Overcoming the barriers to Transit-Oriented Development

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ABSTRACT

Despite the long-term application of Transit Oriented Development (TOD) policy in Australian cities full implementation has proven a challenge. Indeed, in the Western Australian state capital of Perth, residential densities across most train station precincts remain typically low. Moreover, the use of public transport has declined over the last decade despite repeated attempts to boost patronage. In response to this situation, this paper reports on a suite of semi-structured interviews conducted with relevant experts to elicit knowledge concerning (1) the barriers to delivering successful TOD; and (2) potential strategies government planners can employ to mitigate these barriers to create successful TODs. The paper concludes that the success of station precincts must prioritise diverse, creative, and genuinely appealing places and travel options over transport planning standardisation and fixed practices.

Introduction

Transit-Oriented Development (TOD) planning seeks to concentrate compact, mixed-use urban development in precincts around mass transit hubs to increase public transport patronage and urban density (Curtis 2012). Proponents claim that TOD delivers a plethora of benefits. These include boosting the viability of public transportation (Hagan 2017), improving the mobility of low-income households, improving local services and employment opportunities, and reducing car dependency, greenhouse gas emissions and urban sprawl (Congress of New Urbanism 2016).

TOD implementation challenges in Australian cities

Reflecting the ascendency of TOD theory, all Australian Federal, State and Territory capital cities are striving to achieve urban densification around mass transit nodes. Nonetheless, there exists a 'divergence between the compact city imagined in metropolitan plans and what is occurring on the ground in Australian cities' (Gray, Gleeson, and Burke 2010, 336). The TOD vision often conflicts with the reality of urban development that 'remains differentiated and dispersed rather than neatly multi-nucleated' (Forster in Gleeson, Dodson, and Spiller 2010, 5). Indeed, the application of TOD thinking in all capital cities has proven a challenge (Goodman and Moloney 2004; Gillen 2006; Kelly and Donegan 2015; Burton 2017; Goodman 2017; Randolph, Freestone, and Bunker 2017), despite such policies being operational in some cases since the

1980s (Murphy 2012). Indeed, across Australia's major cities, there remains vast swathes of low-density, suburban development (Dodson 2010) and these cities are some of the lowest density on the planet (Hurley, Taylor, and Dodson 2017). Reflecting this, the 2016 Census of Population and Housing found that only 10% of Australians spent Census night in an apartment (Australian Bureau of Statistics 2017).

Prevalent private vehicle ownership and profligate use provide more evidence for the relative failure of TOD planning. In 2016, nearly half (47%) of households living in apartments had one registered motor vehicle – generally parked on-site, and 16% of apartment households had two vehicles (Australian Bureau of Statistics 2017). While the total distance driven and the number of car trips taken are growing more slowly than in previous decades, car use is still growing overall (Kelly and Donegan 2015). Flexibility and expediency, combined with the car-friendly structure of our cities, means private vehicles still account for around 90% of passenger kilometres travelled (Infrastructure Australia 2018).

So why has achieving TOD in existing urban areas been such a struggle in Australian cities? Literature on the topic indicates that barriers to TOD typically relate to three broad yet interrelated categories: (1) community, (2) governance, and (3) development feasibility (Bolleter 2019).

Community barriers

TOD in existing urban areas has often been challenging because of entrenched community resistance to

infill development (Farris 2001; Wheeler 2001; Newton 2010; Kupke, Rossini, and McGreal 2011; Arvola and Pennanen 2014). Density is often perceived as an attack on suburban liveability (Dovey and Woodcock 2014). Indeed, a public 'sullenness' exists about urban densification in suburban areas (Kelly and Donegan 2015, 129). Driving this are worries about increased traffic and parking problems (Holling and Haslam McKenzie 2010), reduced property prices (Burke 1991), and a conviction that trains are already 'packed' and that TOD will just compound this (Rice 2016). Other concerns relate to a loss of privacy and amenity for existing residents (Arvola and Pennanen 2014), the destruction of urban forests and greenspace (Searle 2004), and the erasure of heritage and neighbourhood character (Maginn and Foley 2017). Moreover, some are cynical that TOD is just about property developers making bucket-loads of money at the community's expense (Rice 2016) through a neoliberal planning system that is a tool of developers (Kwok, Johnson, and Pojani 2018).

Governance barriers

Challenges to TOD also emerge from the planning system that merely 'enables' infill development rather than actively facilitating or promoting it. Moreover, TOD requires many representatives and happens in a deeply fragmented regulatory environment, adding complications, cost, time and risk to urban development (Dittmar, Belzer, and Autler 2004, 10). Furthermore, state government sets infill dwelling targets for local government areas, yet local governments labour with the responsibility for infill development delivery. However, local governments are frequently hostile to infill (Farris 2001; Dovey and Woodcock 2014; Hurley, Taylor, and Dodson 2017), and in many cases have been 'elected to enforce the anti-development views of their residents' (Dovey and Woodcock 2014, 68). Compounding this, local councils are often not trained to deal with the complexities of TOD (Dovey and Woodcock 2014) or funded to pump-prime TODs with the level of investment needed (Gray, Gleeson, and Burke 2010). Concomitantly, a lack of state government incentives to encourage a shift away from business as usual development (Newton 2010), means there is little reason for developers to proactively seek transit adjacent sites. Finally, a relative absence of state government leadership and communication strategies means that developers often face considerable community resistance in delivering TOD in existing urban areas (Rowley and Phibbs 2012).

Development feasibility barriers

TOD faces a plethora of development feasibility barriers. Train station surroundings often have well-loved heritage buildings, complex knots of road and rail infrastructure and fragmented land ownership patterns (Bolleter 2015). As such, the multifaceted array of vested interests attached to existing land parcels and infrastructure is a major constraint on TOD (Murphy 2012). Compounding this is a high demand for expansive car parks encircling public transport so that transit users can 'park and ride,' which directly conflicts with creating urbane and walkable places (Holling and Haslam McKenzie 2010). Moreover, TOD sites often lack the necessary service infrastructure, and the prohibitive expense of the required upgrades can undermine the feasibility of a development (Rowley and Phibbs 2012). Related uncertainties around developer contributions is also a significant obstacle to TOD (Rowley and Phibbs 2012). TOD in existing urban areas also runs into other general impediments to infill development such as uncertain demand (Sharam, Bryant, and Alves 2015), difficulties of obtaining finance for development (Burke 1991; Sharam, Bryant, and Alves 2015), inflated construction and labour costs, unattractive sites (Spira 2013), and a lack of exemplars (Newton 2010). These challenges are compounded by a shortage of economic incentives for developers undertaking multi-unit medium-density infill development (Urban Development Institute of Australia 2011) even though the 'financial odds are stacked against' such projects (Burke 1991).

Given this array of barriers to TOD identified in the literature, this paper explores these barriers in relation to the case study city of Perth, where TOD has been generally elusive in delivery. Subsequently, it seeks to identify potential mitigating strategies to overcome these impediments.

TOD planning in Perth

Perth's rail system, the backbone of the public transport system, has grown to consist of five major rail lines radiating from the city centre and connecting other centres such as Midland, Mandurah, Armadale and Butler (Figure 1). While the city has extensive bus services, rail services carry the majority of transit users (Department of Transport, Public Transport Authority, Main Roads WA, & Western Australian Planning Commission 2016). Built by the Western Australian state government, Perth's train system is operated by the Public Transit Authority (PTA), who typically own the land within the substantial rail corridors.

The principles championed in TOD planning, to some degree, have been the backbone of Perth's planning for almost 50 years. For example, the 1970s Corridor plan promoted a structure comprising four corridors, defined by rail lines, radiating from the central business district with regional centres at the
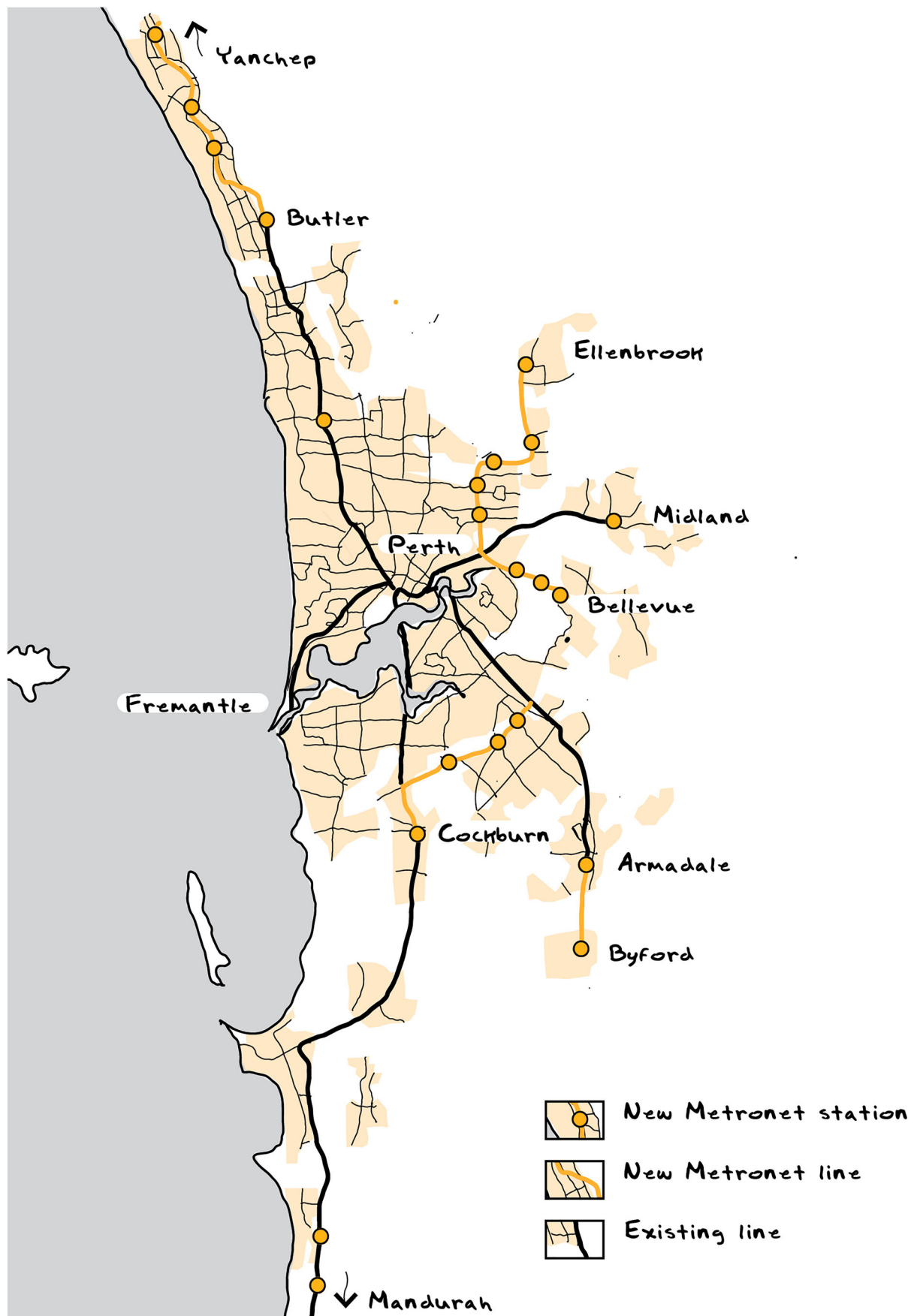
Figure 1. Perth's rail system consists of five major rail lines radiating from the city centre. The potentially transformative Metronet project involves 72 kilometres of new rail lines. Figure by the authors.

terminations, to reduce clogged traffic arteries in the central city (Curtis 2010, 261). In a similar vein, in the 1990s 'Metroplan,' policymakers sought to concentrate employment-generating activities and higher residential densities around mass transit routes (Curtis 2010). Perth's 2004 'Network City' (Western

Australian Planning Commission 2004) and 2010 'Directions 2031' plans also faithfully retained such TOD driven approaches (Western Australian Department of Planning 2010), as does the current plan 'Perth and Peel @3.5 million' (Department of Planning Lands and Heritage 2018).

The current policy and implementation planning for 'Metronet', a potentially transformative rail and station precinct project under the state Labor government, also embraces TOD. Indeed, the Metronet project represents the single largest investment in public transport that Perth has experienced (Metronet team 2021) and aims to reduce road congestion by creating activated, compact, walkable urban precincts around the stations being upgraded or developed (Government of Western Australia 2019a, 2019b, 2019c). Four key passenger rail proposals comprise Stage One of the project. They include a rail line to the airport, an extension of the Thornlie Line to Cockburn, a new line to Ellenbrook, and an extension of the Midland Line to Bellevue (Metronet team 2021).

TOD implementation challenges in Perth

Notwithstanding the long-term application of TOD policy, public transport patronage in Perth has deteriorated since 2012 despite repeated recent attempts to increase ridership (Figure 2) (Public Transport Authority 2021). Explaining this – to some degree – is recent mapping of access to public transport (train and bus) which revealed that only 64% of all residential addresses across metropolitan Perth were within a 400m walk of a bus stop or 800m of a train station

(Centre for Urban Research 2018). In part, this reflects that residential densities across most of Perth's station precincts remain typically low outside of centres such as Cockburn, Claremont and Subiaco, which contained swathes of government-owned land and have been comprehensively redeveloped. Difficulties in achieving TOD in existing urban areas are also evident in the modest percentage of infill development achieved. The infill rate was 43 per cent in 2019, up from just 38 per cent in 2018. These figures are below the comparatively modest target for 47% urban infill (Department of Planning Lands and Heritage 2017).

Indeed, outside of these aforementioned exceptions, there has been a general lack of coordinated redevelopment in TOD sites since Perth's high-level strategic plan for achieving TOD, 'Network City,' was published in 2004 (Western Australian Planning Commission 2004). Indeed, mapping of development since 2004 around key TOD sites reveals that development generally does not heed Activity Centre boundaries (Figures 3–5). In many cases, this development is dispersed, ad-hoc residential, background infill development scattered across the middle ring suburbs with little relation to mass transit hubs (Bolleter 2016). While comprehensive TOD requires sustained policy attention over decades, these figures provide a sobering snapshot of the extent of non-TOD development since 2004.

Methods

In this paper, we aim to understand specifically what barriers to TOD exist in Perth and, importantly, how
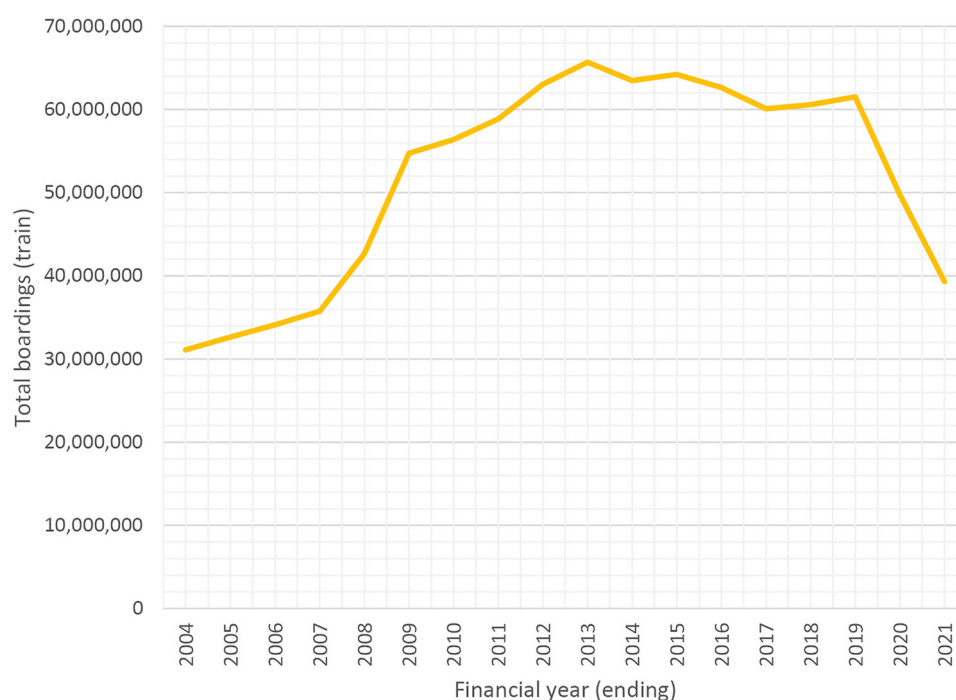

Figure 2. Rail patronage has declined in Perth since 2012. Graph by the authors based on data from the Public Transport Authority.

Figure 3. The Morley Activity Centre (a designated Primary City Centre) overlaid with infill development between 2004 and 2019. Comparatively, little of this development has occurred within the Activity Centre. Map by the authors based on cadastral data from Landgate.

Figure 4. The Cannington Activity Centre (also a designated Primary City Centre) overlaid with infill development between 2004 and 2019. Map by the authors based on cadastral data from Landgate.

Figure 5. The Stirling Activity Centre (again a designated Primary City Centre) overlaid with infill development between 2004 and 2019. Map by the authors based on cadastral data from Landgate.

they could be mitigated. The paper addresses a gap in the literature, as there is no contemporary, Perth-focused research on the barriers to TOD and potential mitigating strategies. This specific geographic focus is important because Perth, the most isolated capital city in the world, varies in societal preferences, development economics and building practices from other cities nationally and globally. The research questions that structure this paper are:

(1) What are the barriers to delivering successful TOD in Perth?
(2) What strategies can be employed to mitigate these barriers to deliver successful TOD in Perth?

Interviews

Thirteen semi-structured interviews were conducted in 2019. Participants were purposefully recruited from a range of fields and had extensive experience in the conceptualisation, planning, design or development of TODs in Perth. The breakdown of interviewees comprised; three transport professionals, three land developers; three design professionals; two-state government planners; one local government planner; one community consultation professional, and one community group member.

Each interview lasted between 30 and 60 minutes, and was audio recorded with the participants' permission. Interviews were based on set questions but were adapted to respond to the participant's particular professional background and fruitful deviations in the discussion. The resulting data set formed over 10 hours of interviews. These were transcribed verbatim, yielding almost 100,000 words of transcribed interview data. The interview transcripts were then subject to manual textual and interpretative analysis to identify key barriers to TOD and mitigation strategies. We employed word and phrase searches and close reading to find similarities and differences in perspectives to achieve this. All identifying information regarding participants and specific projects were removed, with our aim to extract themes from the responses. Responses have been edited for clarity.

Results

The barriers to TOD

The figure below presents the eight dominant barriers to successful TOD in Perth identified by the interviewees (Figure 6).

Transport infrastructure determining TOD precinct design

Throughout many of the interviews, a recurring theme was frustration with the dominance of transport agencies and infrastructure priorities – such as

transport speed (Transport Professional 1) – over the location and design of station precincts. This exasperation resulted from formulaic, inflexible transport planning overriding urban design; for instance, 'you do not stand a hope in hell in terms of transport agencies' standardised approach to roads, road speeds, urban design and pedestrian crossings' (Land Developer 2). The predominance of transport infrastructure over creating a 'place' was echoed by other interviewees (Local Government Planner 1; Transport Professional 2; Community group member). The impact of these controls on station design (including the interface between station and precinct) was cited as being especially problematic. Others commented on the space requirements of current station designs that conflict with good place design: for instance, the width of roadways needed for bus turns and stopping (Land Developer 3, Design Professional 2). Such an operational focus, believed to be based on sometimes inaccurate traffic modelling, was perceived as contradicting the qualities needed to create a 'great place' which is more than a mere 'connector between bus, train and ticket machine' (Land Developer 2).

Most interviewees also identified that government-owned land in road and rail reserves was dominated by the interests of transport agencies such as Main Roads or the PTA. This dominance was expressly noted with regards to the continued requirements for parking on prime sites around the station, whereby 'we have a sea of car parking, so if you drive a car, you get better access to the station than if you walk' (Land Developer 3) (Figure 7). The loss of developable sites to car parking was compounded by the standard practice of delivering at-grade rather than multi-storey parking (Land Developer 2). Transport agencies' decision-making dominance and their fixed infrastructure requirements were perceived as the single biggest barrier to creating the kind of precincts within which people wanted to live in or visit.

Separation between proposed TOD and existing activity

The second barrier to TOD in Perth was identified as the placement of new rail stations. Many interviewees viewed past and proposed station location choice as 'missed opportunities' whereby a station was not optimally placed to integrate with existing urban activity or density. Indeed, the choice of such rail station locations based upon PTA cost and operational requirements was seen as a major barrier to creating good planning and design outcomes (Land Developer 3).

Such sentiments were expressed concerning the lack of connection between the Rockingham and Mandurah (Figure 8) stations (on the southern suburbs railway) to their existing town centres (Transport Professional 1), and the creation of transit
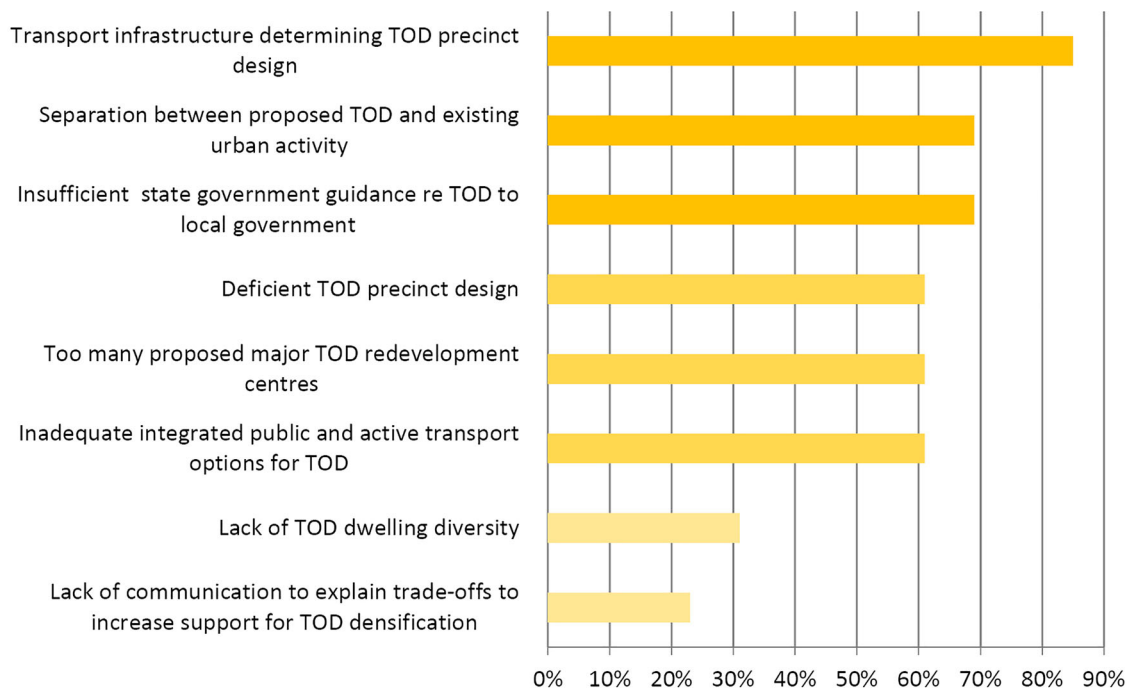
Figure 6. The dominant barriers to successful TODs in Perth as identified by our interviewees. The percentage figure refers to the percentage of interviewees who referenced a particular barrier. Graph by the authors.
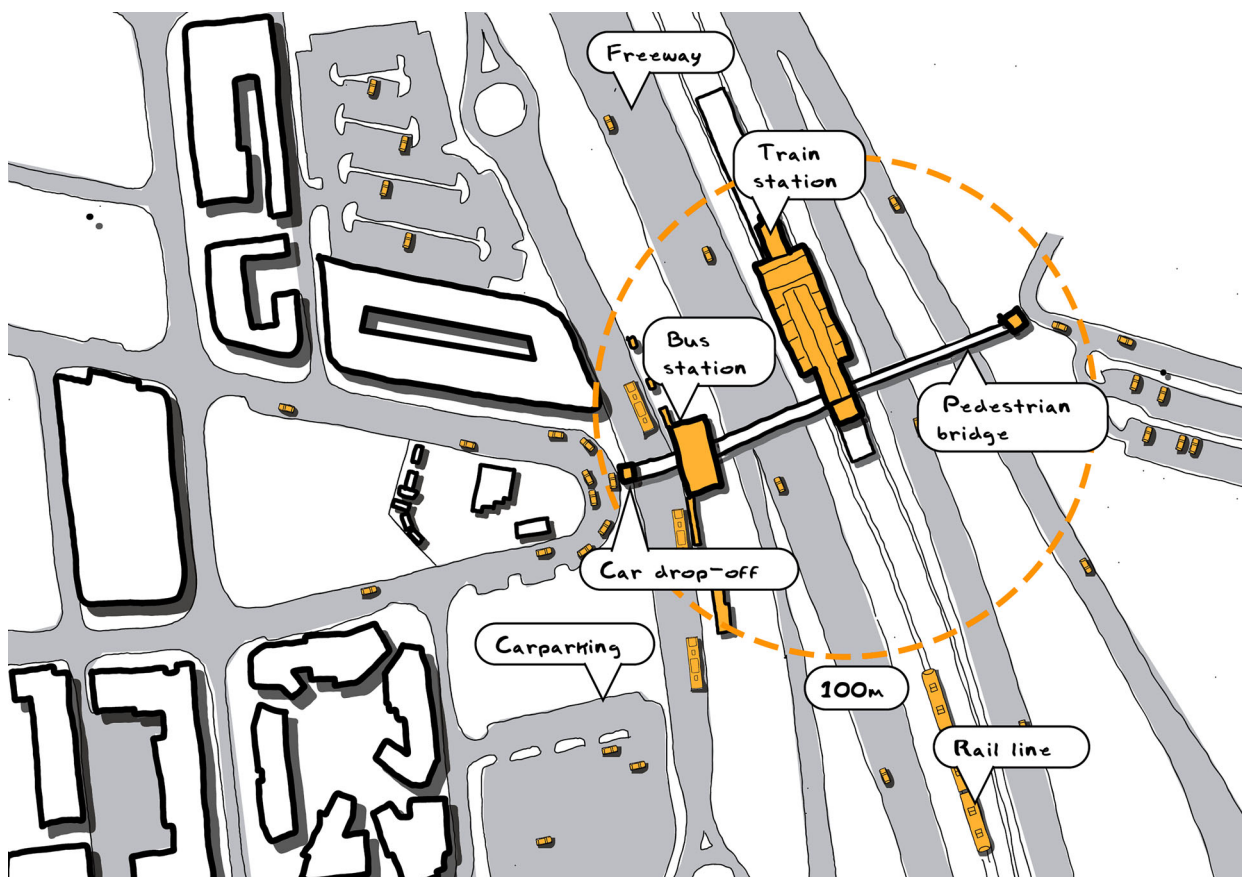

Figure 7. Cockburn, a designated Secondary Town Centre, reveals the dominance of transport agencies and infrastructure priorities as illustrated by expansive at-grade car parking. Figure by the author.

stops in inhospitable locations such as Glendalough an inner-city area with substantial industry (Design Professional 2).

This detrimental disconnect between transit and urban activity was also highlighted regarding the siting of stations within freeway reserves. While the rhetoric

of 'pedestrians first' dominates discussions of TOD, many interviewees lamented the physical and spatial barriers to this in practice, such as long pedestrian waiting times at intersections (Transport Professional 3) and the presence of speeding cars which renders stations unpleasant (Land Developer 2). As one Transport Professional remarked, 'it is very hard to get the residential and commercial development outcomes you like when you have got such a hostile environment caused by a major freeway' (Transport Professional 1).

Insufficient state government guidance regarding TOD to local government

Interviewees largely agreed that the relationship between state government, local government, and developers needed more intervention and oversight to streamline processes and ensure a holistic design. Some interviewees had little faith in the ability of the local government to deliver comprehensive TOD; 'If you want to build TODs, keep the local government out of it. They do not have the ability or professional skills to get there' (Design professional 1). To this end, many believed that the state government had a larger role to play in TOD planning and delivery: 'You need someone that can coordinate, organise, bring a whole government attitude towards it and have the authority to make those decisions because it just does not happen' (Design professional 1). Inconsistencies, local politics, and a lack of resourcing at a local level were perceived impediments where state government assistance could greatly benefit TOD delivery, as 'frankly local government is a mixed bag' (Transport professional 2).

Specifically, entities like Landcorp and the Metropolitan Redevelopment Authority (now both DevelopmentWA) were praised for their role in substantial, coordinated developments. As one interviewee noted, many local governments do not have a long-term vision about where they are going, which is why the State' has got to play more of an assisting role' (Land developer 3). This role could include providing planning guidance on how to deliver context-appropriate infill (Local Government planner 1) and address 'a gross lack of uniformity in terms of the willingness of local governments to develop higher density areas' (Transport professional 2).

Many interviewees expressed that a significant impediment to TOD was a lack of control over private land, curtailing a holistic vision for development. As one design professional stated: 'Subiaco worked because the state government-controlled the dirt' (Design professional 1). Furthermore, the difficulties in achieving land amalgamation – and leaving too much to the private sector – have resulted in poor development in many TOD sites: 'very ordinary subdivision, duplexes and triplexes, rather than any other sensible high rise' (Transport professional 1). Interviewees expressed this frustration in the terms: 'we can

only put the planning in place, it is then up to the landowners to do something. There is only so much within our control' (Local Government planner 1). Comprehensive redevelopment by state government agencies was regarded as potentially unlocking this situation.

Deficient TOD precinct design

A significant barrier mentioned by most interviewees in various forms was the deficiency of the transit precinct design. This barrier concerned different overlapping factors: interest and amenity, safety, and exposure to the elements, and the interface between the station and surrounding urban fabric. This barrier was summed up by one interviewee as a query about creating genuinely inviting places: 'how do you make these dynamic and interesting? Exciting places attract us. How do you make this a place where people want to go?' (Community Consultation Professional)

The barriers to attracting transit users, residents, and visitors, also were exemplified in observations about a lack of attention to exposure to heat, rain, and wind. For example, 'if it is a bland, hot, barren, ugly transition, that is deadly. We need to make sure that we finish it off and make it nice holistically as a design piece so that people – the minute they get off the train – are intrigued, delighted, and are enjoying it' (Land Developer 2). Another interviewee commented, 'You want me to catch the train, but where is the shade? Where is the safe footpath? If I am pushing a pram, where are the crossovers?' (Land Developer 3).

Another barrier to the success of TODs was a failure to address isolation and lack of activation in the design of stations, interfaces, and precincts, resulting in unsafe environments, particularly at night (Land Developer 3). Such factors were expressed as being commonly overlooked but significant reasons in people choosing not to live near or use transit (Land Developer 3). Indeed, it was regarded that inattention to the design of the fine grain experience of the precinct creates a significant barrier to its overall success (Figure 9).

Attempting too many proposed major TOD redevelopment centres

Another barrier identified by numerous interviewees was the drive to achieve 'too many' major TOD centres in Perth. This impediment was emphasised by interviewees from all sectors, who felt it diluted resources and failed to acknowledge the lack of sustained population growth to make them work. As one state government planner stated, 'It is going, which x, y and z strategic centres or other sub-centres do we want to invest time in over the next five years?' (State government planner 2)

All transport professionals interviewed echoed the failure to be selective in this manner; as one explained, 'I feel that we are trying to do TOD in too many places.

Figure 8. In Mandurah, a designated Strategic Metropolitan Centre, the train station and the waterfront town centre are separated by 2.5 kilometres, requiring train passengers to use bus services to access either. Figure by the authors.

Therefore, it is eroding what we can do in any one place. Every major centre is seen as a huge Activity Centre, but the government cannot afford to underground rail and build all the infrastructure needed everywhere in the horizon that we are looking at' (Transport professional 3).

To this end, a strategic focus on the specific hubs that could genuinely become both origin and destination would streamline resources, be more likely to attract a critical mass of residents and funding and create precinct identity distinct from other competing centres.

Inadequate integrated public and active transport options for TOD

While successful TOD is often linked to a decrease in vehicular use and the ability to access public transit, almost two-thirds of interviewees stressed that the current transport network was inadequate to meet people's actual everyday travel needs. As one put it, 'We are putting a hell of a lot of money into the TODs and the rail network, but actually, what we need is an integrated transport strategy that looks at how you can get around' (Land Developer 1). This sentiment was echoed by others, who argued a focus beyond heavy rail was vital: 'What is that next tier of public transport? That is when I think we will start to see the car dependency in the city go down'

(Transport Professional 3). A shift to a decentralised and diffuse active and public transport network that reflects future employment trends and current real-life needs of potential users and residents was regarded as crucial to the success of TOD.

Lack of TOD dwelling diversity

More than a third of the interviewees identified 'the lack of diversity in the dwellings being built in TOD precincts' as impeding the successful delivery of TODs. As one interviewee explained, 'we cannot even deliver diversity in apartment typology. It is the same layout and the same design; it is the same floor to ceiling height. Everything is identical, and they will tell you it is diverse' (Land Developer 2). Moreover, interviewees regarded that challenges to deliver TOD resulted from failure to market these apartment products to a broader cross-section of the community (Land Developer 1) – particularly a growing cohort of older adults (Land Developer 3).

Lack of effective communication to explain trade-offs to increase community support for TOD densification

Finally, community opposition to development was another barrier mentioned by several interviewees, but – contrary to the perspective that the community
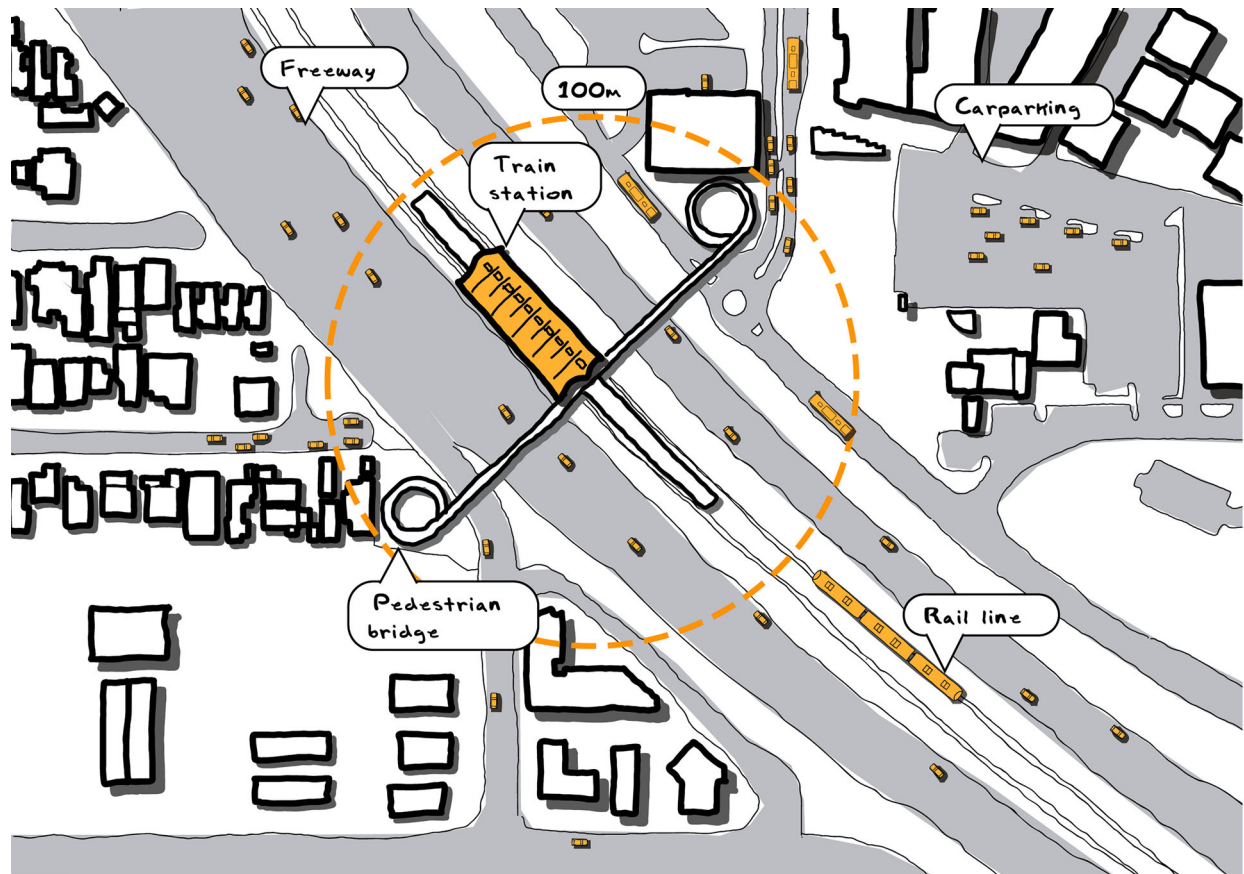
Figure 9. Leederville, a designated Secondary Town Centre, is disconnected from the surrounding urban precinct by deficient precinct design compounded by the presence of a major freeway. Figure by the authors.

was generally resistant to development – this barrier was sympathetically specified as a lack of clear communication about development that understandably aggravated some community members. In this regard, the emphasis was on 'bringing the community with you' rather than frustration with the community voicing concerns. As one land developer expressed about TOD,

> If you are a resident, you would be going, 'What is in this for me? Where is the upgrade to the parks? Where are the street trees? Where is the new community centre?' … And it is not enough to say, 'You are getting an upgraded station' (Land Developer 3)

This feeling that there is a lack of true engagement with communities regarding TOD was echoed by others, who felt that excluding residents from the planning process heightened the misunderstandings and opposition that could follow. For instance, the emotive opposition to height in many developments was cited as the main concern of community members. However, the failure of community members to envisage positive scenarios was perceived to stem from the failure of government to provide 'real discussion and diverse options.' As one interviewee explained, 'I do not think people are involved early enough. I do not think they understand that you have to have trade-offs' (Community Consultation Professional).

In particular, not addressing the concerns that design neglected the local context was considered a genuine barrier. Some interviewees regarded that rolling out similar station designs regardless of location caused a 'huge uproar in your community because why would this community – completely different from that community – get the same development?' (Design Professional 2). This failure to sell a contextually specific plan to the community (Local government Planner 1) was considered a significant impediment to TOD.

Mitigation strategies for achieving TOD

Optimistically, the interviewees considered this plethora of barriers surmountable. Figure 10 presents the six dominant mitigation strategies for successful TOD in Perth, as identified by interviewees.

Integrate station with surrounding TOD precinct
Our interviewees stressed the importance of making the station and precinct a unified, delightful, active place that was safe, protected from the elements, and integrated into the surrounding fabric. As one interviewee explained, the aim should be making spaces 'dynamic and interesting' (Community Consultation Professional). As another expounded, the diversity
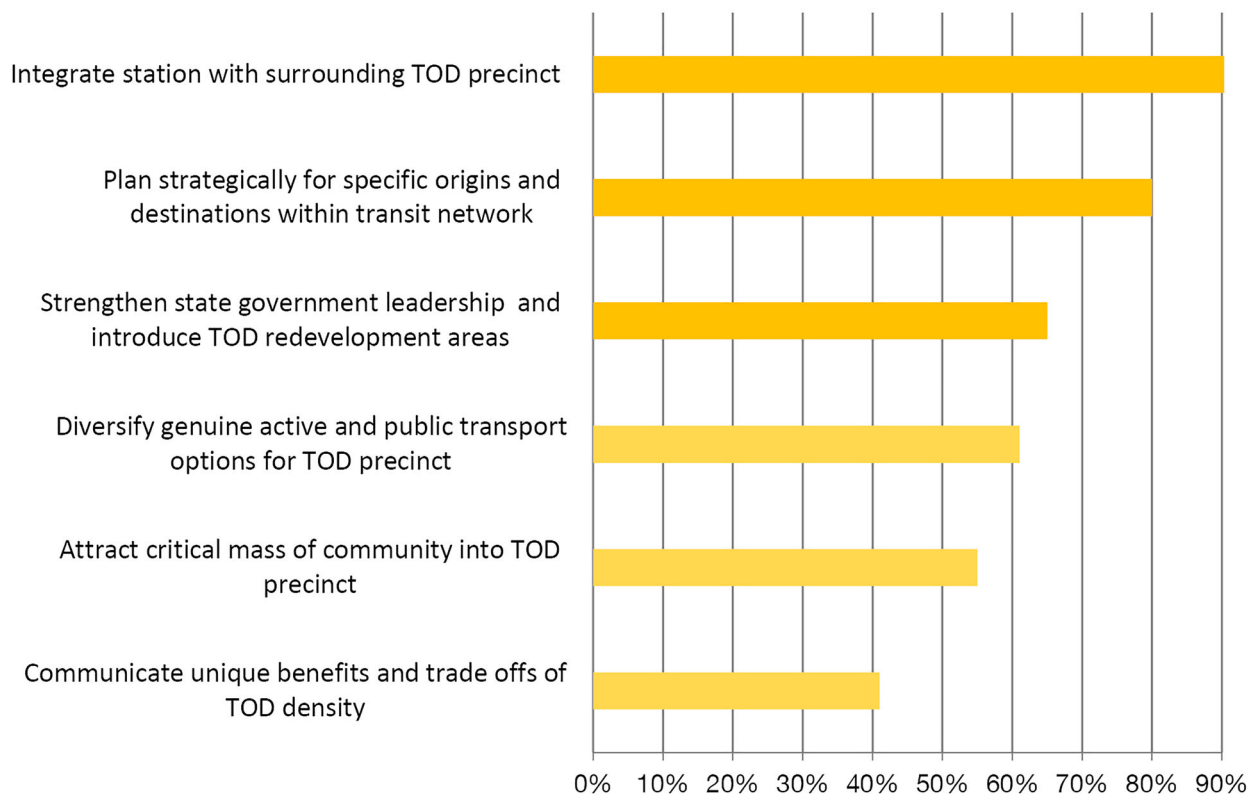
Figure 10. Mitigating strategies for delivering successful TOD precincts in Perth. Graph by the authors.

and intrigue that such places generate, and then eventually self-perpetuate, relies on a desire for people to be there (Land Developer 2). According to our interviewees, the design focus should be the critical interface between the station and precinct, and the creation of continuity and inviting elements throughout the extent of the TOD precinct.

Plan strategically for specific origins and destinations within the transit network

Our interviewees highlighted that government planners need to prioritise fewer key centres and refocus energy on smaller hubs. This strategy involves 'bringing the rail to density and activity, not density and activity to rail.' As several interviewees suggested, the heritage rail lines offer much in the way of examples of successful, organic TODs, whereby existing stations are comprehensively 'embedded into communities' (Transport Professional 3) and the 'community is closer' (Transport Professional 1). These examples prompt a focus on a reduced number of major transport activity hubs and a more diffuse, finer grain network of places that are considered destinations.

Strengthen state government leadership and introduce TOD redevelopment areas

Our interviewees indicated the need for greater oversight of TOD through the state government planning apparatus. Rather than this being a driver of

overriding neighbourhood character, they regarded that it would enable a holistic vision and streamline processes to enable the uniqueness of each area to flourish as development occurs. As one interviewee explained having oversight ensures the development of design guidelines, enforcement of design standards for Development Applications, and adherence to an integrated vision for the precinct (Land Developer 2). Our interviewees explained that state government leadership would shift the burden off local governments and ensure that no single transport agency dictates a design agenda. As one land developer stated,

> 'We need a higher level of government when you are dealing with the issues around a TOD. Then you can say, 'Listen, there is a higher strategic outcome that we need to try harder to achieve.' It is more about leadership and a higher-up directive (Land Developer 2).

Interviewees stated that greater state government leadership ensures that haggling over policy interpretation and contradictions at a local level is avoided, enabling efficient development to accompany excellent design outcomes.

Diversify genuine active and public transport options for TOD precinct

Our interviewees highlighted the need for a comprehensive analysis of travel connectivity outside the rail network at a human scale. It was felt a TOD that only provides access to the city centre will not

incentivise reduced car use or increased public transport use beyond single trip activities like getting to and from work. In turn, several interviewees felt such limited transport options may not be enough to attract potential residents to a TOD.

Our interviewees explained that what is required is a whole of journey approach, which incorporates motivations and experiences of active travel. For example, mundane and unshaded bike paths can deter someone who might otherwise be keen to cycle to the train station. As one design professional aptly explained,

> For a TOD to work you need to think of the before and after transport. For example, I live in my suburban house, getting into my car to get to the train station next to the freeway, why would I stop? TODs are not just that little precinct; it is the whole network that you need to consider (Design Professional 2).

Attract critical mass of community into the TOD precinct

Our interviewees stressed the need to create precincts that offer interesting, affordable, and diverse dwelling types and de-couple the assumption that TODs equal high-rise development. As one land developer stated, 'I think we have got to be really careful thinking that density has got to be high-rise apartments. We are going to need to be a lot cleverer about the way we do medium density (Land Developer 3).

Creating a thriving, diverse precinct means attracting varied demographics to give the area layered cultural and social complexity. In practical terms, such precincts can offer creative spatial arrangements for residents, whereby co-living becomes more common for people not traditionally viewed as wanting to share housing: older adult siblings, co-workers, grandparents, families with very young children (Land Developer 1). Therefore, to offer genuine opportunity, apartments need to vary in size, not just in the number of bedrooms, and provide more bespoke elements (Land Developer 2).

Our interviewees explained that this strategy requires engagement with potential and existing residents; 'I do not feel like we get any buy-in from everyday people' (Community consultation Professional). Asking community members what genuinely would attract them to live in a TOD can offer a lot to these discussions. Genuine diversity of dwelling types within a TOD precinct is critical to attracting this diversity of residents. However, in practice – as expressed by our interviewees – this diversity is generally not occurring. Indeed, 'diversity' is diluted to constitute a single type of 'different' dwellings for a particular demographic rather than a genuine mix of housing choices.

Communicate unique benefits and trade-offs of TOD density

Our interviewees stressed the need to offer unique additional features to sell higher density TOD to a community rather than just transit services. As one interviewee asked, 'what does density let you do that you could not do anywhere else?' (Land Developer 3) Three main creative suggestions were made to shift this focus to a desirably different precinct and attract a broader cross-section of the community.

The first is energy sharing, whereby power generation is included in the precinct, creating a novel optimisation of resources (Land Developer 3). The second is a true commitment to sustainable precincts, in which TODs become exemplars of genuine carbon-neutral living (Land Developer 1; Community Consultation Professional). Thirdly, the opportunity for making station precincts test-cases for experimental housing which could transform the attractiveness of often unappealing sites adjacent to stations (Design Professional 2).

Discussion

This paper has identified the barriers to TOD development in existing urban areas and considered several strategies that planners could pursue to mitigate these barriers to deliver succesful TOD. The interviewees conveyed deep frustration and feelings of lost opportunities arising from the struggle to achieve comprehensive TOD in Perth. This angst relates to how TODs are shaped by infrastructure and operational requirements over experience and location and the unmet potential of precincts that result. Nonetheless, the mitigation strategies illustrate possibilities for design-led development through shifts in perspective and processes. These prioritise diverse, creative, and genuinely appealing places and travel options over the speed of development, standardisation, and fixed practices.

Policy implications

Given the scale of the Metronet project underway it is paramount to identify strategies to overcome the barriers and ensure comprehensive TODs are developed. In this respect, it is concerning that the strategies for achieving TOD that interviewees tabled, in some cases, contradict Perth's current planning. Below we note these contradictions and suggest policy responses. Firstly, the proposed refocussing of TOD efforts on a limited number of sites have significant implications on Perth's overarching planning document, which sets out a substantial 93 Activity Centres (most of which are TODs) (Department of Planning Lands and Heritage 2018) – as well as the Metronet rail project which aims to introduce a host of new centres (Metronet team 2021). Policymakers need to

develop a clear hierarchy to establish which centres are the priority so that efforts and capital are not spread too diffusely over this extended network; such as was the case with the 'Melbourne 2030' plan and its horde of 114 proposed centres which Elliot (2017, 107) described as 'superficial to the point of ridiculousness.'

Moreover, the problematic separation of proposed TOD from the existing urban activity, which our interviewees recognised as a major problem, is being perpetuated in current planning for Metronet (Metronet team 2021). Indeed, a host of new stations will be delivered in freeway medians, such as along the Morley- Ellenbrook line, and in locations remote from existing town centres, such as the Morley station, which is two kilometres to the east of the existing town centre defined by the gargantuan Galleria shopping centre. Such decisions will likely lead to separation between TODs and existing activity – which will make the delivery of a successful, vibrant TOD precincts extremely difficult. As such, future Metronet planning must find creative ways of uncoupling freeway and rail infrastructure.

Nonetheless, the findings of our research resonate with some of the planning for the Metronet project. For example, our interviewees identified the weakness of a monocentric CBD focussed rail network, and the Metronet project potentially will introduce a greater level of poly-centricity into Perth's urban structure. Moreover, the Metronet station precinct guide advocates for the Metronet related TODs to be 'finely grained' (Metronet team 2018, 16) and 'thriving, active, safe and inclusive places for the community' in which the impact of parking and services is appropriately considered and integrated. However, given the dominance of transport planning over urban design in Perth, we have concerns that such policy aspirations will be lost in the headlong rush into Metronet implementation.

The continued requirement for extensive parking around mass transit hubs will benchmark how well stations are integrated with their urban precincts. A recently released Precinct Design Guide provides guidance in terms of efficient use of parking and a strategy that enforces upper limits on parking (Department of Planning Lands and Heritage 2019); however, it is yet to be seen whether such aspirations will find expression on the ground given often inflexible and formulaic transport planning standards.

Our findings with the literature

Our key, and novel, finding highlights that the success of station precincts must cogently, firmly, and enduringly reflect the design principles and imperatives that will maximise their potential as authentic community places. In wrestling with the thorny issue of densifying TOD precincts, policymakers should be attentive to the 'real people' of Australia's cities to understand their 'needs, wants, capabilities and fears' (Mares 2010, 41) rather than grasping to 'achieve' infill development or transit use targets. Indeed, as Troy (2004, 125) reminds us, other approaches 'only wastes a lot of the planners time and government money.' This situation has (to some degree) occurred with TOD – an approach that might have convinced planners but has not necessarily convinced communities.

Farrelly (2021) identifies in our TOD fixation 'a prioritisation of the "going"over the "being" lies an overweening impatience, a focus on efficiency and a near-universal obsession with utility as the highest good.' Moreover, Fishman (1982) explains how the mission to organise the city around speed and efficiency allowed urban planning to be seen as a science, not an art; a situation which has seen an emphasis on transport connectivity over the creation of 'place.' Our findings resonate with such prescient contributions.

In more detail, the literature echoes the need to integrate the station with the surrounding precinct. In particular, the literature identifies how extensive parking around stations conflicts with messaging around reduced car use, active travel, and compact development (Soria-Lara, Valenzuela-Montes, and Pinho 2015). Moreover, it identifies that a feeling of safety (or lack thereof) can determine the precinct's success (Carpio-Pinedo, De Gregorio Hurtado, and Sánchez De Madariaga 2019).

Secondly, the literature is supportive of our findings of the need to 'plan strategically for specific origins and destinations within the transit network' and 'diversify genuine active and public transport options.' Mees echoes these sentiments in his call for public transport to be a genuine 'alternative to the car for a full range of trips, not just those to the city centre' (2014).

Thirdly, the need to attract a critical mass of community into a precinct, in part, through housing diversity, is confirmed by the literature. Indeed, Kamruzzaman et al. (2016) identify that due to a disconnect between housing choice and household compositions, 'there are a large number of people that do not live in TOD areas who would prefer to do so.' This situation is particularly pronounced for families with school-aged children who, due to a lack of larger apartments and private open space, 're-locate toward non-central, mostly transit-poor parts of the metropolitan area' (Wolday, Næss, and Cao 2019).

The opinions of our interviewees were also generally consistent with those from stakeholder surveys conducted by Renne (2005) from the Planning and Transport Research Centre. The barriers and related mitigating strategies identified in this project resonate with ours (Renne 2005). This comparison indicates

that many of the obstacles to TOD have been long-standing in Perth and are unlikely to be surmounted without targeted policy interventions such as we have proposed.

Limitations

As the interviews informing this paper were conducted in early to mid- 2019, the paper does not scope the implications of the COVID-19 pandemic for TOD and compact city planning policy. Nonetheless, COVID-19 has reduced the desirability of both apartment living and transit use, which will compound barriers to full TOD implementation (Bolleter 2021).

Conclusion

Planner Charles Marohn has argued that 'Great places need a train less than a train needs a great place. Build the place first, and transit becomes the logical, inevitable next step – no more transit-oriented development schemes. Instead, what we need is development-oriented transit' (Quednau 2018). For this reason, urban planners and designers should learn from our TOD struggles of the past and focus on the everyday routines and embodied movements of those targeted to live in and use TOD precincts. To give existing and future residents a reason to support TOD, beyond transit, beyond a fast commute to the CBD, will be imperative to the success of TODs in Perth and elsewhere.

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