Re-Assembling the Car-Dependent City:
Transit-Oriented Intensification in Melbourne

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Abstract:

Cities are often said to be the engines of the global economy in an age of rapid urbanization. Car-dependent cities - particularly those that characterize North America and Australasia - are largely cities of suburban sprawl, freeways, shopping malls and poor public transport. They are also cities of great opportunity for significant reductions in carbon emissions through transit-oriented intensification within existing suburbs. Such development, however, depends on a multi-scalar understanding that links the shaping of built form and public space at an urban design scale to larger scales of metropolitan structure and urban flows. This paper is an overview of how such urban design and transport opportunities can be explored with a focus on Melbourne. The paper seeks to show how transit-related problems and opportunities at different scales interconnect to form synergies and alliances both between projects and between scales. Through a series of design research studies we explore scenarios for the transformation of suburban railway stations, tram corridors, private shopping malls, university campuses and post-industrial zones. The analysis is undertaken within a theoretical framework of self-organization, emergence, complexity, adaptation and assemblage. Design research at every scale is argued to be a necessary link in the process of unlocking capacities for urban transformation.

1. INTRODUCTION

Australian cities are some of the lowest density on the planet and intensified urban development to meet the imperatives of population growth and a low-carbon future is a major challenge. Despite decades of compact city policy there has been little change to the practice of ever-expanding suburban fringe development that entrenches and exacerbates car-dependency. One of the major blockages to transformational change has been a lack of design vision that can capture the public imagination for more sustainable urban futures. In 2010 we commenced an ARC Linkage research project called 'Intensifying Places: Transit-Oriented Urban Design for Resilient Australian Cities' that seeks to analyse this conundrum in relation to Australian cities and to develop visions for transit-oriented futures that can achieve broad community acceptance in a democratic framework. The research emphasis is on both design quality and resilience – on the quality of urbanity created or enhanced by design intervention and on the socio-spatial resilience embodied in high levels of urban amenity, accessibility, economic vitality and equity. A key hypothesis is that transit-oriented development can achieve such outcomes but success hinges on the quality of the urban design and the contribution of such design to improved social, environmental and economic outcomes.

Melbourne is a key test-site for these issues, with low densities, entrenched car-dependency, and the potential for innovative and globally-applicable propositions for change. The urban policy framework has long called for intensification along transit corridors and within existing activity centres but change has been difficult in the face of community resistance to what is seen as a threat to the valued character of suburban life (Dovey & Woodcock 2011). The project title, 'Intensifying Places' connects two key issues for designing future sustainable cities. 'Intensification' incorporates the increased efficiencies of higher residential and employment density with the better use of scarce resources. 'Place' is a term that brings together issues of urban design qualities and intensities with everyday concerns of the community and markets. The two concepts come together in addressing the challenge of creating resilient cities, through the design of intensified urban places. More than just density, this is an intensification of activities and amenities - of social and economic vitality. Intensified places involve qualitative and quantitative improvements; they are more efficient but also more dynamic and more resilient in the face of economic, social and ecological change.

2. ASSEMBLAGE & RESILIENCE

The theoretical framework deployed here has been developed from two primary sources. The first of these is 'assemblage' theory based on the work of Deleuze and Guattari (1987). The term 'assemblage' here is a translation of the french 'agencement' which is akin to a 'layout', 'arrangement' or 'alignment' – it suggests at once both dynamic process and a diagrammatic spatiality. Assemblage is also a useful way of re-thinking theories of 'place' in terms of process, identity formation and becoming (Dovey 2010). An assemblage is a whole that is formed from the interconnectivity and flows between constituent parts — a socio-spatial cluster of interconnections between parts wherein the identities and functions of both parts and wholes emerge from the flows between them (DeLanda 2006). Transit-oriented development is not a thing or a collection of things, it is the assembled connections, alliances and liaisons between them that are crucial (Deleuze & Parnet 2007: 69). For our purposes these interconnections are social, spatial and environmental. Assemblage is at once verb and noun — both the process of assembly and the assembled outcome. It is the flows of life, people, materials and ideas that give places within cities an emergent sense of place. The dynamism of assemblage involves the ways territories and boundaries are inscribed and erased, the ways identities are formed, expressed and transformed. Assemblage thinking operates against any notions of place as contained or stable – transit-oriented developments are held in place by connections, tensions, flows and desires.

The levels of complexity, adaptability and self-organization embodied in urban assemblages suggest a second and complementary framework of resilience theory based in theory of complex adaptive systems (Gunderson & Holling 2002; Walker & Salt 2006). The task here is to understand the dynamics of complex systems where the outcome of a system depends on unpredictable interactions between parts. This is work that grows out of a mix of theories of cybernetics, chaos, complexity and resilience, much of it transferred from the study of natural systems. A complex system is one where the parts adapt to each other in unpredictable ways - they self-organise. The detailed outcomes of such a system cannot be determined in advance but rather 'emerge' from practices of adaptation and self-organisation (Johnson 2001). Key properties of complex adaptive systems include the diversity and redundancy of different parts such that each performs a multiplicity of functions where no single part is crucial to success and the system can adapt by moving forms, functions and flows around. The tendency to maximize efficiency of the system – often the goal of formal planning – can lead to a loss of redundancy. As with assemblage theory, there is no easy way to define the 'system' as each transit node is an interactive part of further systems at higher scales. While such theory is useful for understanding complexity and adaptation the term 'system' carries connotations of predictability and systematic control — the 'complex adaptive assemblage' is a more accurate and useful label.

3. METHODS

Our method has been to analyze Melbourne for potentials and capacities for transit-oriented intensification at multiple scales. We have selected case studies at smaller scales and developed a range of urban design scenarios that are then tested against the social, political and governance frameworks of the city. These case studies have been chosen according to the following criteria.

First was the issue of public transport access; we were looking at both existing transport nodes and for sites where new public transport investment could deliver maximum value. Our primary focus was on trains and trams as high and medium capacity public transport respectively. A key sub-issue here is the degree of integration of the larger public transport system into a genuine network. We were thus looking for sites with potential to add value to the whole network through greater network connectivity. We were also looking for potential to extend existing and add new lines to create a networked rather than radial tram/train system.

A second key site selection criterion was capacity for intensified development, particularly large land parcels within walkable proximity to existing or potential transit. The issue here is potential development yield and such capacity incorporates factors such as lot-size, ownership and market demand. If ownership is in private hands then the capacity to use future capital gains to pay for infrastructure development is limited. Railway corridors often have significant parcels of adjacent public land as easements, stations, public carparks or marshalling yards; air-rights can add to this potential in some locations. Tram corridors are generally lined with a range of small private lots where the capacity is limited by distributed ownership but the overall capacity is significant because of the extensiveness of the network (Adams 2006).

The third site-selection criterion was the existing and potential level of amenity. Here we were looking for the capacity to leverage higher density development off existing place-based amenity such as walkability and a good land-use mix of public open space, recreation, social and retail facilities. A key issue was the potential uplift in livability and amenity through the intensification process. Fourthly, we were interested in replicability - to what degree does this case constitute a typical place type that is likely to be found in other parts of Melbourne and other cities? How can this design research add to a larger body of knowledge? The final criterion was the likely level of resident resistance to urban intensification and new transport infrastructure. While resistance in some locations may render any form of transformation unlikely, others were selected in order to test the capacity for urban design vision to enlarge the urban imagination.

4. SCALES

The criteria above cannot be adequately assessed at a single scale but require a multi-scale analysis – the capacity of a site to produce intensification depends on both existing and possible connections at several scales of both space and time. It is fundamental to both assemblage thinking and complex adaptive systems theory that a hierarchy of scales is not a hierarchy of importance. Cities emerge as a result of both formal top-down initiatives and controls and informal bottom-up practices, through both lateral and multi-scale connections. Our focus is on the interdisciplinary capacity to think across scales and to understand the relations between them. The key issues with regard to transit-oriented development are diagrammed across the different scales in Figure 1 where issues of transport, morphology, land-use, economics and sociality overlap at different scales. While our key interests are in the morphological issues, these cannot be seen in isolation from the larger context.
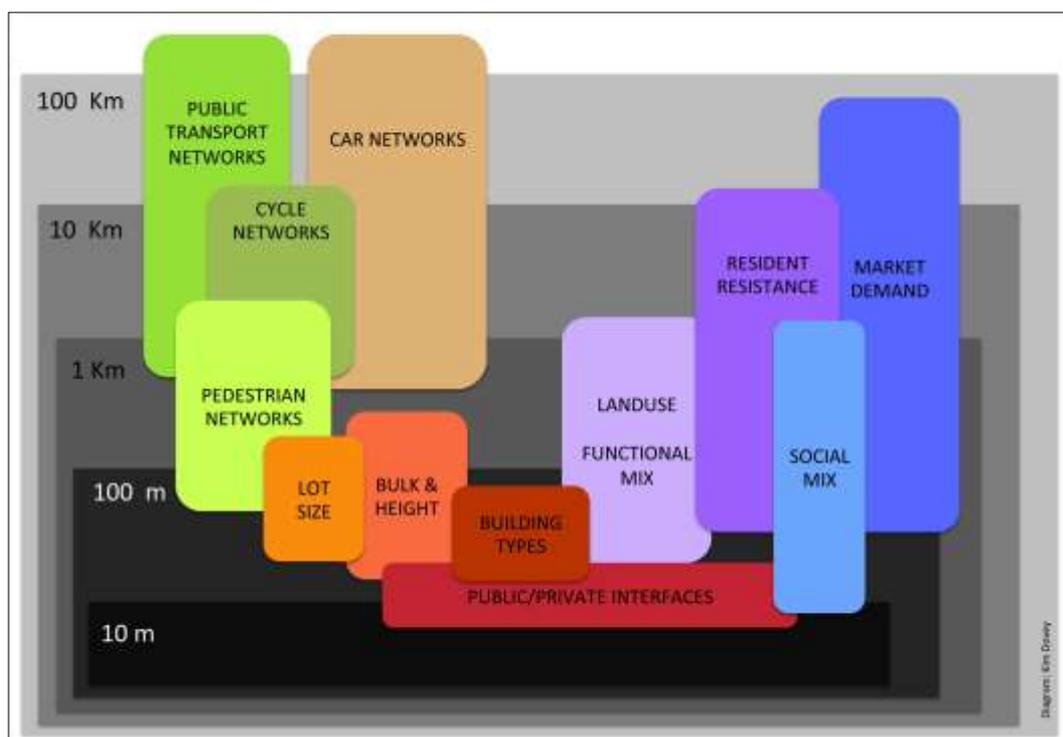

Figure 1: Multi-Scale Assemblage

100 x 100 km - Metropolis

At the 100Km scale we see the city-region and the agro-urban assemblage; the growth corridors and the green belts. We can map the major public transit lines and their relationships with larger activity centres. At this scale the radial structure of the train system is most apparent, with few effective interchanges (Figure 1). The tram system only covers the inner-city and has many *cul de sacs.* There

are significant gaps in connectivity that can be filled by trams, both within the existing system and via the addition of new routes. We have largely omitted the bus system because it is largely slow, low-volume and infrequent. We can map the isochrones that show public transport travel times from different parts of the city and expose the vast urbanised areas that are infrequently serviced by public transport. We can map the urban growth boundary designed to limit sprawl and the ways in which it has expanded over time to meet the demand for car-based suburbs. We can map the ways developers have bought up this fringe land in anticipation of a zoning change; we can understand the new fringe suburbs as a growing market for more freeways. We can map the distribution of densities, jobs, socio-economic classes and ethnicities across the city; we can show social disadvantage across the west and north of the city linked in turn to a lack of investment and the separation of industrial production from privileged consumption. We can map resident resistance to intensified development centred on the wealthier, older and leafier suburbs to the east and south-east of the city. At this scale we can see a metropolitan-scale assemblage that is enmeshed in a dynamic where existing political, social and economic investments lead to ongoing production of car-dependent suburbs.

Figure 2: Melbourne at 100 Km x 100 Km with existing trains and trams plus 10 x 10 km zones

10 x 10 Km - 20 Minute City

The 10k x 10k scale (100 square km) occupies the middle ground between the metropolis and neighbourhood, between metropolitan planning and urban design. This is the scale at which sub-centres of the polycentric city emerge; where interconnections between employment, housing, services, recreation and transport become crucial. The ideal of the '20 minute city' - where most of the desired urban amenities are accessible within 20 minutes – is essentially multi-scalar but when focused on multi-modal transport with declining and congested car usage we find a range of maybe 3-10 Km in 20 minutes.

The map in Figure 3 draws upon data from Google maps to show zones of walkable, cycling, public transport and car access from three of our case study sites. It shows that walking and cycling zones

are relatively circular, predictable and contained within a 10km x 10km zone. Those for public transport and cars are both more extensive and more dependent upon infrastructure. As a thoroughly car-dependent city, Melbourne offers a far greater range by car transport and it is a large challenge for public transport to compete.
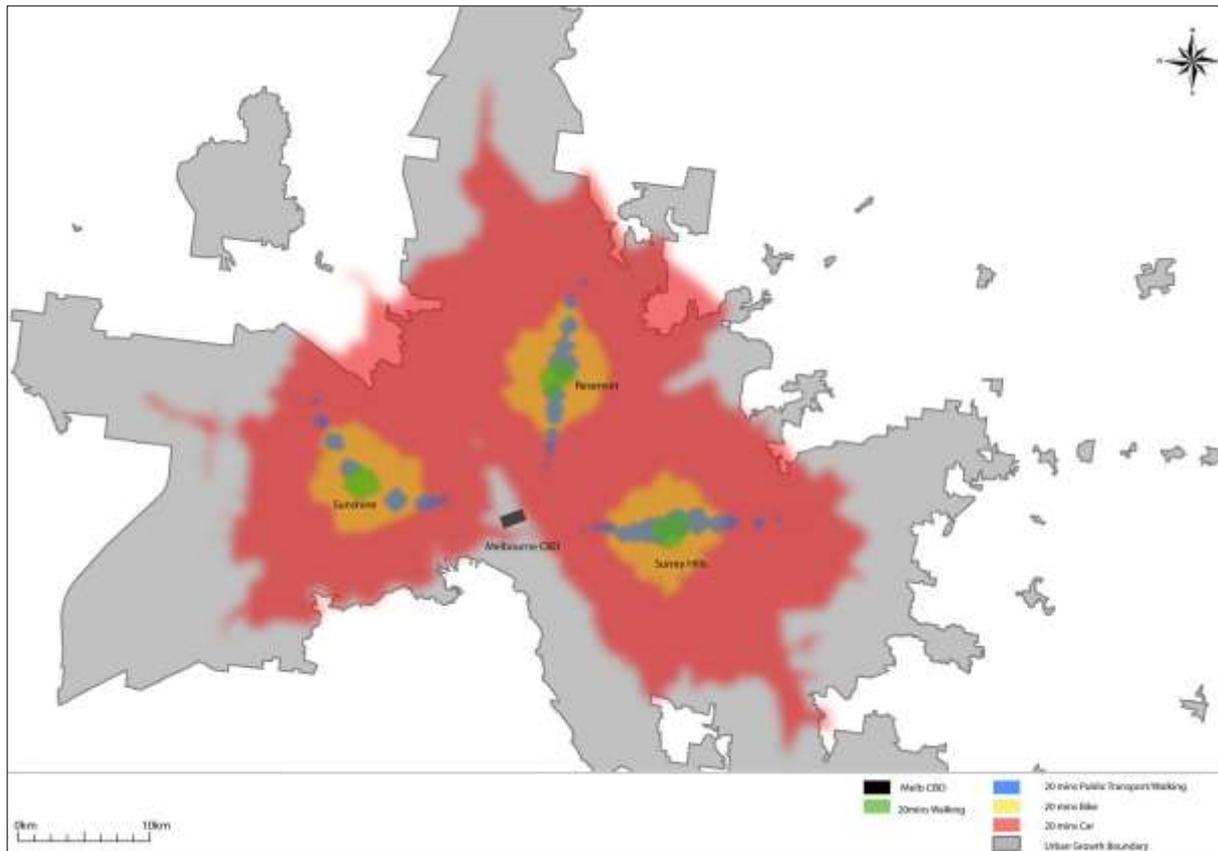

Figure 3: Mapping the 20 Minute City for 3 case studies with the urban growth boundary in grey.

At the 10km scale we begin to see a city of everyday connections between suburbs and activity centres, between housing and jobs, education and recreation. This is the scale at which we need to understand local public transport networks—the ways buses, trams and trains connect with each other, with bikes, pedestrian networks and activity centres. Some major intensification opportunities identifiable at this scale involve the transformation of radial transit lines into interconnected networks that enable lifestyles to become more localized. The need to travel for work or leisure can be met via modes of active transport instead of the private car. We can begin to see visions for genuine mobility choices and new flows that will in turn producing a market for new types of development.

The area of analysis at the 10 x 10 km scale is difficult to define – it is not a neighbourhood and it crosses local government jurisdictions. It is a cluster or constellation of existing and potential interconnections that is in turn connected to adjacent clusters; it has scale but no clear boundaries. Most crucially for our purposes it is a place and a cluster of places with potential for the emergence of a low-carbon urbanism through an intensification of active transport flows, built forms and multi-scalar alliances.

We have identified three suburban regions at the 10 kilometre scale with significant intensification opportunity in order to explore the potential interconnections between the project types listed above (Figure 2). Currently, each of these regions is an assemblage of railway and tram lines connecting activity centres in proximity to campuses and malls (which are often disconnected from the primary public transport network). Our task has been to understand each region as an assemblage and to interrogate it for potential intensification scenarios. These scenarios include both redevelopment around existing transport infrastructure and the design of new transport connections that generate potential. A key question is the relationship between intensification potential and infrastructure

investment – to what extent does the latter have to occur to realise the former? In a market-driven planning context, this co-dependence between infrastructure and intensification becomes a crucial conundrum to which we will return.
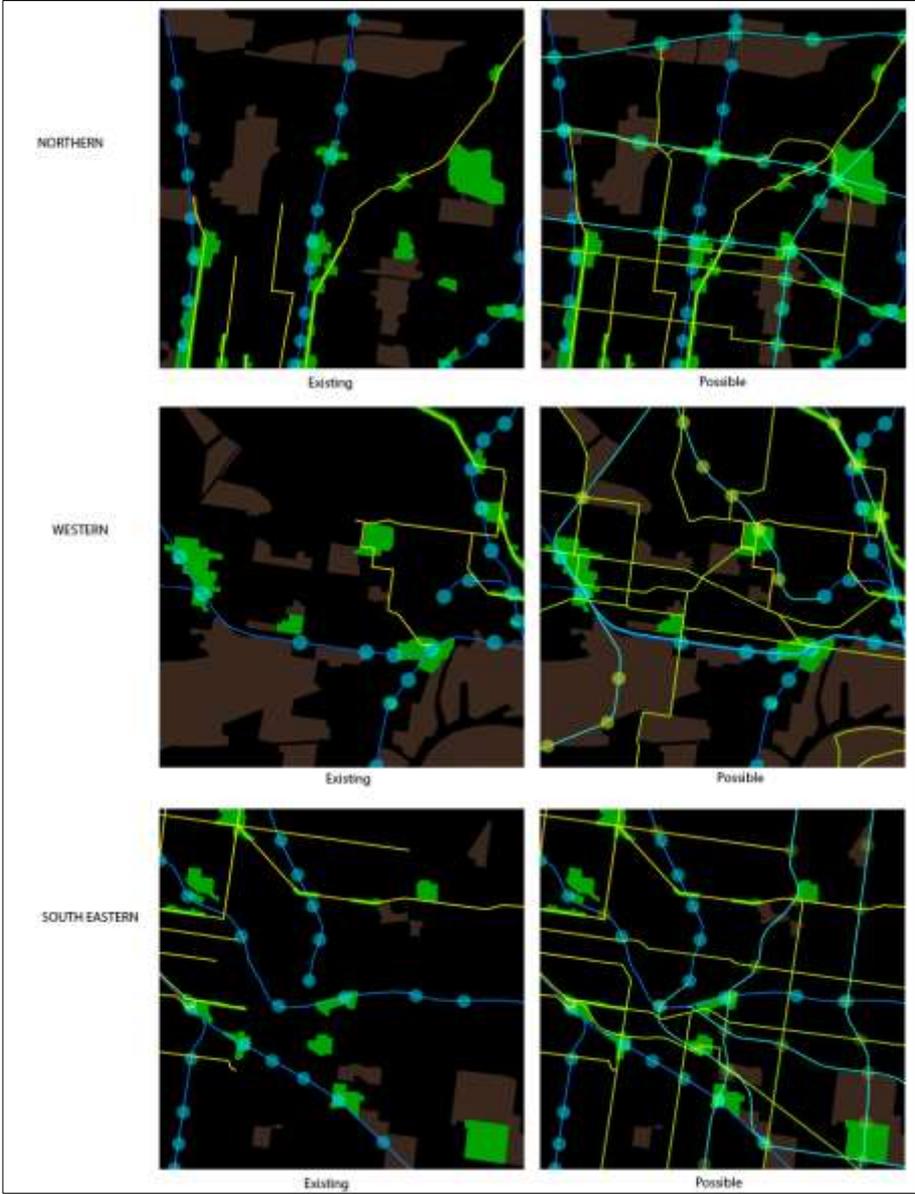

Figure 4: 10 x 10 Km Clusters showing existing and possible transit+landuse assemblages

Our Western Zone incorporates a major shopping mall (Highpoint), two major activity centres with small campuses of Victoria University and extensive industrial zones. The area has huge potential for intensification but is poorly serviced with public transport beyond the rail corridors and has a relatively limited apartment market and employment clustering. The prospect of a rail connection to the airport through this zone holds potential for significant transformation. The South-eastern Zone incorporates many of the wealthier suburbs, several rail and tram lines and high levels of amenity, significant markets for apartments, employment clustering and potential for intensified development. It also includes the largest shopping mall in the southern hemisphere (Chadstone), tantalizingly close (but unconnected) to rail or tram lines, and some remnant industrial zones along creeks. The Northern Zone incorporates La Trobe University, several train and tram lines, activity centres, industrial zones and a major regional shopping mall, with major creek frontages. This is also a relatively disadvantaged region of the city with relatively low levels of amenity and socio-economic status in the middle suburban part and a gentrified inner-city component associated with tram corridors.

1 Km X 1 Km Urban Design

This is the traditional neighbourhood or urban design scale at which issues of built form and the shaping of public space come to the fore; where our understanding of the city moves from abstract cognition to everyday life. We can map and understand the ways some sites operate as key attractors for both cars and pedestrians; we can analyse relations of permeability to walkability and the relations of pedestrian, cycle, car and public transport networks. Measures of density - both populations and built forms - transform as we move from gross measures across broad suburban areas to focused zones and net measures. This is the scale at which design development overlays and height limits play out. Questions of urban and neighbourhood character come to the fore as resident groups organize to defend against higher density or 'over-development' however defined. At this scale land-use begins to transform into a more nuanced understanding of functional mix; this in turn is linked to a mix of densities, building types, housing types and social classes. This is the scale at which sites and capacities for intensified development can be identified; where opportunities emerge to re-design the localized assemblages that privilege and produce active transport within existing car-dominated suburbs.

100 M – Streetscape

At this scale we encounter issues such as lot-size or grain, building typology, bulk and height. Here the phenomenology of streetscape and social life overwhelms the broader cognition of the city. We begin to see the development potential of specific sites - we can calculate yields, densities and profits. We can understand how the new development can add amenity to the local neighbourhood through more shops and services, more accessible and frequent public transport, new public space and facilities with an increase in streetlife and vitality. Synergies become apparent between density, public transport, walkability and public health. Only at this scale can we understand what kind of development makes sense because here the impact on the city becomes sensory - concrete rather than abstract. We can understand how a developer's desire for bulk and height can conflict with resident desires to protect from overlooking and overshadowing. What does 'overdevelopment' or 'underdevelopment' mean; at what height and bulk does a lively and livable transit corridor become seen as a shady and unlivable canyon (Woodcock et al. 2010, 2012)? The invention of new urban types and the design/regulation of the public/private interface proceeds at this scale. Here we catch (or fail to catch) the public imagination for a better urban future.

10 Metres – Encounter & Interface

This is the primary scale at which we encounter others in public space—the scale at which we shop, meet, loiter and perform. It is also the primary scale at which density translates into intensity, largely mediated by the public/private interface and the detailed design of urban space (Dovey & Wood 2011). While the various measures of density (Dwellings/Ha, Habitable Rooms/Ha, Jobs/Ha, Floor Space Index, Floor Area Ratio, Plot Ratio) are mapped at larger scales, this is where the interactions between differences take place in public space; where intensity becomes the emergent effect of the larger assemblage.

These scales are somewhat arbitrary, defined only by a relative factor of ten. We could easily extend them or insert other scales in between (a 1:5 ratio may be more useful). In the end the appropriate scale of analysis depends upon the questions we are asking. Our primary questions are about the potential for urban design analysis and vision to contribute to transit-oriented intensification and they cannot be addressed unless we learn to think about the city through vastly different scales and the interconnections between them.

5. CASE STUDY PROJECTS

As a result of this multi-scale analysis, a series of scoping studies and multi-scalar transit infrastructure scenario investigations, we selected the following range of project types (with combinations between them) as representing the greatest potential for transit-oriented intensification.

Small Rail-based Activity Centres:

Almost 90% of the 204 stations on the Melbourne rail system are in low-density suburban locations. Such sites often have a small neighbourhood shopping strip and other land uses close by, but are otherwise surrounded by residential development and there may be significant community resistance to change. While the intensification capacity of individual projects may appear to be limited, similar opportunities replicated across the metropolitan network could make a substantial overall contribution to assembling a transit-orientated city. From a typological point of view, these suburban stations can be divided into two categories – those with substantial, easily developable public land associated with the station in the form of parking and those without.

Surrey Hills

Surrey Hills is a residential suburb in Melbourne's leafy eastern region with a medium-passenger volume railway station with frequent services providing a 20 minute ride to the central city. The station and its 355 car spaces occupy 2.2 Ha of public land. Adjacent to the station is a park, shopping strip and small industrial zone, all surrounded by relatively up-market housing in a mix of detached and multi-unit developments of 1-2 storeys. Dwellings in Surrey Hills are in high demand and the station site could be developed to a height of up to 8 storeys at the peak without impacting the existing privacy or sunlight of surrounding housing. However, the railway is at grade and a key barrier to change is the level crossing which frequently blocks a key north/south bus and car arterial road. It makes little sense to develop this site prior to grade separation, but the opportunities to generate capital gains on public land could be significant. This capacity, however, depends in turn on the development of urban design visions and an effective community engagement process for its realization. The existing park is badly exposed to the railway, relatively inaccessible and underused. The opportunity here is to generate greater diversity of housing, employment and retail options together with upgraded parkland, new public space and greater pedestrian permeability across the train line.

Figure 5: Scenarios for Surrey Hills

Batman

Batman station is located in a residential and industrial suburb in Melbourne's north, a 20 minute ride from the city. The station has low passenger volume with no parking, yet it is near the intersection of a key east west arterial and a major north-south tram route with close access to the high quality open space of Merri Creek. There is potential for high-density development on private land in large lots that are either vacant or under-utilised. The potential of the larger assemblage involves better pedestrian and cycle connections from the railway station through the new development and tram corridor to the creek and its extensive bike trail (Figure). A major impediment is the existing level crossing which limits the development of east-west flows, yet any grade separation here involves a re-arrangement of rail infrastructure along the line to the south.
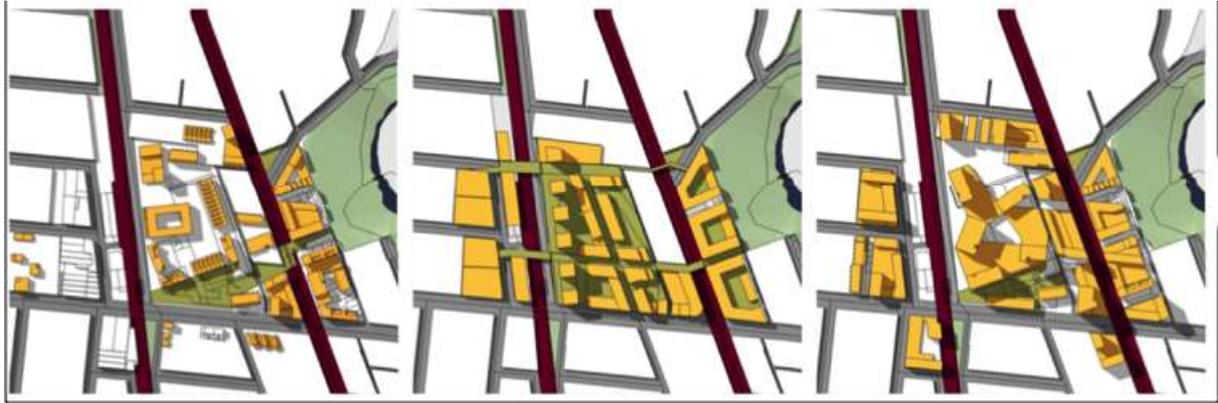
Figure 6: Scenarios for Batman

Large Rail-Based Activity Centres

A relatively smaller number of railway stations coincide with substantial suburban activity centres with potential for intensification within the pedestrian catchment. These are also generally modal interchanges with other forms of public transit such as bus and tram.

Reservoir

Reservoir is a large rail-based activity centre in Melbourne's disadvantaged northern region about 12 kilometres and a 25 minute train ride from the central city. The railway - with adjacent level crossing, roadways and parking for 495 cars - cleaves the existing retail and community activity into two very separate main streets with about 150 metres and a 5 minute walk between them. While the rail connection to the city is relatively frequent and there are bus connections, there are no fast, frequent and high-volume transport connections to the nearby shopping and employment centres of Northland (3 kilometres) and LaTrobe University (3.5 kilometres).

A major barrier to redevelopment is a low level of market demand. Reservoir is a similar distance from the city and with a comparable rail connection to Surrey Hills yet the median house price is about half. Reservoir ranks low in the status hierarchy of suburban Melbourne and a large part of the challenge here is to transform the place identity. The major opportunity is to invest in east-west light rail connections so that Reservoir becomes highly accessible to and from Coburg in the west but particularly LaTrobe and Northland to the east. These new transit lines would enhance local resident access to the train, create network effects and build demand for living and working in Reservoir. The second major potential emerges at the 1km scale in the form of a wedge of about 15 hectares of relatively vacant public land immediately adjacent to the railway and extending about 800 metres south from the station.

The major barrier to any redevelopment, however, is the level-crossing that cleaves Reservoir into two. To leave the level-crossing while increasing the frequency of rail transport will compromise any future flows of high volume public transport along the east-west link. The conundrum here is that the current lack of demand makes it difficult to fund a grade separation – whether the rail is elevated or buried – yet any development that compromises a future grade separation leaves Reservoir with a very poor future and wastes considerable opportunity. The long- term prospect is that Reservoir can be transformed from an isolated station to become an integrated node of a revitalized university/retail/residential cluster; and from a relatively low-income suburb to more socially mixed; from a univalent suburban morphology to a mix of housing types and densities (Figure 7).

Figure 7: Scenarios for Reservoir

Sunshine

Sunshine is a large rail-based activity centre in Melbourne's disadvantaged western region, about 25 minutes from the city by train and is on the preferred route for a rail link to the airport. Public transport facilities are some distance from the main centres of retailing and recreational activity. The rail lines cleave the activities into three quite separate areas, with the main centre of commercial activity being a hardtop mall about 600m away from either station. The area includes a small university campus, big box retail and warehousing. Sunshine has enormous potential that has been investigated using a range of very different scenarios (Figure). What all three of our visions have in common are ways of connecting the parts of Sunshine by elevating or trenching the rail tracks to varying degrees and allowing different kinds of transit-oriented foci to develop at different densities. While Sunshine has a strong residents group, it is likely that the primary concerns of local residents would focus on leveraging services, improved access to open space and other public amenity from any intensification process..

Figure 8: Scenarios for Sunshine

Private Shopping Malls

Private shopping malls within the suburbs comprise some of the busiest activity centres in the metropolitan area and are largely disconnected from the public transport system. While this disconnect is currently the case, we selected shopping malls as case studies for three reasons: because we wanted to explore the potential for development on the surrounding carpark land; because their future is compromised if they remain car-dependent; and because the provision of high volume public transport could provide the leverage to enable such malls to integrate effectively with their suburban hinterland.

Chadstone

Chadstone is Melbourne's largest and oldest private shopping mall, located about 15 kilometres from central Melbourne near the junctions of a major freeway and two major vehicular arteries. It is also within a kilometre of two railway lines and several tramlines, none of which has walkable access to the mall. Tension with adjacent suburban neighbourhoods has led to the construction of a high perimeter wall with limited access points. The challenge and the potential here is to turn a private and essentially anti-urban type inside out through the process of intensification. We investigated two approaches to intensification – the first focused on the addition of transit directly under and through the mall site, the second located a heavy-rail line about 200m to the east of the mall site.

Figure 9: Chadstone Scenarios

The first scenario envisaged how a relatively short underground rail connection could link Chadstone mall to three of Melbourne's busiest rail lines and extensions of existing nearby light rail lines. This strategy has eroded the perimeter boundary and extended streets across it to form

a new public street network through the carpark zone while leaving the mall itself intact. Some locations on the major arterial road are suitable for dense development and there is the prospect of constructing high-rise commercial and residential on top of the major anchor stores and parts of the mall. The blank external perimeter of the mall can be re-faced with an active edge – a process that has been underway since the 1990s. Between the mall and its hinterland, there are many potential ways of inserting permeable mixed-use residential blocks, with ground-level commercial and community uses that would allow Chadstone to emerge as a public rather than private city. The second scenario investigated how rail close to but not within the mall site could induce a broader field of intensification, and combined with a light rail extension, explored the way that the mall might become integrated into a broader corridor of incremental development that incorporates an adjacent industrial precinct with creek frontage.

Light Rail Corridors

Melbourne has a very substantial light rail network, much of it lined by 1-2 storey development in a mix of retail, commercial and residential. While the potential for high-density is limited, that for 4-6 storey development is significant and the tram corridors are very extensive (Adams, 2009; Woodcock etal, 2011).

Lygon Street

Our example here is a stretch of Lygon Street in Brunswick that has been targeted for redevelopment. This is a relatively typical condition in Melbourne where a mix of shopfronts and housing on small lots lines a major tramline in the context of a low-density suburban hinterland. Our approach has been to explore the outcomes of an existing urban design strategy that enables intensified development within certain building envelopes. Different members of our research team designed projects to be plugged into a sketch-up model as a test of possible urban design outcomes (Figure).

Figure 10: Lygon Street Scenario

University Campuses

Suburban university campuses have tended to be designed primarily for car access and mono-functionality. Like shopping malls they tend to be surrounded by carparks and poorly connected to the local neighbourhood. Since the land is generally consolidated and under quasi-public ownership there can be great potential for new development that can also be leveraged to fund better public transport connections.

Industrial Zones

Many industrial zones have potential for transformation into mixed use redevelopment. Some are large brownfield sites with potential for major new projects but many are small lot subdivisions ripe for evolutionary intensification incorporating creative clustering.

6. RETHINKING DESIGN/RESEARCH

This is a design research project in the sense that many of the research questions we have outlined cannot be answered in advance of an investigation of the urban design outcomes. Design is generally seen as infill within a planning framework: planning comes first, urban design fills in the smaller scale and three-dimensional framework, and architecture fills in the details. We suggest that this sequence from larger to smaller scale embodied in such thinking is neither accurate nor useful. Cities and the vital neighbourhoods, activity centres, zones and corridors within them emerge as a result of both top-down and bottom-up processes and concepts; they are both organized from above and are self-organizing. Formal organization generally comes from the state in the form of planning frameworks and infrastructure projects while self-organization is generally a market-based competition (jobs, products, property, etc.) – the challenge is to understand the interrelationships between them.

High-quality urban design is a wealth-creating activity that increases the attractiveness and productive capacity of the city; it provides an uplift in land values that can provide funding streams for infrastructure. The role of design here operates at multiple scales - well-designed infrastructure networks at the 100 km scale enhance capacities at smaller scales while high-quality urban design at the 1 km scale enables better flows within and between regions, with higher levels of intensification and greater capital gains. The potential for development of any given activity centre has a great deal to do with establishing and nourishing inter-connections and synergies with other centres – particularly through its local integration with the public transport network. There are synergies between larger and smaller scales in that the infrastructure investment required to better connect any given activity centre can be paid for in part by the capital gains created through high-quality design. A part of what is being produced are new flows of desire, new urban property markets. A key issue here lies in the role of design research in establishing the capacity for new development as a pre-requisite to understanding the benefits of infrastructure investment and the potential capital flows that might fund it. The investment must come first, yet be funded by the new flows it creates.

Design vision, in this sense, must encompass all scales of the city from ten metres to a hundred kilometres. We need to enlarge the public imaginary with regard to how major infrastructural investments at the larger scale can transform the city at every scale. Yet until we explore the urban design possibilities at the smaller scales we will not understand the potential yield of particular redevelopment sites and therefore the flows of capital necessary to fund the infrastructure. If the politics of urban planning proceeds in the absence of design vision then it becomes either driven or paralyzed by ideology rather than imagination.

Design research is a speculative mode of inquiry that explores the 'space of possibility' embodied in a particular urban assemblage (DeLanda 2011) - the range of possible spatial transformations that might be effected under different design strategies. Design research then generates forms of spatial knowledge about urban futures that becomes a basis for strategic decisions and investments – particularly infrastructural investments. This production of knowledge has a peculiarly spatial character – it is not linear, linguistic or numeric. Through a range of visual and spatial techniques, such as drawing, diagramming and 3-D modeling, design research generates, articulates and tests a range of possible urban scenarios at different scales. Design research takes the essential unpredictability of urban systems and outcomes as a starting point and seeks to experiment with the existing city as a laboratory. These experiments are not scientific because the context and future adaptations cannot be controlled. However, design research does involve a level of rigour in testing the possibilities - more accurately the 'compossibilities' - that emerge from the alliances and synergies between different parts of the urban assemblage. Design research exposes new ways of thinking and new definitions of the problem.

As academics we have worked on this project with leading practitioners from both public and private sectors. While our own disciplines span architecture, urban design and planning, those of our partners also incorporate transport planning and community development bringing knowledge and expertise from multiple scales and disciplines. Many of our partner meetings have been run as workshops designed to generate and test multiple scenarios for different parts of the city. The workshops have

enabled social, economic, environmental, and design quality issues to be integrated in a manner that is not possible within a purely academic or practice framework. The ways one thinks about the issue of transit oriented development has a lot to do with how one thinks new public transport infrastructure should be funded. Should it be funded by the state, by private profits, by capital gains on public land or by a levy on the general uplift in property markets generated over the long term? The most likely successful outcome is a mix of these, but the kind of mix will depend on the specific capacities and potentials of individual cases. But this capacity – this space of possibility – cannot become known without design research. When focused on typical conditions that are replicated across our cities, this design knowledge becomes applicable more broadly. We build a knowledge base for the transformation of transit networks, corridors, malls, campuses and activity centres. Design research is not a form of consultation that displaces normal design practice directed at immediate solutions, rather it is directed at changing ways of thinking about the city and its possible futures, changing conceptions of economic sustainability, livability, social equity and the value of public transport versus private cars. The test, in the end, is not whether we have found a solution so much as some steps towards a more productive way of thinking about the city.

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Images:
Ian Woodcock: Figs 2, 3, 4, 8 (centre)
Kim Dovey: Figs 1, 5 (right), 7 (centre, right), 9 (upper)
Rutger Pasman: Figs 6 (left, right), 9 (lower), 8 (left)
Tom Morgan: Figs 8 (right); 9 (lower)
Lee-Anne Khor: Fig 9 (lower)
Elek Pafka: Figs 5 (left, centre), 6 (centre), 7 (Left)