without robust drivers to justify such large investments.

The following points discuss ways to optimise transport and land use drivers, in the context of a city shaping rail project:

- **Updating the economic character and demographics of station precincts to better reflect changes in land use** – The typology of the station precinct, such as the employment type and industry mix, should be reflected in the transport model. This will capture the change in a precinct’s economic character. For example, a precinct that is mostly industrial takes on a different economic character after redevelopment (i.e. mixed use).
- **Getting the right trip attractors** – When deciding on station options, the balance between origin and destination stations should be considered. That is, linking residential areas to trip attractors such as employment centres, education and retail precincts (which have a relatively higher public transport usage) and connecting employment centres, will generate a higher level of demand.

- **Transport design** – Optimising customer transfer at transport interchanges to drive travel time benefits and optimising transport integration (i.e. road and local bus networks within centre-serving corridors to improve access to the metro station or bus or light rail feeder services).
- **Finding a balance between travel time benefits and land use outcomes** – Fewer stations between major destinations is likely to provide a larger travel time saving between those destinations. However, this will limit accessibility to the transit system as well as limiting the potential of generating large land use benefits and the lost opportunity to support planned growth. On the other hand, having many stations is likely to increase patronage and land use benefit but the overall travel time saving is likely to be lower as some users receive a travel time disbenefit. Undertaking analysis on the marginal benefits assists in finding the right balance between speed and transport connectivity versus broader access and supporting urban renewal.
- **An integrated portfolio approach** – The benefits of co-ordinated transport and land use planning can also extend to the temporal management of a portfolio of transport and land use outcomes. The coupling of transport and land use outcomes and staggering their deployment together over time can enable a quicker take up of surplus transit amenity provided by the transport project and therefore maximising benefits.
- **Delivering local place-making outcomes and better design** – Major transport interventions, such as stations, provide a catalyst for urban renewal. Importantly, this does not necessarily equate to transformation of a place. The application of good place-making principles is critical for the success of a major transport project. Planning, design, engagement and implementation require a collaborative and iterative approach, as for example promoted in the NSW Government’s Better Placed policy (NSW Government, 2017).
- **Improving and broadening the transit network for the community** – The role of city shaping projects is not only to unlock future land use benefits but also serves to improve transit accessibility to areas that have the scale and density to support transport infrastructure but currently lacks it. It also creates the opportunity to broaden the geographical coverage of the existing transport network and opportunities for interchange locations. This provides benefits not only to those who access new stations, but other commuters who have improved interchange times and the option of having an additional travel path that may not have existed before. Broadening the transport network also serves to improve social equity by providing greater accessibility to jobs and services and greater housing opportunities to those of lower socio economic status.

3.2 Justification for long term outcomes

There are certain elements that are unique to city shaping projects because benefits are realised on a very long term timeframe. Some of these are discussed below.

3.2.1. *Productivity benefits catalogue*

The benefits of a city shaping project are further reaching than traditional transport benefits such as travel time savings and road user benefits. Major transport improvements are often associated with transformational impacts on local economies and an ability to connect businesses (Venables, 2007) as well as improving productivity from greater employment density in the form of agglomeration. Improved accessibility can also influence a business decision to locate, highlighting the effect transport has on urban form. A city shaping project

should consider these wider economic benefits that go beyond traditional travel time savings. In addition, urban renewal benefits are also integral for consideration, particularly the land value uplift and improved amenity that is generated. Other ‘indirect’ land use benefits such as environmental and sustainability benefits are also relevant to certain city shaping projects. Generally, decreases in energy consumption from infill living are brought about if additional housing in Greenfield areas are substituted for infill development (Trubka et al., 2009).

In addition to the quantification of benefits, the economic narrative is important in telling the transport and land use story. Part of this narrative includes clearly articulating the expected transport, productivity and land use benefits attributed to the project; evidence that the integrated transport and land use project will improve productivity and agglomeration; and how it will be measured.

3.2.3. City legacy outcomes

Major transport improvements are often associated with long term transformational economic outcomes that may never have been envisaged by their initiators, but have formed the key backbone for future network expansions. Or in some cases, initiators are themselves transformed into visionaries of their times. Local examples include the Sydney Harbour Bridge and the electrification of the Sydney suburban rail network. Both projects created fundamental transport improvements that enabled Sydney to expand and grow. International examples include megaprojects such as the Øresund Bridge, Tama Garden City Development Tokyo, High Speed Rail 1, Bay Area Rapid Transit San Francisco, or even the Suez Canal.

City shaping projects naturally create an economic legacy that goes beyond typical evaluation timeframes and envisages a future that is shaped by well-considered transit amenity. Consideration should be given to the benefits of increased land value, businesses development, international trade, tourism, skill development, knowledge sharing, advancements in technology or design and institutional reform. If planned well, investment in major transport infrastructure creates and sustains employment, improves productivity and competitiveness, benefits consumers through higher quality services and improves environmental outcomes (Flyvbjerg, 2017). Of course it is also critical to recognise the inherent risks and potential extraordinary negative outcomes of major projects if implemented poorly.

3.3 Strategic partnerships and governance

The very heart of an integrated transport and land use project is collaboration and the presence of strong institutional arrangements that facilitate cross sector collaboration. A complex city shaping project must be developed and co-ordinated in conjunction with key partners such as transport and planning agencies. It is not only done within transport agency disciplines (rail, road, bus, freight, active transport) but also between agencies and between the layers of Government. The need for an integrated governance structure is increasingly important, the more complex the project is. Therefore, an inclusive and integrated approach to governance is vital for success.

Integrated governance is more difficult to achieve than collaboration alone, requiring robust institutional arrangements. The following explores key considerations to strengthen institutional arrangements:

- **Alignment between land use plans and development regulations** – Long lead times for approvals for rezoning, consolidation of land parcels and construction approvals

may make it difficult to undertake large scale urban development across multiple land parcels.

- **Involvement and support from all levels of government** – In some jurisdictions, concentration of urban planning at lower levels of government (i.e. local government) may isolate municipalities making co-ordination more difficult at the state level unless institutional arrangements and regulatory mechanisms are implemented. An example of this is in Bogota Columbia, where the regional and local bus services are not well connected making people who live in adjacent municipalities but commute to Bogota difficult. This arises because the city’s bus service jurisdiction does not align with the regional context under which the planning and policy making occurs (Suzuki et al, 2013). In other words, areas with many districts each with their own government, objectives and economic agendas, make it more challenging for successful urban renewal, thus the need for stronger institutional arrangements and involvement from all levels of government. This echoes the principles of horizontal (across different policy areas), vertical (across different levels of government) and territorial (across neighbouring geographical areas) integration and the flexibility of institutional arrangements, to achieve intended integrated transport and land use goals (Stanley, 2015).

In addition, support from the top tier of government is important to promote integrated transport and land use planning. In India, it is recognised that urban planning and transport is the responsibility of local governments. However, the Indian national government considered that a central policy (known as The National Urban Transport Policy), was needed to promote the development of integrated transport and land use plans for all cities. The policy outlined that urban development and planning bodies in the cities are required to have in house transport planners as well as representation from transport authorities. The Government of India would also contribute 50% of the cost of developing integrated transport and land use plans and towards pilot transit studies, highlighting the encouragement and financial support for integrated transport and land use at the national level.

The concept of integrated governance is relatively recent and that problems confronting cities globally will not be accurately resolved by sector-based approaches (Stanley, 2015). The risk with a non-integrated governance approach is an ever increasing gap between the transport plan and the land use plans, where transport infrastructure is continually responding or ‘catching up’ to the land use plan.

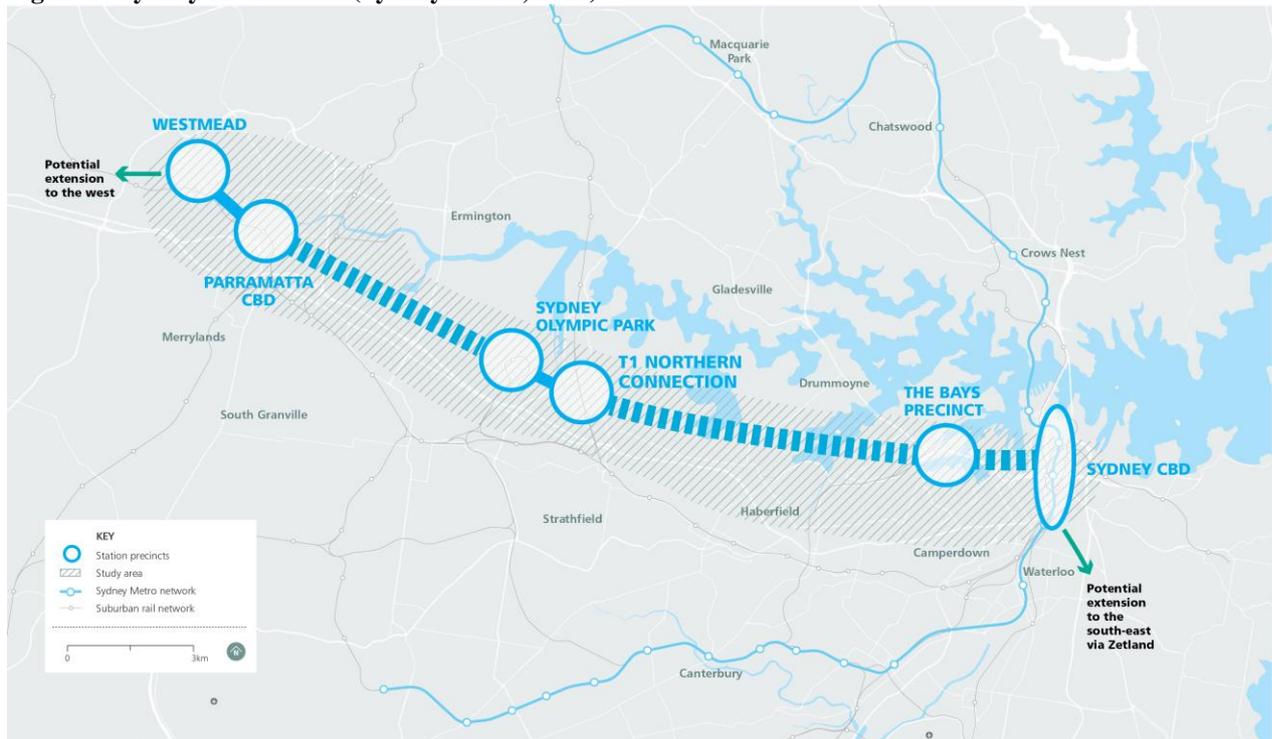
An integrated governance structure (and project working groups) with collaboration across government agencies, ensures transport and land use plans are in alignment to achieve strategic outcomes, such as the Three Cities Vision for Sydney. Cross agency collaboration can also lead to better place-making outcomes. For example, the preparation of planning proposals to rezone land must be carefully co-ordinated with the construction of integrated station development, to ensure activity and vibrancy is delivered from Day 1 opening of the transport infrastructure. In addition, working with local councils and precinct partners ensures that the project’s transport and land use assumptions are integrated with potential Master Planning processes. It is about involving stakeholders from the beginning, building trust and bringing them along for the journey, leaving a positive legacy.

4. Case study: Sydney Metro West

4.1. Project overview

The Sydney Metro West project is a new underground metro railway connecting the CBDs of Parramatta and Sydney. The new railway will effectively double rail capacity from Parramatta to the Sydney CBD and provide a more reliable, less crowded and faster service. This city shaping infrastructure investment will link communities between the two centres, unlocking housing supply and boosting employment growth. In the planning of the project, the NSW government will integrate transport with planned land use outcomes along the corridor (Sydney Metro, 2018).

Figure 3: Sydney Metro West (Sydney Metro, 2018)



Sydney Metro West will service key precincts:

- **Westmead** – One of the largest health, education, research and training precincts in Australia. It is home to a large student population and key employment centres such as Westmead Hospital, The Children’s Hospital at Westmead, campuses of The University of Sydney and Western Sydney University, the Westmead Medical Research Institute and the Children’s Medical Research Institute.
- **Parramatta CBD** – By 2036 Parramatta will be one of Greater Sydney’s major administrative and business centres and will be an important area for finance and government services, education, retail and entertainment. The number of jobs is expected to double over the next 20 years to 100,000.
- **Sydney Olympic Park** – A lifestyle super precinct with a world class event, entertainment and sports district as well as commercial, residential, educational opportunities.
- **The Bays Precinct** – A significant urban renewal development opportunity of about 100 hectares of largely government owned land, just 2 kilometers west of the Sydney CBD. It will incorporate a mix of residential, retail and commercial development with a vision to attract high value knowledge intensive jobs.

- **Sydney CBD** – Allowing access to the existing public transport network and Stages 1 and 2 of Sydney Metro currently under construction.
- **Other intermediate stations** - Other areas along the Greater Parramatta to Sydney CBD corridor which could benefit from a Metro station, improving accessibility, linking communities that have not been previously serviced by rail and unlocking housing supply.

4.2. Sydney Metro West as a driver of strategic vision

Mass transit services are a fundamental part of a growing global city. As outlined in the Future Transport Strategy 2056, Sydney Metro West is a key step in the delivery of the strategy, along with other initiatives such as improvements to the heavy rail system between Sydney's Three Cities. It creates the mass transit connection needed to serve both the city-shaping and city-serving corridors in which future generations will benefit from. The project is both responding to the needs of today and also planning for the future, with new transport strategies and technology to ensure communities are better places to live, work, play and visit. It also integrates with other public transport modes, including the Parramatta Light Rail, to grow and support the centre-serving corridors.

Building city shaping projects creates an opportunity to bring together international best practice to generate vibrant and attractive precincts. Vibrant places attract visitors, workers and investment and enhance the city's liveability. It is envisaged that Sydney's new metro stations will create new places for people and public spaces designed to encourage walking, cycling and social interaction.

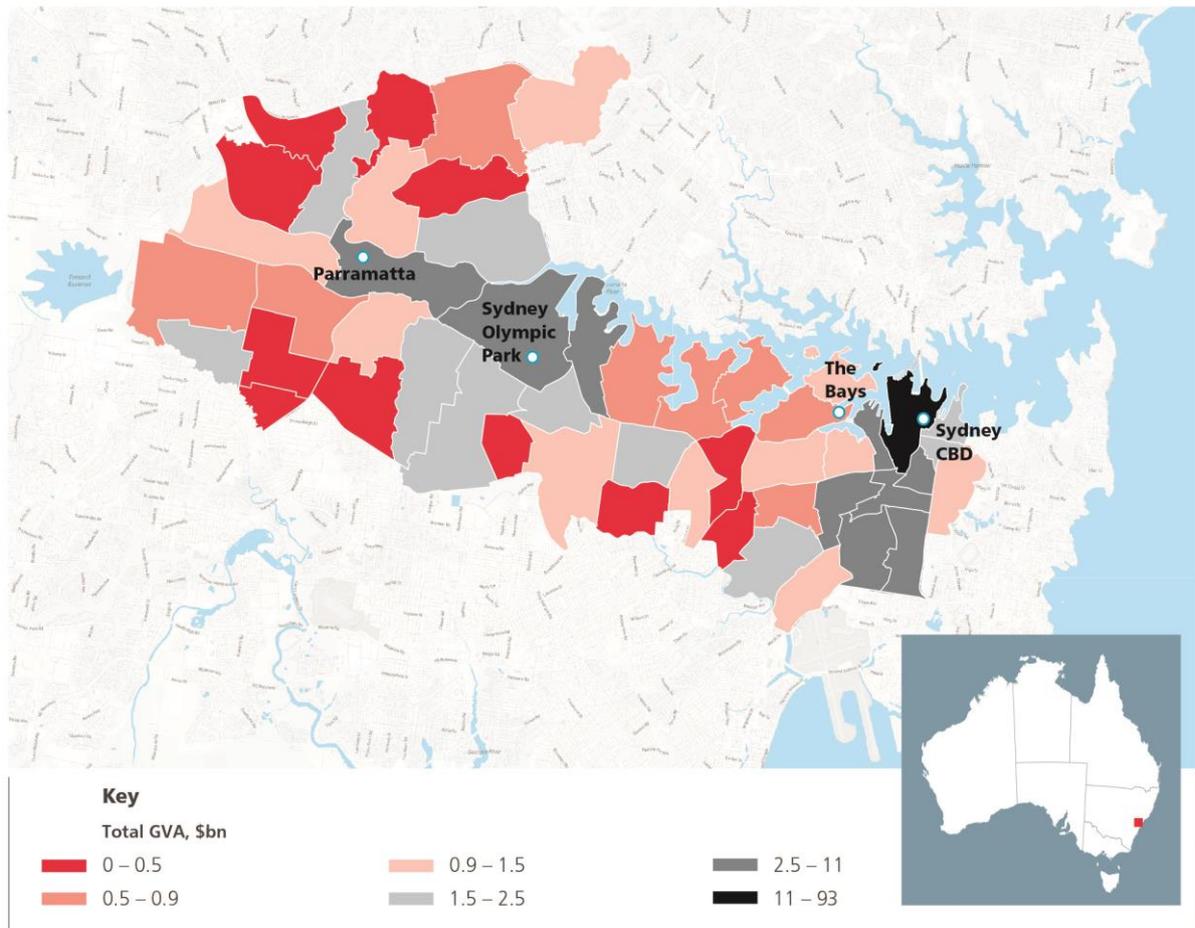
4.3. Sydney Metro West's long term city shaping power

The Sydney Metro West corridor is an important economic corridor, contributing to about 30% of Greater Sydney's productivity¹. It is an enabler of realising the Three Cities vision, linking the most productive areas within the Central City (i.e. Parramatta CBD) and the Eastern City (i.e. Sydney CBD). Each of the precincts in the corridor is unique, containing a mix of industries including high value knowledge intensive jobs such as Financial & Insurance services. City shaping projects of this scale are expected to drive agglomeration benefits – productivity benefits from firms and people as they locate near one another together in cities and economic clusters. A high level of agglomeration is likely to occur if the transport investment increases accessibility in an area in close proximity to an economic centre or a large employment centre (DfT, 2016). Sydney Metro West has the potential to create agglomeration benefits bringing firms and workers closer together in key employment centres and from land use change, supporting the relocation of employment and people to the corridor.

Figure 4 shows that Sydney Metro West links areas of high productivity, in particular the Sydney CBD, Sydney Olympic Park and Parramatta CBD. These areas also have a high presence of knowledge intensive industries which is a key driver of agglomeration.

¹ Analysis undertaken by Sydney Metro based on draft Australian Transport Assessment & Planning small area gross output estimates

Figure 4: Total productivity levels in the SMW Corridor (2016)²



The increased productivity benefits in the area is further highlighted with the urban renewal opportunity at The Bays Precinct whose vision is to be a major employment centre for high value jobs in the future and being in close proximity to ‘knowledge hubs’ (Urban Growth, 2018).

Further examples of how Sydney Metro West enables agglomeration include:

- Improved linkage between suppliers and customers from reduced transport costs;
- Firms have improved access to a bigger pool of skilled workers in the corridor compared to traditionally accessing the labour market in the Sydney CBD;
- Better connecting start-ups firms/idea generators (innovation precincts) with venture capitalists/financing in the Sydney CBD and ultimately linking with production facilities; and
- Linking research and innovation (i.e. medical research) with health and education precincts such as Westmead and Sydney Olympic Park.

² *ibid*

4.4. Sydney Metro West's ways of working

Stakeholder collaboration is vital to optimise project delivery outcomes for a city shaping project. In addition to the consultation and governance processes with various government departments, agencies and local councils, Sydney Metro West has consulted with precinct partners, community and industry, which has helped shape the project. Working with precinct partners such as Urban Growth at The Bays Precinct, Sydney Olympic Park Authority and Westmead Local Health District ensures that the precinct's master planning outcomes are co-ordinated; interfacing issues are effectively managed; and that there is an understanding of the role that Sydney Metro West plays to achieve the vision of each precinct. The planning of the project is also done in collaboration with Parramatta Light Rail Stage 2 to support the Greater Parramatta to the Olympic Peninsula area.

This inclusive collaboration model, shown graphically in Figure 5, maximises the ability of multiple partners to influence the project outcomes and contribute to the benefits. It ensures decision making can be undertaken with evidence from multiple sources. For example, economic outcomes that are driven by health, recreation, or social activity are best described by local partners that understand their own business and how these outcomes contribute to their long term vision. Finally, it facilitates support or ownership by those directly impacted by the project.

Importantly, two rounds of community engagement have been undertaken to define and refine the project, and ensure issues and concerns are identified and addressed early in the project development life-cycle.

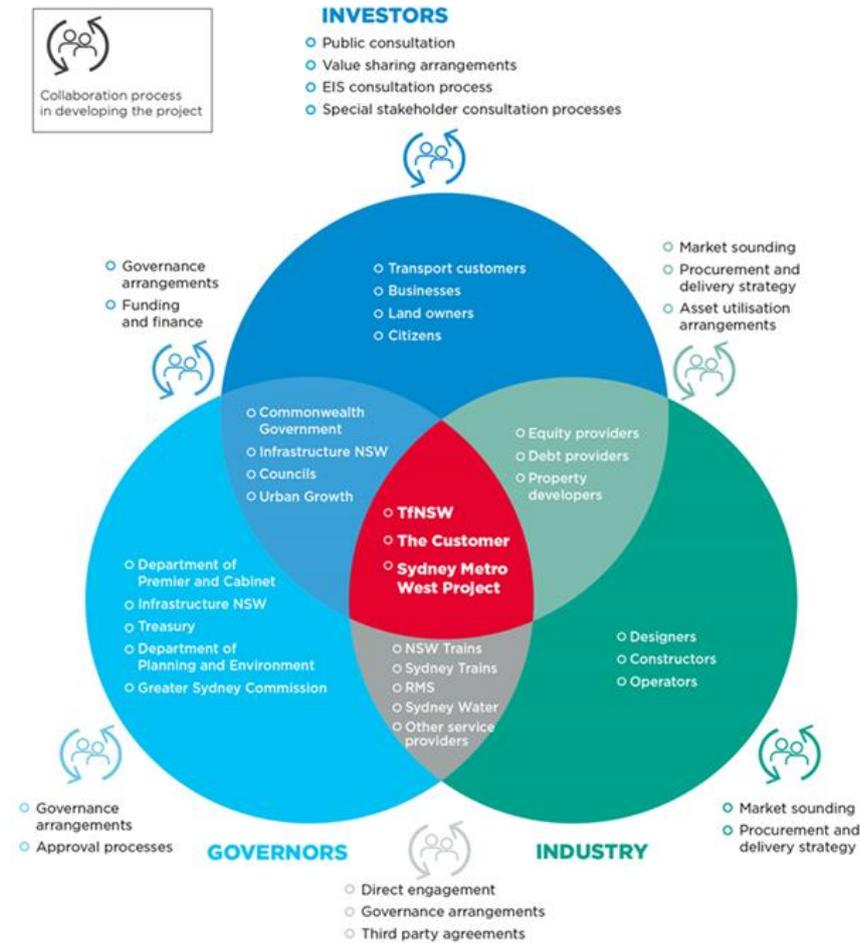
Industry engagement with local and international stakeholders was also undertaken to build awareness of the project and to foster innovation and best practice on a range of topics such as delivery strategy, technical design & constructability, systems & operations as well as funding & financing.

For all engagement processes with government, key stakeholders, community and industry, these consistent objectives were applied:

- Build awareness of the project, promote the benefits and provide information about how to get involved;
- Align with and support strategic, regional, and local planning, such as the Three Cities vision, Future Transport Strategy 2056 and local council plans; and
- Build knowledge about evidence, opinions and aspirations to inform decision making.

For a city shaping project, this engagement approach allows the participation by all stakeholder groups concurrently. Concurrent engagement across different sectors provides equal opportunities to influence the project, improve value for money and increase benefits.

Figure 5: Inclusive collaboration model for Sydney Metro West (courtesy, Corview 2017)



5. Future considerations

The release of various Strategic Plans such as the NSW Government’s Future Transport Strategy 2056 and various guidelines are an important step in recognising the importance of integrated transport and land use projects. The 2016 Australian Transport Assessment and Planning Guidelines which have recently been revised, incorporates a chapter on Integrated Transport and Land Use Planning and represents a step forward in socialising and improving the approach. The updated Infrastructure Australia Assessment Framework (March 2018) also acknowledges that some infrastructure projects have significantly positive land use impacts. The framework outlines guiding principles and acknowledges that it is an area that needs to be expanded upon in the future (Infrastructure Australia, 2018). In support of this, there needs to be further guidance on the key practical considerations required in the development of complex city shaping projects and a reconsideration of traditional economic appraisal techniques in order to reflect the full benefit (and cost) at the core of an integrated transport and land use project.

6. Concluding remarks

This paper explores key factors for practitioners to consider when planning city shaping projects, so that the full potential of economic benefits are reflected. Moving from a traditional ‘predict and provide’ approach to an integrated approach ensures that the vision for a more liveable, sustainable and well connected city can be realised. Failure to adopt an integrated approach for projects with great city shaping potential can lead to sub-optimal outcomes for a city, which may be difficult to reverse. The Sydney Metro West project is

used as a case study to demonstrate the integrated planning of the project and the role the project plays to shape Greater Sydney, by linking key employment centres and connecting communities, unlocking housing supply and providing urban renewal opportunities.

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