Final Report

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Towards a new development model for housing regeneration in greyfield residential precincts

authored by

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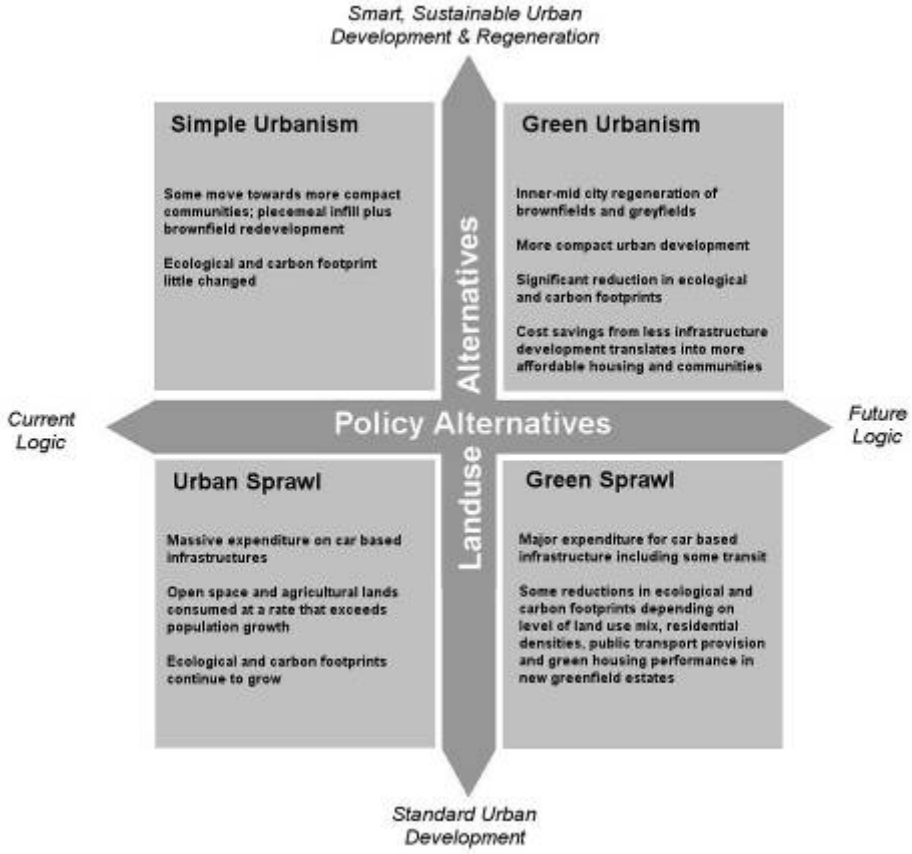
EXECUTIVE SUMMARY

Project premise

Australian cities are forecast to grow substantially over the next half-century. The vision that they can 'get better as they get bigger' (Committee for Melbourne 2010) will ultimately depend upon how and where this growth is directed. The planning logic applied to urban development in Australia over much of the past 60 years was based on low-density 'garden city' greenfield expansion; a regime that was highly car-dependent and perpetuated the industrial era's restrictive zoning of land uses. It was a period when practitioners and populations alike foresaw little in the way of resource or environmental constraints upon urban development.

A future logic for urban development is required: one that can significantly reduce our ecological footprints as well as enhance city productivity, competitiveness and social inclusion, thus enabling Australian cities to get better as they get bigger (see Figure 1).

Figure 1: Alternative urban development options



Source: Adapted from presentation by Peter Schwarz (Global Business Network) on Sustainable and High Growth Cities, World Cities Summit, Singapore, 29 June 2010

Exploring pathways for such a transformation is the focus of this AHURI Investigative Panel project. The research recognises that future metropolitan growth and investment will need to be redirected inwards rather than outwards, into precincts and regions of the middle suburban *greyfields*. Greyfield residential precincts are defined here as under-utilised property assets located in the middle suburbs of large

Australian cities, where residential building stock is failing (physically, technologically and environmentally) and energy, water and communications infrastructure is in need of regeneration. Greyfields are usually occupied and privately owned sites typical of urban development undertaken from the 1950s to the 1970s (Newton 2010).

The project investigates the processes required for an effective development model capable of delivering more affordable and sustainable medium-density housing through the regeneration of greyfield precincts in Australia's capital cities, with a particular focus on Melbourne. It targets the middle suburbs as the key areas of investigation for new urban policy (Major Cities Unit 2010).

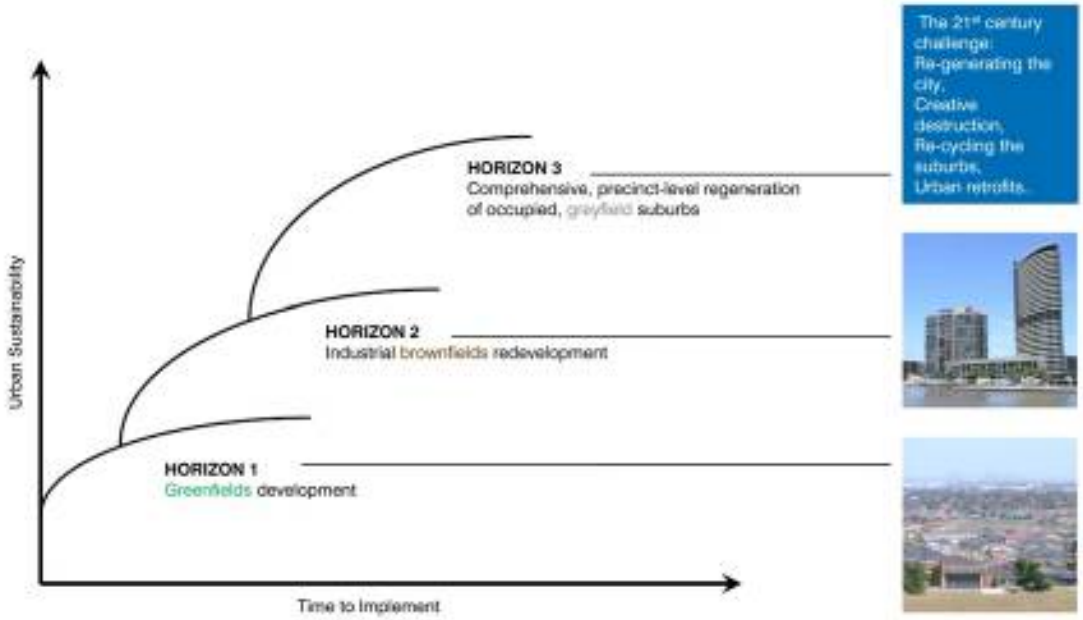
While the middle suburbs show evidence of prior patterns of densification, including the walk-up flats and post-strata-title townhouse development of the 1960s and the 1970s, the prevailing housing typology remains a detached dwelling on a single lot. This represents a nominal density of eight to 15 dwellings per hectare, and is widely accepted as unsustainable.

Formal strategies for urban intensification have involved the redevelopment of large land assemblages in activity centres and more recently, the examination of transport corridors (Adams et al. 2009). However, as much as 35 per cent of infill redevelopment in middle suburbs takes place informally (Goodman et al. 2010) so it is surprising that there has been little detailed examination of this small-scale redevelopment activity, or the possible contribution it could offer intensification efforts.

Regeneration of residential greyfield precincts is not proposed in opposition to existing state government policies, which appropriately aim to increase population density around transport corridors and activity centres. However, these strategic areas have been very slow in generating new housing, with fragmented infill continuing to be the major provider of new housing in the middle suburbs. Because this informal infill generally falls outside of the government policy-focused areas, it has been neglected as an issue for investigation. This project aims to bridge this research gap by considering how infill redevelopment could be undertaken more effectively through a precinct approach—this could contribute to a range of strategic city planning objectives within an emerging national urban policy (Department of Infrastructure and Transport 2010).

As distinct from its greenfield and brownfield counterparts (Newton 2010; see Figure 2), greyfield redevelopment lacks an established model to drive the process, resulting in fragmented and sub-optimal development. This project aims to identify the innovative policy directions and associated organisational and technical processes needed for an effective development model in greyfield residential precincts. Sustainable urban development (that addresses environmental, social, economic and governance dimensions as envisaged here) will not be achieved without fundamental transformation of the greyfields in the middle suburbs. Melbourne is the focus of this study, but the findings are applicable to other major Australian cities.

Figure 2: Pathways to more sustainable cities: horizons of urban development



Source: Newton and Bai 2008

The greyfield precincts proposition

This research focuses on the informal infill that clusters around two to seven dwellings per development, undertaken mostly by small developers (Phan et al. 2008). The project explores how this kind of informal development could be strategically managed. By exploring a range of issues—including how parcels of land could be assembled for higher-density redevelopment at the scale of precinct and how innovative design and construction methods could make these developments more socially and environmentally sustainable—this research aims to develop strategic management models for infill developments.

For the purposes of the investigation, a precinct has been assumed to consist of 10 allotments. However, a larger or smaller number may be more viable. It is proposed that a precinct of 10 suburban lots could be sufficient for up to 40 dwellings. It is highly unlikely that housing provision in areas of greyfield regeneration will be provided by high-rise high-density apartment typologies. While such typologies are mandated for activity centres and transport corridors, in a greyfield suburban setting they are unprofitable and undesirable. However, a combination of dwelling types may be feasible. These would include four storey buildings—prefabricated or timber-framed, and delivered by the domestic residential sector—along with a variety of other typologies, to create a mix of detached, semi-detached, row and apartment housing.

The precinct level design model also provides for high quality shared spaces, concentrated car parking solutions and a finer grain to pedestrian circulation and interconnection paths beyond the line of the street. It also offers opportunities for non-traditional suburban forms—offices, shop frontages, studio spaces—and ancillary community services. Such diversity could assist in accommodating the rental market displaced from inner city and activity centres (Wood et al. 2008) and the expected baby-boomer ‘relocation within region’ (Olsberg & Winters 2005).

Three types of precinct were considered, as follows (see Figure 3).

Consolidated precinct

This precinct type consists of a large parcel of assembled land enabling high-density built outcomes suitable to large-scale development. Development sites of this type can produce high yield and construction efficiencies, and have the potential to achieve high quality design input and provide precinct based infrastructure.

Dispersed precinct

This type consists of small suburban parcels dispersed over a 400 square metres area. Based on current infill development patterns, this model is based on a single developer working over a number of non-contiguous sites. It can provide high quality, diverse housing typologies ranging from low to medium densities. Opportunities for intensive infrastructural efficiencies are limited but the scope for improved landscape and street amenity is enhanced. By coordinating development on several sites within a precinct, certain economies of scale may be possible.

Hybrid precinct

This type of precinct consists of a mixture of stand-alone and aggregated lots, potentially connected by infrastructure and landscaped elements. Assuming a single developer working over the precinct sites, certain economies of scale may be possible including prefabrication and a common design strategy. In addition, the mix of land sizes means that different typologies can be developed and higher densities achievable.

Figure 3: Indicative greyfield residential precinct models

Consolidated Precinct | Hybrid Precinct | Dispersed Precinct

The potential for greyfields precinct redevelopment in the middle suburbs is significant, with regeneration possible in the following domains:

- Housing—delivering a mix of dwelling types, styles and costs, at higher densities, with some mixed use, while at the same time having the capacity to deliver a more aesthetically pleasing, higher amenity redesigned neighbourhood than its predecessor.
- Energy—achieves carbon neutrality or zero carbon status with the introduction of distributed (renewable) energy and micro-generation technologies as new elements of hybrid buildings or precincts, capable of generating energy for local use as well as for the national grid (Newton & Tucker 2010).
- Water—integrated urban water systems involving water-sensitive urban design are best implemented at precinct scale, enabling appropriate mix of technologies for local water capture, storage, treatment and end use to be introduced in an eco-efficient manner, implementing ‘city as catchment’ (Kenway & Tjandraatmadja 2009; Diaper et al. 2008).

- Waste—precinct-scale redevelopment can optimise reuse of demolished stock and minimise the waste stream from new construction, as well as automate waste disposal and maximise recycling from occupied dwellings.
- Walkability—opportunity to reduce land assigned to car transport and reconfigure to encourage more active transport modes (walking, cycling).
- Construction—linking off-site manufacture and on-site modular assembly to reduce many negative impacts of a traditional construction site, reduce time to 'construct', reduce cost of delivery and increase quality to more closely align with a manufactured product.
- Sense of place—opportunity for creating an attractive physical neighbourhood and social community setting, with distinctive look and feel.

Research process

Towards a New Development Model for Housing Regeneration in Greyfield Residential Precincts represents a new research vehicle for the Australian Housing and Urban Research Institute. It comprises a series of Investigative Panels and background papers designed to effect direct engagement between experts from the research and policy communities, and practitioners from the industry and community sectors, to interrogate a specific policy or practice question (AHURI 2009).

The project involved a four-stage process that examined different aspects of greyfield redevelopment. In each stage, Investigative Panels comprising leading experts from industry, government, community and academic sectors participated in a facilitated workshop. Each workshop was preceded by a discussion paper that provided guidance for discussion and debate and was followed by a panel report that documented the issues and opportunities discussed, and the research directions for subsequent stages of work. This iterative mode of examination—modelled on the transition management approach (Loorbach 2007, refer Section 9)—allowed for the collective development of ideas that would test and map a viable model for greyfield residential precinct regeneration.

Investigative Panel 1—Why? Where? Who?

The first Investigative Panel focused on the challenge set for Australia's capital cities; to accommodate between 50 and 70 per cent of their requirements for net new housing from infill. For Melbourne, this means over 300 000 new dwelling units will need to be built in established suburbs. The discussion paper and workshop revealed capacity in the middle suburbs for higher-density housing, and that redirecting growth and urban investment inwards, rather than outwards, represented a more sustainable solution from economic, environmental and social perspectives. The panel members discussed the potential impediments to greyfield regeneration in relation to both supply and demand. Key issues included the challenge of assembling adequate land, the financial disincentives that exist for current land-owners considering redevelopment, the need to de-couple political processes from metropolitan planning strategies, and the lack of good quality demonstration projects that could illustrate the individual and community benefits of higher-density precincts.

Investigative Panel 2—Design, construction and viability

The second stage of the research provided more detail to the expert panel regarding alternative greyfield precinct typologies and focused on the benefits, barriers and changes that would be required to achieve each proposal within existing development processes. The panel members identified a number of design and construction opportunities absent from conventional redevelopment models, including potential to

increase housing choice, more efficient use of infrastructure, and improved community amenity. These benefits were considered more feasible and replicable on consolidated and hybrid assemblies of land, although possibly requiring shifts in project financing, planning and property management.

Investigative Panel 3—Community, finance and governance

Investigative Panel 3 explored the processes of effective community engagement, discussing avenues for improving community acceptance and participation in the development process. Methods for communicating and demonstrating precinct design models and delivery processes were reviewed from both a top-down and bottom-up approach. Certainty and confidence in the planning process was re-addressed from the community perspective. This highlights the significant role of municipal government in the successful provision of local public amenity, infrastructure and open space management. Strategies to address the challenge of development viability were expanded to include a range of innovative finance arrangements that might be applied to this scale and type of project. Funding options considered involved public, private and cooperative models.

Investigative Panel 4—Mapping a development model

The final stage of the project drew on a small core group of expert panel members to synthesise the ideas and discussions of the previous three Investigative Panels. The objective of the fourth panel was to articulate the organisational and technical processes needed to implement new urban policy in the middle suburbs. Issues raised in each of the previous investigations were re-examined in relationship to the complete process, rather than as discrete issues addressed in isolation, as had often occurred in previous panel sessions.

Research findings

The project has revealed that multiple and interconnected innovations are required to achieve a more sustainable regeneration of greyfield residential precincts within the middle suburbs of Australia's cities. Most of the innovation needed is organisational and institutional—there are strong path dependencies that need to be redirected. The scale of the technological innovations required is not as pronounced; however, both aspects will require attention. The Investigative Panels identified multiple arenas (Figure 33) where major transformation could occur to achieve a development model for greyfield precincts, as follows.

Urban policy

The limited uptake of new housing in greyfield residential sites represents a major failure of recent urban policy. As long as a suitable supply of brownfield land exists and outer greenfield land supply remains unlimited, the greyfield areas will struggle to attract major property developers in anything other than a piecemeal fashion. New planning and policy frameworks and infrastructures will need to be established to reduce the risk and uncertainty associated with larger-scale redevelopment in the middle suburbs. In addition to housing redevelopment, there are social and environmental imperatives driving the need for regeneration that are aligned with 21st rather than 20th century conditions.

What may be required is something equivalent to the *Building Better Cities* program—a nation-building initiative of the Commonwealth government between 1991 and 1996 that can be credited with leading the revival of Australia's inner cities (Neilson 2008). Such a program would seek to establish an 'umbrella' intergovernmental agreement

that defines the collaboration required between government and industry in order to obtain federal funds.

Urban renewal organisation

To undertake greyfield precinct development, a new regional body or authority responsible for urban renewal (equipped with financial, statutory and planning power) would need to be established. This may be via coordination of existing public funding for the region, or the direction of new capital accrued through development contributions. Such a body would operate within long-term and large-scale strategic planning goals, over 20 year timeframes and engage in the development of greyfield precincts within middle and inner regions. It would be required to deliver consistent results at the scale of the city, yet should be flexible enough to function as both statutory authority and coordinating point for non-government delivery.

Spatial information platform

To be effective, greyfield precinct regeneration needs to be proactive. Multiple layers of property, planning, utility and demographic data need to be brought together into shared urban spatial information systems to enable the exploration of development opportunities and potential regeneration sites by property developers, design and construction professionals, investment organisations, local government and neighbourhood communities. In 2011, projects to develop information platforms are commencing at the Australian Urban Research Information Network (AURIN) and the Commonwealth Research Centre (CRC) for Spatial Information.

Demonstration models of precinct design

For a precinct approach to be achieved in Melbourne's residential greyfields, substantial shifts in how our urban environment is envisaged, designed and delivered will be required. The configuration of these precincts can include the fully consolidated assembly of sites, hybrid precincts (partial assemblage), and fully dispersed precincts. District-wide approaches to energy, water and waste, along with community facilities and shared open space arrangements are considered more viable in consolidated or hybrid assemblages of land than dispersed precincts.

It is important that each precinct typology is visualised and communicated. More design development is required to demonstrate how each model could contribute to the broader urban environment and social contexts and goals. Of particular note is the increased housing choice and community interaction that low-rise high-density housing typologies can offer.

Construction and labour force innovations

While the construction industry is an important driver in housing delivery, it is not often at the forefront of change. Greyfield residential precincts, positioned as they are between large-scale commercial construction, volume residential construction and small-scale infill housing, have potential to act as a catalyst for innovative practices.

Innovative construction processes and labour force changes may provide attractive solutions to medium-density housing developments. Industrialised processes that include combinations of prefabricated panels, service systems and interiors can provide fast turnaround options for replacing existing low-density housing. These may make medium-density options available to residents in existing greyfields.

A shift away from conventional domestic construction practices is needed. However, the viability of introducing new techniques and technologies into this sector of the construction industry is unknown.

Proactive community engagement

Greyfield precinct regeneration offers opportunities to engage citizens as ‘partners’ in development, in both planning/design and finance aspects. This requires a radical departure from the established ‘placatory’ or ‘adversarial’ models of engagement that are often employed with populations targeted for redevelopment.

A brokerage agency would be needed to facilitate this process. This could be a new specialist department created within established organisations, such as local government, state authorities or major developers, or a new entity possibly emerging from the community and specific to a particular precinct development (Cunningham 2008). The process of engagement will also be critical, as will be establishment of trust. However, there is a tension between demonstrating genuine avenues for citizen involvement and the need to inject certainty into the outcomes. The latter may be bolstered by contractual outlines, with participants rewarded with ‘good faith’ gestures such as first right of return into the development.

Regen Code

Current planning is structured to manage impacts rather than to deliver visionary outcomes. It focuses on historical precedent and has little scope to address shifts in modes of living, new housing approaches and typologies, or the urban challenges of the 21st century—which, depart significantly from those of the 20th, when our current planning regimes were first instituted. The limitations of current planning prevent the uptake of greyfield precinct redevelopment and unless otherwise convinced, developers will continue to pursue well-tested ‘safe’ approaches. Therefore, there is a need for a robust planning instrument or code (Regen Code) for the redevelopment of greyfield residential precincts.

Such a code would need to define special attributes of ‘place’ that should not be lost in the future ‘DNA’ of the precinct. These may be physical characteristics—building form, vegetation patterns—or social markers. The code would also need the potential to improve universal design standards by enabling the reappraisal of density requirements, sustainability standards and accessibility codes. It would focus on higher performing community infrastructures over the existing mandates for individual provision. There may need to be a framework for independent design and environmental performance panels to assess mandated performance elements. Automated performance-based tools for precinct or neighbourhood assessment would need to be in place to guide the regeneration process and deliver agreed outcomes, for example the GBCA’s (Green Building Council of Australia) Green Neighbourhood tool, the U.S. Green Building Council’s LEED (Leadership in Energy and Environmental Design) for Neighbourhood Development tool, and the New South Wales government’s PRECINX tool are all precursors to such an automated system.

Goals for precinct regeneration would need to be clearly articulated, with developers’ costing-against-yield outlined at a suburb or precinct level. Clearly stated yields, environmental performance, and affordability targets and goals would help alleviate developer concern and confusion. It would also pre-empt negative community responses by outlining exactly what can and cannot be undertaken in the region.

New finance models

It is reasonable to expect that new forms of greyfield development may be facilitated by different forms of finance or financial incentives. Recently the Property Council of Australia advocated the creation of Growth Area Development Bonds to finance infrastructure development in growth areas on the city fringe. Interest on the bonds is financed by the growth in property tax resulting from the new development. Similar

logic could be applied to greyfield development, where ‘Greyfield Development Bonds’ could be used to finance land consolidation and infrastructure improvements in areas subject to redevelopment. The provision of improved infrastructure may help to overcome local opposition to consolidation.

Other potential forms of finance include allowing access to superannuation funds to fund consolidated development, new financial structures similar to cooperative building societies in which home-owners and buyers pool savings and assets to finance denser precinct development, tax-increment financing, and land tax and stamp duty rebates.

Future directions

Two major areas of research have been identified for further development.

Feasibility study of a precinct redevelopment—whereby a precinct is identified for greyfield redevelopment in order to test the feasibility of the regeneration model. This would include visualisation of the proposed models through sketch design of buildings and urban design, cost estimates of planning and construction processes which incorporate time allowances for community engagement and land assembly (also part of the feasibility trial), as well as a life cycle assessment of the proposed environmental and community benefits.

Transition arena for residential greyfield precincts—by applying the transition management approach (refer Section 9.1), organisational and institutional processes to execute the greyfields model within industry would be developed by a range of experts. This may involve a range of scales of development, construction operations and alternative planning frameworks.

1 INTRODUCTION

Sustainable urban development is a principal challenge of the 21st century. By 2050 it is estimated that 75 per cent of the global population will be urban. In Australia, one of the world's most urbanised nations, population is projected to reach more than 35 million by mid-century; and over 70 per cent of this growth will be in the capital cities (Infrastructure Australia 2010). Providing an adequate supply of affordable housing to meet the demands of fast-growing cities is now a critical issue for governments at state and national levels (National Housing Supply Council 2010). Within Australia's big cities, where should this population growth go?

From population, housing and employment perspectives, the middle suburbs of large cities such as Melbourne are under-utilised, with. The middle suburbs are where the residential building stock failing (physically, technologically and environmentally), constituting an under-utilised asset awaiting redevelopment. The energy, water and communications infrastructure of these suburbs is also ageing and in urgent need of regeneration.

Despite the more recent injection of 'smart growth principles', low-density greenfield development remains the dominant model for much 21st century city building in Australia, within both government (e.g. Victoria's Growth Area Authority) and the private sector property development industry (McGuirk & Dowling 2007).

In the absence of government regulations requiring higher levels of environmental performance (e.g. integrated urban water systems, Diaper et al. 2008; building energy performance that meets international best practice, Horne et al. 2005; distributed renewable energy generation, Jones 2008; local waste utilisation via eco-industrial clusters, Batten et al. 2008), opportunities to wind back the unsustainable ecological footprints of Australia's cities are being lost in current greenfield developments. Melbourne's footprint is 6.4 hectares per person, approximately three times the global average (Turner & Foran 2008).

Attempting to avoid the negative externalities associated with suburban sprawl is the principal driver behind compact city strategies. The case for redirecting more population and residential investment inwards—to the regenerated brownfield and greyfield areas in established suburbs—marks a radical departure from past practice.

Housing regeneration in greyfield residential precincts is based on clear sustainability principles

Compact cities make economic sense

Trubka et al. (2008) calculate that each new greenfield fringe block incurs an extra $85 000 in infrastructure costs compared to urban redevelopment, as well as $250 000 extra in transport costs over 50 years. Cunningham (2008) views urban regeneration and redevelopment as the basis of a new 21st century restoration economy, capable of significant new wealth generation and job creation. The core areas of large cities in the USA are also proving to be economically resilient following the global financial crisis (Frey 2009). Price premiums for residential property of between 40 and 200 per cent on a dollar per square foot basis are emerging for walkable urban places, as opposed to nearby 'driveable' suburban places (Leinberger 2008).

Compact cities make environmental sense

Compact cities require up to 40 per cent less transport energy to operate than sprawling cities and can save similar amounts of carbon dioxide emissions from urban

transport (Newton 1997). Medium-density housing is typically 25 per cent more energy efficient than detached (Newton & Tucker 2010). There are a range of other environmental benefits including reduced water and material use and waste generation (Newton 2008), as well as preservation of farmland and green space at the edges of the city (Dowling 2010).

Compact cities make sense from a social perspective

The vulnerability to rising petrol prices, linked to peak oil, of residents in car-dependent outer suburbs (Dodson & Sipe 2008) represents an additional layer of socio-economic disadvantage to that already identified in outer suburbs of cities such as Melbourne and Sydney by Baum and Woolcock (2008) and Timmins et al. (2008). Cities that fail to recognise this bifurcation, which will be further accentuated by emerging energy realities, will suffer in terms of resilience, competitiveness and liveability. Redevelopment of ageing detached housing to medium-density, will not just deliver more housing, but more housing choice throughout the middle suburbs of our cities that is more able to meet the needs of a nation whose demographic profile is now markedly different to when the suburbs were constructed.

It is critical that cities seek to reinvent themselves and to undergo regeneration on a continuing basis as part of their process of evolution. This should be based on a clear idea of what the city needs and what can be translated into projects.

Twenty-first century urban, industrial and demographic process (radically different from those of the 20th century) are likely to accelerate the pathologies associated with urban obsolescence and decline, prompting the need for early intervention policies.

1.1 Current strategic directions and progress

The most recent strategic plans for major Australian cities (Table 1) clearly reveal an attempt to move away from greenfield development as the principal means of delivering new housing for metropolitan residents: all target over 50 per cent of new development to be built within established residential areas, principally the inner and middle ring suburbs. Results suggest that the challenge of meeting these targets, especially in the middle ring suburbs—and under current industry, government and community processes—may be insurmountable unless there is a significant transformation in the process by which, and the scale at which, the existing built environment can be regenerated.

Table 1: Infill targets for major Australian cities

City	*Strategic planning document*	*Timeframe*	*Target dwellings (number)*	*Percentage from infill (%)*
Sydney	City of Cities: A Plan for Sydney's Future	2005–31	640,000	60 to 70
Melbourne	Melbourne 2030: A Planning Update—Melbourne @ 5 Million	2009–30	600,000	53
South-east Queensland	South East Queensland (SEQ) Regional Plan	2009–31	754,000	50
Perth	Directions 2031 Spatial Framework for Perth and Peel	2009–31	328,000	55
Adelaide	30-Year Plan for Greater Adelaide	2010–40	258,000	Moving from 50 to 70

Source: National Housing Supply Council 2010, p.112

In their policies for the strategic long-term development of the capitals, state governments have aimed to achieve more compact and sustainable urban development through:

- Land-use intensification and reduced automobile dependence.
- Provision of a greater variety of housing options for an increasing diversity of household types.
- Promotion of more sustainable communities, with particular reference to water and energy.

Reviews of strategic plans undertaken (e.g. Department of Planning and Community Development 2008; Major Cities Unit 2009, p.1) suggest that 'on the ground' implementation of these plans has massively under-performed—what Bramley (1993) termed 'an implementation gap', viz.:

- Insufficient progress in redirecting residential growth from the fringe to established areas of the metropolis (see Figure A8, Appendix E).
- Lack of significant residential or mixed use development around principal and major activity centres.
- Lack of progress by local governments in developing future housing strategies and estimates of housing capacity for their municipalities.

These challenges are not unique to large Australian cities. In discussing the evolution of cities, Batty (2007) highlights the need for cities to develop the capacity to rebuild themselves in situ—what Kadoriku and Gijutsu (2007) term 'metropolitan metamorphosis'. David Harvey (2008) adds further to this by arguing: 'The prospects for making and re-making the city in a different image and according to a different logic are omnipresent. We need to seize these prospects in order to transform the city'. These aspects are discussed further in Birkeland (2008, p.284), including a detailed catalogue of reasons why suburban retrofitting (Dunham-Jones and Williamson 2009) is not occurring at the rate projected in the strategic plans for all three eastern seaboard capital cities. Some of these reasons being:

- Lack of urban retrofitting models that demonstrate eco-efficiency and the ability to be replicated.
- Lack of government regulations and incentives to encourage a shift away from business as usual; currently best practice is accepted by government as marginal improvement, not the transformative step changes necessary to meet the multiple challenges facing cities in the 21st century (Newton 2008).
- A fragmented and adversarial built-environment industry that focuses almost exclusively on capital as opposed to life cycle costs, and responds slowly to innovation (Newton et al. 2009)—linked to risk aversion and the purported lack of client demand—which cause builders and developers to stick to conventional practices.
- Infrastructure pricing and subsidies that favour centralised water and energy utilities, and high levels of urban resource consumption (Newton 2006), encouraging comparatively inefficient greenfield development, while greyfields continue to operate without significant renewal.
- The focus of building codes and assessment and rating tools on new construction, over retrofitting.
- Strata title and its inhibiting effect on redevelopment of medium-density housing blocks (Randolph 2006).
- 'Save our Suburbs' and NIMBY (not in my backyard) movements that are responding to inappropriately designed and piecemeal infill redevelopment which is often unsympathetic to both neighbours and neighbourhood character (Lewis 1999; Birrell et al. 2005).
- Political obstacles inherent in the paradigm that currently operates in Australia's cities: 'One of the dirty secrets of the population debate is that Sydney and Melbourne can carry many more residents within their existing postcodes. The problem is that no government, federal or state, wants to put their name to a strategy that sees every spare piece of inner-city land converted to high-rise apartments. Better to send lower income families to some new housing estate than keep them close to the services that the rest of the nation takes for granted … The metropolitan fringes of Sydney, Melbourne and southeast Queensland are the problem, not the solution to the nation's population challenge. The first federal or state government that can refocus and redirect growth will deserve the compliment of nation-builder' (Megalogenis 2010).

1.2 Re-words: approaches to urban regeneration

Urban regeneration/renewal/redevelopment are all terms that have been used somewhat interchangeably in the past to refer to the processes associated with area-based initiatives for the rebuilding-restoration of places, aimed at revitalising the built environment, local communities and local economies. Urban regeneration has a significant past (Roberts & Sykes 2000; Lawless 2010) and is considered a critical engine for the 21st century economy, given the global challenge of delivering more sustainable cities (Cunningham 2008).

The term 'greyfield regeneration' is used here to denote a new and critical focus for strategic metropolitan planning, requiring the articulation of a new process aimed at more effective triple bottom line transformation of large tracts of our cities. This necessitates a focus on *precinct scale* rather than piecemeal infill; *new housing typologies* such as low-rise high-density development; *new partnerships* that involve community participation; *new modes of constructing* the built environment of the future; and the establishment of new nimble *'regen' organisations* capable of stimulating

greyfield regeneration. This new focus will encompass the existing public sector interventions to housing in deprived neighbourhoods (Department for Communities and Local Government 2010) that primarily involve government housing and welfare tenants—less than 5 per cent in any Australian city—but will also aim to create a substantial rejuvenation of under-performing, privately owned housing in the nation's inner and middle suburbs. Greyfields regeneration, as conceived here, represents a process of 'routine' neighbourhood transformation rather than waiting for degeneration to reach a point where major public intervention is required.

As will be evident from the sections that follow, the key elements identified in successful urban regeneration projects in both Europe and North America (Carter 2000; Cunningham 2008) are featured in this study:

- Visioning or creating the narrative—envisaging the type of place to be created, including all the elements of the precinct to be regenerated.
- Strategies and frameworks that identify regeneration objectives (including that of density); deal with the barriers (e.g. via reform of regulations); and create new models for design, delivery, finance and so forth.
- Partnering to ensure a critical mass of local support for the creation of a regen precinct, exploring options for resident buy-in, creating new regen organisations to catalyse the process and so on.

1.3 Arenas of urban redevelopment

Three principal arenas for housing regeneration exist in the middle suburbs: extensions and alterations to existing property, piecemeal infill, and precinct-scale redevelopment incorporating activity centres, transit-oriented development (TOD) and transport corridors (see Figure 4).

Figure 4: Existing regeneration approaches

Activity Centres

Brownfield Precincts

Transport Corridors

Piecemeal Infill

Within precinct-scale redevelopment there are multiple pathways that warrant consideration regarding their ability to deliver enhanced outcomes for housing (mix, volume, affordability), energy use (and level of carbon emissions), water efficiency, waste generation and recycling, walkability, and physical and social amenity.

1.3.1 Brownfield precincts

Brownfield redevelopment has emerged as a process to re-imagine and transition the parts of our cities that have 'outlived' their original industrial era functions. Principal among these are the abandoned or under-utilised docklands which occupy prime waterfront sites in all coastal cities, as well as the thousands of industrial sites (Kirkwood 2001) that are to be found in all large metropolitan areas: the factories, scrap yards, railroad corridors and vacant petrol stations which catalogue Australia's industrial past. They are typically:

- Owned by a single party, usually government or industry.
- Of a scale which is closer to that provided by greenfield sites for development.
- Contaminated to some degree, dependent upon prior use.
- Unoccupied and therefore not requiring the same level of community engagement as greyfields.

As such, brownfields have been attractive to the property development and finance industries which have been able to create a development model to undertake projects such as Docklands and Federation Square in Melbourne, Darling Harbour and Barangaroo in Sydney, Newport Quays in Port Adelaide and Southbank in Brisbane. They represent an important contribution to the revitalisation of abandoned urban land and to the net additional housing stock in growing cities, but are far from sufficient to meet aggregate metropolitan demand for new housing.

1.3.2 Greyfield precincts

Unlike brownfields, greyfields usually have no need for site remediation. Furthermore, they predominantly lie between the more vibrant inner city housing market and recently developed greenfield suburbs, and therefore provide greater access to employment, public transport and services than the latter zone. Greyfields have become a key target for intensive redevelopment by the state government planning agencies in their future capital city development strategies.

Activity centres and transit-oriented development

Activity centres have been a focus of intensification in greyfield sites predating Melbourne 2030. They now constitute a renewed focus, coupled with TOD projects, not only for Melbourne but also for Brisbane, Sydney and Perth. The principles of TOD are well established: a stimulus for urban renewal and enhancement of a centre's image that concentrates a greater mixture of land uses and housing, at higher densities, around high quality transport services configured as the heart of the enlarged community. They also benefit from having a number of development models that are being applied to TOD projects: government-led (e.g. Gold Coast University hospital precinct), private-sector-led (e.g. Brisbane's Albion Mill TOD precinct; see Dunn 2009) and public/private partnership-led (e.g. the Green Square Town Centre in Sydney).

The progress of these projects has been much slower than anticipated due to local reactions to the scale of the high-rise development proposed and changes to neighbourhood character. In response, the previous Labor state government proposed the establishment of Development Assessment Councils that would assume control of planning permit decisions in activity centres, currently the jurisdiction of local councils (Lahey 2009).

Public transport corridors

A recent proposal by Adams et al. (2009) for urban redevelopment focuses on linear transport corridors as a locus for medium-rise high-density development. Requiring approximately 9 per cent of Melbourne's existing urban area, the sites along major corridors with potential for development (estimated to be 12 400 sites along tram lines and 22 000 along priority bus routes) could collectively accommodate approximately 500 000 new dwellings. The requirements for this to work include prescriptive controls over key aspects of corridor development, for example, up-front 'as of right' development to levels between four and eight storeys. In addition to delivering a significant volume of net new housing in greyfield areas (as a result of enabling land value for redevelopment to be more easily determined), key drivers include the easing of development pressure in existing interstitial suburbs, enabling them to become the new 'green lungs' (enhanced water, energy, food production and so on) of our cities, albeit at existing levels of low density.

Both activity centres and transport corridors feature prominently in the latest State Planning Policy Framework—Clause 12 (VC67). However, as with all greyfield redevelopment initiatives, achieving public acceptance is a key challenge. The principles outlined will assist in this regard, as they are intended to assure the wider community that these corridors are fixed and will not spill over into the suburban areas in between.

As Newton (2010a) has argued, current brownfield and greyfield approaches to urban redevelopment, while necessary, are not sufficient for a sustainability transition of our cities as they would consign the remaining 90 per cent of greyfield residences to piecemeal infill redevelopment. This represents a sub-optimal solution for regenerating housing, energy, water and waste systems and local amenity via enhanced mixed use development and active transport (e.g. walking, cycling) options, all best done at a precinct level (Lukez 2007; McGee 2008; Dunham-Jones & Williamson 2009; Haahs 2010).

Regeneration of residential greyfield precincts is a necessary complement to the state government policies that aim to increase population density around transport corridors and activity centres. However, these strategic areas have been very slow in generating new housing, with fragmented infill continuing to be the major provider of new housing in the middle suburbs. Because this informal infill generally falls outside of the government policy-focused areas, it has been neglected as an issue for investigation. This project aims to bridge this research gap by considering how infill redevelopment could be undertaken more effectively and contribute to a range of strategic city planning objectives within an emerging national urban policy (Department of Infrastructure and Transport 2010).

As distinct from its greenfield and brownfield counterparts (Newton 2010), greyfield redevelopment lacks an established model to drive the process, resulting in fragmented and sub-optimal development. This project aims to identify the innovative policy directions and associated organisational and technical processes needed for an effective development model in greyfield residential precincts. Melbourne is the focus of this study, but the findings are applicable to other major cities.

1.4 Methodology

This project represents a new research vehicle for AHURI, comprising a series of Investigative Panels designed facilitate engagement between experts from the research and policy communities, and practitioners from the industry and community sectors, to interrogate a specific policy or practice question (AHURI 2009).

Towards a New Development Model for Housing Regeneration in Greyfield Residential Precincts involved a four stage process which examined different aspects of greyfield redevelopment. Leading experts from industry, government, community and academic sectors were invited to participate in a facilitated workshop for each stage of the project (see Appendix B). Each workshop was preceded by a discussion paper which provided guidance for discussion and debate. Panel reports, documenting the issues, opportunities and research directions discussed at each workshop were produced as well. This iterative mode of examination, modelled on the transition management approach (Loorbach 2007, refer Section 9), enabled the collective development of ideas for how to test and 'map' a viable model for greyfield residential precinct regeneration. The mind maps that feature in Appendix C show the diversity of stakeholder opinions, with the mind mapping software providing real time recording, synthesis and display of all the key points raised by stakeholders.

1.5 The Investigative Panels

Investigative Panels—which are a core feature of this AHURI project—form part of what has been termed by Loorbach (2007) as a transition governance process focused on a particular urban arena, in this instance, greyfield regeneration They constitute a 'transition coalition' of individuals intimately connected with urban planning, community planning and property development, who are interested in driving developments in these areas. However, as part of a transition coalition they become members of a shadow process, functionally disconnected from their normal work roles but capable of providing unique insights and knowledge pertaining to the urban development process. The desired outcomes of the transition coalition were new policy and process approaches to greyfield regeneration at precinct scale that could inform future 'experiments' and initiatives.

1.5.1 Investigative Panel 1—Why? Where? Who?

The first Investigative Panel focused on the challenge set for Australia's capital cities to accommodate between 50 and 70 per cent of their requirements for net new housing from infill. For Melbourne, this means over 300 000 new dwelling units will need to be built in established suburbs. The discussion paper and workshop revealed a capacity in the middle suburbs for higher-density housing, and that redirecting growth and urban investment inwards rather than outwards represented a more sustainable solution from economic, environmental and social perspectives. The panel members discussed the potential impediments to greyfield regeneration in relation to both supply and demand. Key issues included the challenge of assembling adequate land, the financial disincentives that exist for current land-owners considering redevelopment, the need to decouple political processes from metropolitan planning strategies, and the lack of good quality demonstration projects that could illustrate the individual and community benefits of higher-density precincts.

1.5.2 Investigative Panel 2—Design, construction and viability

The second stage of the research provided more detail to the expert panel regarding alternative greyfield precinct typologies and focused on the benefits, barriers and changes that would be required to achieve each proposal within existing development processes. The panel members identified a number of design and construction opportunities absent from conventional redevelopment models, including potential for increased housing choice, more efficient use of infrastructure and improved community amenity. These benefits were considered more feasible and replicable on consolidated and hybrid assemblies of land, although possibly requiring shifts in project financing, planning, and property management.

1.5.3 Investigative Panel 3—Community, finance and governance

This panel explored the processed of effective community engagement, discussing avenues for improving community acceptance and participation in the development process. Methods for communicating and demonstrating precinct design models and delivery processes were reviewed from both a top-down and a bottom-up approach. Certainty and confidence in the planning process was re-addressed from the community perspective which reinforces the significance of municipal government in the successful provision of local public amenity, infrastructure and open space management. Strategies to address the challenge of development viability were expanded to include a range of innovative finance arrangements that might be applied to this scale and type of project. Funding options considered involved public, private and cooperative models.

1.5.4 Investigative Panel 4—Mapping a development model

The final stage of the project drew on a small group of expert panel members to synthesise the ideas and discussions of the previous three Investigative Panels. The objective of the fourth panel was to articulate the organisational and technical processes needed to implement new urban policy in the middle suburbs. Issues raised in each of the previous investigations were re-examined in relationship to the complete process, rather than as discrete issues addressed in isolation, as had often occurred in previous panel sessions. Components for the resulting model have come from existing urban redevelopment initiatives. Providing a single and viable framework for adoption by industry would be a priority for the project; locating the proposed model against existing urban strategies would assist in demonstrating the viability of the approach. It was also expected that the required technical expertise and processes either exist already, or are feasible for future development. The most challenging aspects of the proposed model were expected to be organisational.

1.6 Purpose of this document

The aim of the document is to provide a knowledge base from which future policy and industry initiatives might springboard, and to articulate future directions for urban transitions. It brings together the breadth of issues, benefits and barriers explored throughout the 12-month research process, and records the key ideas and propositions made by each Investigative Panel. The body of the document comprises a detailed discussion of the existing development context as well as the new organisational and technical processes required for a new development model in greyfield residential precincts: the ‘future logic’ drawn from the background papers. Section 9 (Research Summary) provides an overview of possible research directions and implementation pathways for a new greyfield precinct redevelopment model.

1.7 Structure of the report

Chapter 2: Outlines the context of residential development in the middle suburbs and presents the three primary precinct models currently used in greyfield redevelopment. Within the context of a hypothetical precinct site in East Oakleigh, design and typology issues are discussed and assessed.

Chapter 3: Discusses current urban planning policy and suggests improvements to metropolitan and local government structures, in particular Regen Code.

Chapter 4: Addresses the dominant issue in the regeneration of greyfield residential precincts—land assembly. Methods for identifying and analysing potential redevelopment sites are discussed along with the representational and informational approaches available by using integrated Geographical Information Systems (GIS).

Chapter 5: Considers general issues of viability in terms of market demand and desire, alongside the role of locational preference and lifestyle choices in more compact forms of urban living.

Chapter 6: Outlines key construction and labour force innovations required to deliver new residential greyfield precincts.

Chapter 7: Examines financial barriers to greyfield precinct regeneration in relation to the unique situation of the retiring baby-boomer generation. Existing and proposed delivery approaches, including partnership and part equity funding models, are described and assessed in terms of their ability to meet the needs of those in the greyfield precinct sector.

Chapter 8: Involves proactive engagement with the participating communities in the act of land assembly and greyfield precinct redevelopment, as well assessing, cohering and directing such communities.

Chapter 9: Frames the eight 'transition arenas' required to achieve greyfield precinct regeneration and suggests future research directions.

2 TOWARDS A NEW DEVELOPMENT MODEL FOR HOUSING REGENERATION IN GREYFIELD RESIDENTIAL PRECINCTS

This research proposes a new arena for investigation—greyfield residential precincts. This term is used here to describe occupied but economically and technologically obsolescent, failing and under-capitalised housing (Newton 2010). Greyfields housing is also a poor performer environmentally (Newton & Tucker 2010) and in pockets has become a major location of social disadvantage (Randolph & Freestone 2008).

This report examines the redevelopment potential of private residential greyfields in middle suburban locations.

2.1 Melbourne's middle suburbs

Historically, Melbourne has accommodated population growth primarily via a model of low-density greenfield housing development. Until the 1950s, the pattern was strongly influenced by the fixed rail networks of trains and trams. The next 50 years were characterised by automobile based suburbanisation. The 'middle suburbs' is an ambiguous concept, but in Australia tends to refer to those residential areas established between the late 1920s and early 1970s.

For our purposes, Melbourne's middle suburbs are defined as the bulk of the housing built from the 1940s through to the early 1980s, including areas of inter-war stock located close to public transport. Originally laid-out as residential dormitories, they now constitute a contiguous built region between 10 kilometres and 30 kilometres from the central business district. Unlike the inner suburbs, where a measure of urban regeneration is already well underway, the middle suburbs have tended to retain this dormitory layout, with many buildings and infrastructures likely to be showing signs of physical and technological obsolescence. (The inner suburbs commenced a process of residential gentrification in the 1970s and manufacturing precincts have been progressively abandoned since the 1980s; see Gipps et al. (1997). The brownfield developments and commercial-to-residential conversions in the central city in the 1990s reflect efforts towards urban regeneration that are largely lacking in the middle suburbs.) The urban character and demography varies substantially across the region with disparities in housing affordability and diversity. In comparison to the outer suburbs, this belt of suburbia is rich in service, transport, amenity and employment. Its characteristic features are described more fully in Appendix E.

2.2 Infill development in the middle suburbs

While the middle suburbs show evidence of prior patterns of densification, including the walk-up flats and post-strata-title townhouse development in the 1960s and 1970s, the prevailing housing typology remains a detached dwelling on a single lot. This represents a nominal density of eight to 15 dwellings per hectare, and is widely accepted as unsustainable.

The three dominant redevelopment approaches being pursued in middle suburban areas (see Table 2) are:

1. Demolition and redevelopment or expansion of conventional detached dwellings on a one-to-one basis.
2. Dual occupancy and low-rise units from informal development activity (see Figure 5).

3. Higher-density apartment typologies in response to strategic development policies.

Formal strategies for urban intensification have involved the redevelopment of large land assemblages in activity centres and more recently, examination of transport corridors (Adams et al. 2009). However, as much as 35 per cent of infill redevelopment takes place informally in middle suburbs (Birrell et al. 2005) so it is surprising that there has been almost no detailed examination of this small-scale redevelopment activity or the possible contribution it could offer intensification efforts.

Table 2: Redevelopment types in the middle suburbs

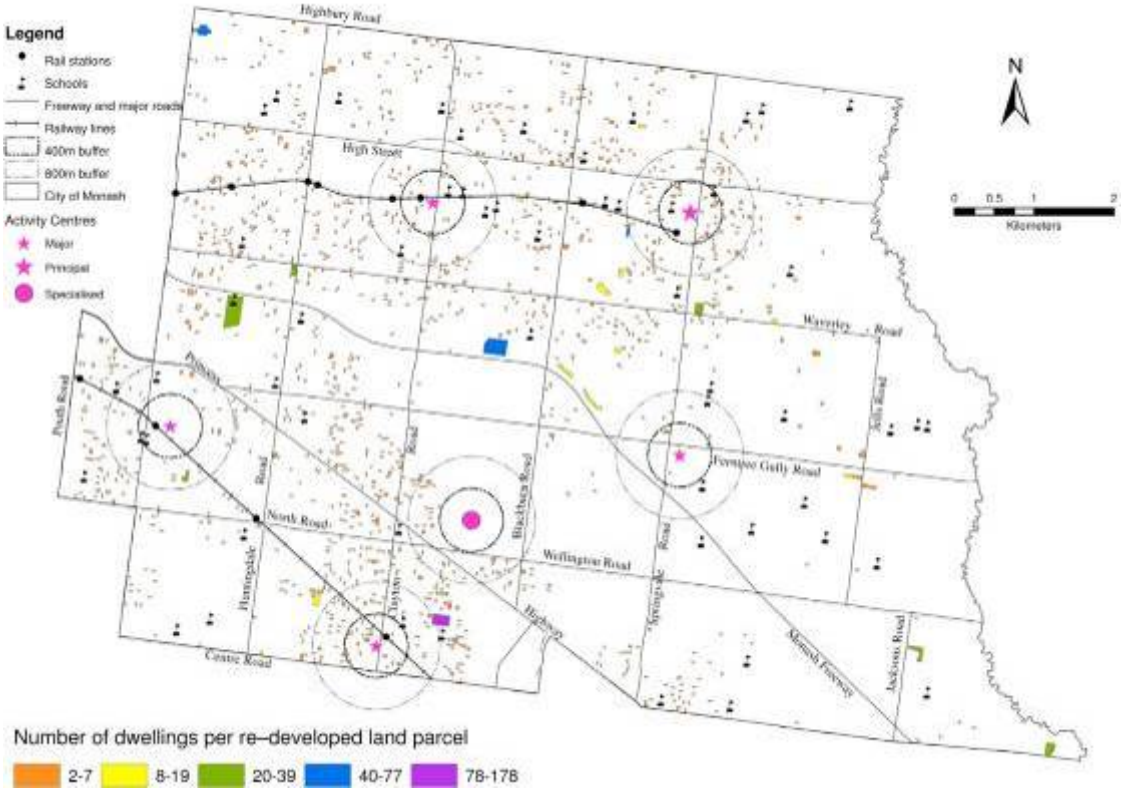
Arena	Net addition to housing stock	Planning framework
1. Alternations, extensions, refurbishments to existing residential properties; 1 for 1 replacement	Nil	'No go'; limited change zone—specific characteristics recognised for protection, providing limited opportunity for increased housing.
2. Piecemeal infill (typically demolition and replacement on a single parcel of property)	Ranges from 2 for 1 to approx. 8 for 1	'Slow go'; incremental change zone—respects existing neighbourhood character while providing an increase in housing diversity with a moderate increase in new dwellings.
3. Precinct regeneration activity centres/TODs transport corridors	Significant addition to housing stock	'Go go'; substantial change zone—designed to promote a significant increase in new dwellings, greater housing diversity and new built form and character.

A recent study by Phan et al. (2008) revealed that small-scale residential infill was the dominant development type in the City of Monash (a typical middle ring suburb) between 2000 and 2006. Over 98 per cent of the municipality's urban intensification was due to either backyard subdivision or to replacement of old (detached) stock with new dwellings ranging from two to seven units. The bulk of this development activity occurred outside nominated activity centres or strategic development zones (see Figure 6). The infill that did fall within 400m and 800m of activity centres was of the least intensifying class. Redevelopment yields from demolished housing in this locality appear somewhat less than those recorded in the City of Stonnington (1:8) and the City of Maroondah (1:3.5) for equivalent time periods (Newton et al. 2008).

There is no clear pattern to the infill development in the City of Monash. It appears to be opportunistic, occurring as land appropriate for profitable development entered the market (Phan et al. 2008). The principal actors in this type of redevelopment are small 'mum and dad' builder/speculators. The uncoordinated nature of this redevelopment limits choice in dwelling design, performance and quality. Without strategic oversight, there are no corresponding improvements in infrastructure, servicing or amenity (Ruming et al. 2007). What remains uncertain is to what extent these infill developments across Melbourne municipalities are delivering the volume of new housing needed to meet the Melbourne @ 5 Million's 50 per cent target. The National Housing Supply Council's 2010 report suggests it does not.

Figure 5: Typical middle suburban low-rise development

Figure 6: Infill development in the City of Monash, 2000–06



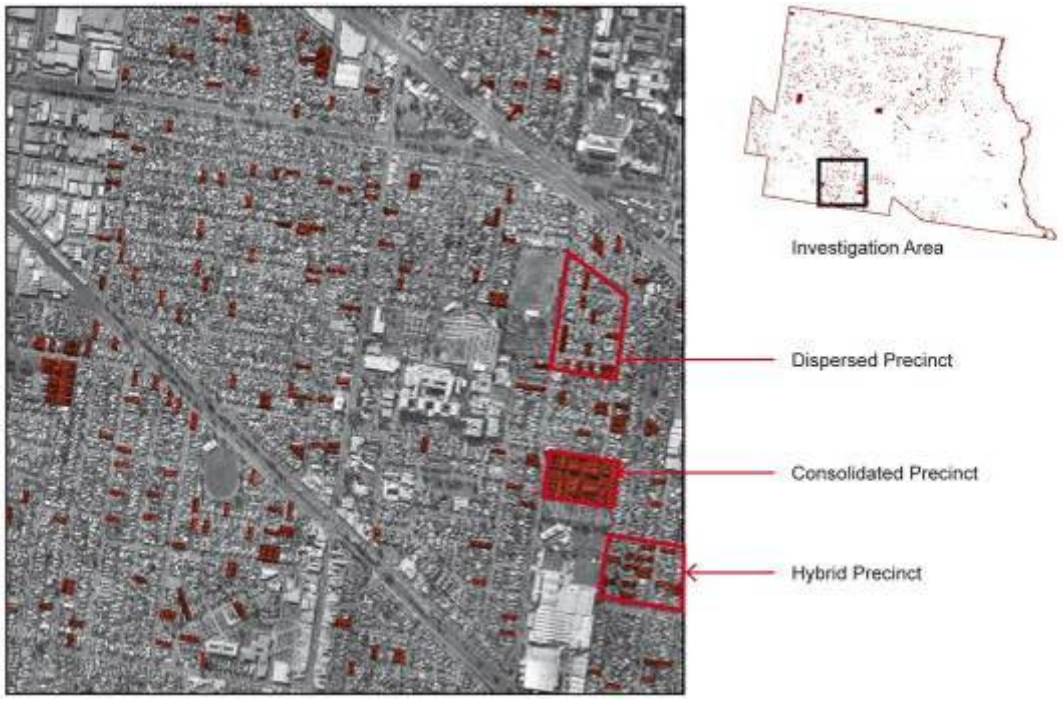
2.3 Greyfield residential precincts

This project investigates the processes required for an effective development model capable of delivering more affordable and sustainable medium-density housing in the middle suburbs. It examines the specific design, construction and financial contexts affecting the predominance of informal development activity in these areas and explores how a precinct-scale approach might be strategically managed to improve the performance and quality of the built outcomes.

For the purposes of illustration, a precinct has been assumed to consist of 10 allotments. The precincts have been examined in three different configurations; a fully consolidated assembly of sites; a hybrid precinct which demonstrates partial assemblage; and a fully dispersed precinct. The three distributions of infill sites are reflected in current development patterns (Figure 7).

A coordinated effort, involving assemblages of land parcels for redevelopment, rather than the current piecemeal process, offers a way for cities to transition to a more sustainable future. If appropriately designed and integrated, the regeneration of greyfield residential precincts could provide district-wide ESD (environmentally sustainable design) solutions and more housing choices that better respond to industry and market processes.

Figure 7: Aerial outlining existing development patterns in the City of Monash



Source: Derived from Phan et al. 2008

2.4 What is a greyfield residential precinct?

It is proposed that a precinct of 10 suburban lots could be sufficient for up to 40 dwellings. It is highly unlikely that housing provision in areas of greyfield regeneration will be provided by high-rise apartment typologies. While such typologies are mandated for activity centres and transport corridors, in a greyfield suburban setting they are unprofitable and undesirable. However, a combination of dwelling types may be feasible. These would include four storey buildings—prefabricated or timber-framed, and delivered by the domestic residential sector—along with a variety of other typologies, to create a mix of detached, semi-detached, row and apartment housing. The precinct level design model also provides high quality shared spaces, concentrated car parking solutions and a finer grain to pedestrian circulation and interconnection paths beyond the line of the street.

It also offers opportunities for non-traditional suburban forms—offices, shop frontages, studio spaces—and ancillary community services. Such diversity could assist in accommodating the rental market displaced from inner city and activity centres (Wood et al. 2008) and the expected baby-boomer ‘relocation within region’ (Olsberg & Winters 2005).

2.4.1 Consolidated precinct

This precinct type consists of a large parcel of assembled land enabling high-density built outcomes suitable to large-scale development (see Figure 8). Development sites

of this type can produce high yield and construction efficiencies and have the potential to achieve high quality design input and provide precinct based infrastructure and servicing. Within the scope of greyfield regeneration, this model's suitability and feasibility is limited due to a lack of available larger land parcels outside of brownfield or strategic development sites.

An example of the consolidated precinct type is the Living Spaces project in Dandenong, which demonstrates mechanisms for densification and consolidation of six suburban lots. The project converts the existing suburban fabric into a mixture of one, two and three-bedroom units. The shared open spaces are made available to the surrounding built form. Moreover, the small ecological footprint of the development suggests methods by which infill might allow the densification of ageing suburbs. The development possesses its own water and power resources, which in combination with reduced consumption levels and the control of storm-water run-off, puts less pressure on existing infrastructure networks.

2.4.2 Dispersed precinct

This type consists of small suburban parcels dispersed over a walkable area. Based on current infill development patterns, this model is based on a single developer (as distinct from multiple and mostly small developers as at present) working over a number of non-contiguous sites. It can provide high quality, diverse housing typologies ranging from low to medium densities. Opportunities for intensive infrastructural efficiencies are limited but the scope for improved landscape and street amenity is enhanced. By coordinating development on several sites within a precinct, certain economies of scale may be possible.

An international exemplar of this process is the development undertaken by POSTgreen homes, comprising small-scale infill projects on a number of sites around middle and inner Philadelphia. These have been developed on an incremental basis, creating a dispersed precinct of functionally separate but formally consistent and linked elements.

2.4.3 Hybrid precinct

This type of precinct consists of a mixture of stand-alone and aggregated lots, potentially connected with infrastructure and landscaped elements. Assuming a single developer working over the precinct sites, certain economies of scale may be possible including prefabrication and design strategy. In addition, the mix of land sizes means that different typologies can be developed and higher densities achievable.

A local example is the Ashwood/Chadstone Gateway, with 272 affordable and market rate units across six separate aggregated lots. The two main developments are near the Warrigal Road commercial corridor and comprise taller apartment structures. The remainder of the sites are dominated by townhouse types, ranging from row houses with submerged parking, to semi-detached townhouses with at-grade parking.

Figure 8: Indicative greyfield residential precinct models

Consolidated precinct | Hybrid precinct | Dispersed precinct

2.5 Benefits of greyfield residential precinct regeneration

The potential for greyfields precinct redevelopment in the middle suburbs is significant, with regeneration possible in the following domains:

- Housing: delivers a mix of dwelling types, styles and costs, at higher densities, with some mixed use, while at the same time having the capacity to deliver a more aesthetically pleasing higher amenity redesigned neighbourhood than its predecessor.
- Energy: achieves carbon neutrality or zero carbon status with the introduction of distributed (renewable) energy and micro-generation technologies as new elements of hybrid buildings or precincts, capable of generating energy for local use as well as for the national grid (Newton & Tucker 2010).
- Water: integrated urban water systems involving water-sensitive urban design are best implemented at precinct scale, enabling appropriate mix of technologies for local water capture, storage, treatment and end use to be introduced in an eco-efficient manner, implementing 'city as catchment' (Kenway & Tjandraatmadja 2009; Diaper et al. 2008).
- Waste: precinct-scale redevelopment can optimise reuse of demolished stock and minimise the waste stream from new construction, as well as automate waste disposal and maximise recycling from occupied dwellings.
- Walkability: the opportunity to reduce land assigned to car transport and reconfigure to encourage more active transport modes (walking, cycling).
- Construction: linking off-site manufacture and on-site modular assembly to reduce the negative impacts of a traditional construction site, the construction times and the cost of delivery—and increase quality to more closely align with a manufactured product.
- Sense of place: opportunity to create an attractive physical neighbourhood and social community setting, with distinctive look and feel.

Information relating to the benefits of precinct-scale redevelopment is sparse but is beginning to emerge from several agencies in Victoria as well as internationally:

- CSIRO's Water and Energy Flagships that feature innovations in water-sensitive urban design and distributed energy generation (www.csiro.au).
- Sustainability Victoria's 'Sustainable Precincts' project, which includes case studies for leading international projects, for example BedZED, UK; Dockside Green, Canada; and Dongtan, China (www.sustainability.vic.gov.au).

- Victorian Eco Innovation Lab (VEIL), where distributed systems feature significantly in several projects (www.ecoinnovationlab.com).
- City of Melbourne through their '1200 Buildings' project (distributed energy) and 'City as Catchment' (water) project.
- Yarra Valley Water's integrated water system projects for both greenfield and infill types of project (Tony Kelly, CEO; www.yvw.com.au).
- Department for Communities and Local Government's (2010) case studies of interventions in housing and the physical environment in deprived UK neighbourhoods.
- Timothy Haahs' (2010) work on the design of 'cells' as the most appropriate scale for urban revitalisation around town centres. Cells are designed as a mix of densities, mixed use with housing above retail creating self-sustaining, walkable places.

A hypothetical precinct 'case study' was used in order to better understand the scope, impact and interactions of these emergent domains.

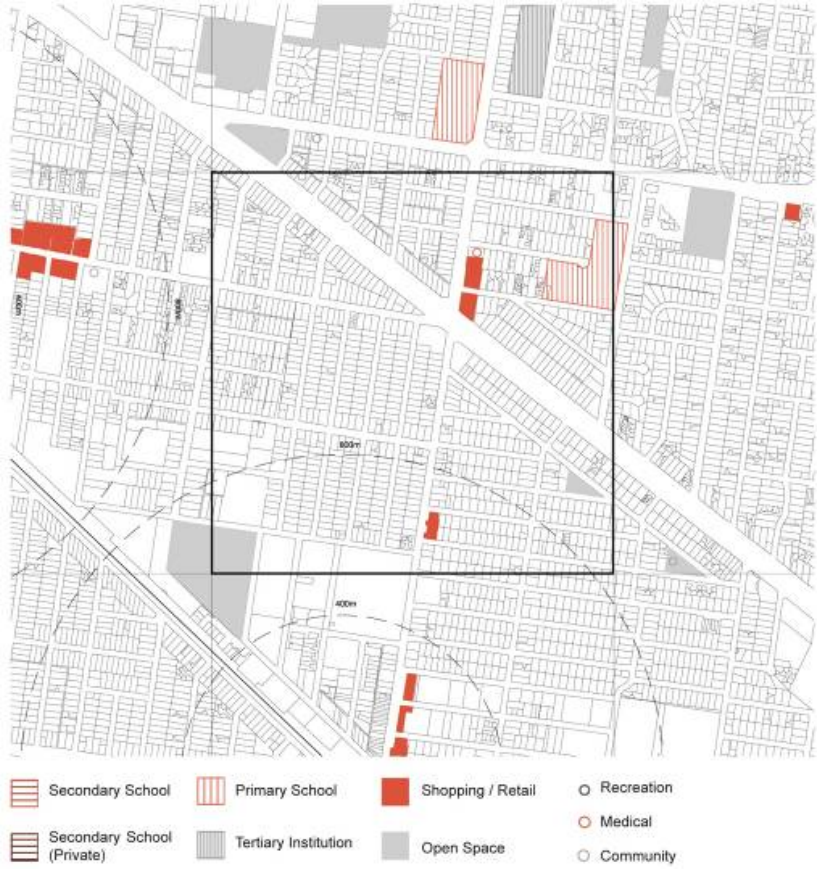
2.6 Case study precinct: Oakleigh East

Oakleigh East represents a possible location for both dispersed and hybrid precinct models, and has been selected for its proximity to existing patterns of redevelopment (see Figure 9). The suburb is bisected by the Monash Freeway, which divides a southern area of older, inter-war housing stock, light manufacturing and warehouses from a northern expanse of newer, post-war suburban housing. The site covers a region of fairly uniform 15m by 35m suburban blocks with current redevelopment characterised by the construction of larger single-family homes or simple duplex or two-pack subdivision.

Visual examination of nearby development clusters show pockets where three or four lots are redeveloped at roughly the same time, in fairly close proximity. In many cases this may occur in runs of neighbouring lots. It is reasonable to assume that this model could be sustained and strengthened to provide sites for larger-scale infill, with clusters of townhouses or flats.

Within the Oakleigh East investigation area, we chose 10 allotments to demonstrate possible arrangements for dispersed and hybrid precinct models, as detailed over the following pages.

Figure 9: Oakleigh site and amenity study



A consolidated precinct (Figure 10) would offer the greatest yield over established suburban regions, although the consolidated nature of the site may encourage recourse to established apartment typologies and development models. The intensive scale of development facilitates substantial developer attention to issues of design, as well as commercial tenancies and the provision of community infrastructures. The scale of the development would also allow for precinct level energy generation, solar energy collection and storm- and grey-water remediation.

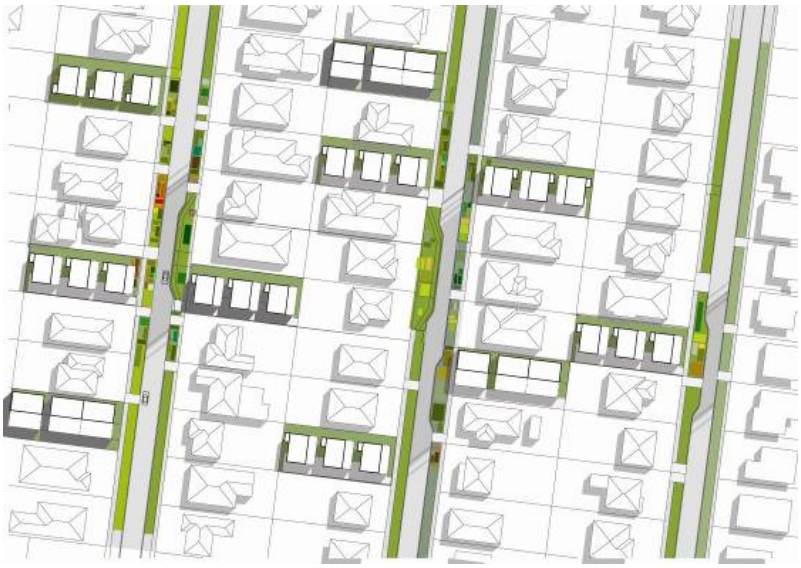
Figure 10: Consolidated precinct: Oakleigh

A hybrid precinct (Figure 11) would offer a mix of housing typologies at higher densities than achievable via dispersed infill, whilst partially maintaining existing suburban qualities of open space and design variety. The scale of development also allows for a proportional increase in developer attention to issues of design, as well as commercial tenancies and the part-subsidised provision of community infrastructures. The hybrid precinct would increase block porosity and merge with the surrounds via shared community spaces, wider nature strips, traffic calming devices, and jointly owned and operated 'productive gardens'.

Figure 11: Hybrid precinct: Oakleigh

A dispersed precinct (Figure 12) would offer a mix of housing typologies at moderately higher densities than achievable via dispersed infill, whilst maintaining existing suburban qualities of open space and semi-detached type. The scale of development allows for attention to landscape and connections between the sites, but may not allow for an overarching infrastructure plan. The dispersed precinct may be the most financially feasible and could conceivably be pursued as a series of design models completed by separate developers.

Figure 12: Dispersed precinct: Oakleigh



2.7 Scale and type of development

Reconfiguring suburban redevelopment to operate at a precinct level introduces obvious economies of scale. Benefits include increased yield, material and construction efficiencies, and the introduction of 'value added' elements that are traditionally lacking in small single lot developments, for example, architectural and environmental design. However, the nature and role of these precincts remains open to speculation. This paper has introduced three broad categories of suburban greyfield precincts—consolidated, dispersed and hybrid—but there may be further variations. The scale (whether focused or dispersed), staging (instantaneous or incremental) and intensity of such interventions are all topics of conjecture.

2.8 Dwelling typologies

The current model of intensification in activity centres privileges a medium-density to high-density apartment typology. Within suburban greyfields, the informal application of single-lot subdivisions diminishes potential typological diversity. The precinct level model offers the scope to introduce new typologies. Alongside established housing models such as townhouses, precinct sites can introduce and experiment with alternative forms of housing and distribution of program. Precincts may enable the housing industry to engage with previously unprofitable typologies—speculation, then, revolves around identifying these new types and addressing issues of their application.

Architectural design can contribute to sustainable redevelopment of greyfield precinct sites through 'minimal cost' contributions such as improved spatial planning and better typological choice (Murray 2007). Architectural design is virtually absent from domestic residential housing provision in the middle suburbs and commentators have noted that this has led to a lack of innovation in the industry (Blayse & Manley 2004). Due to the strict budgets in domestic residential construction, architectural input is unlikely to be feasible at the individual housing level. However, architectural design could be applied across multiple housing units and could therefore be incorporated into the cost structure. Architectural engagement with the domestic residential sector has traditionally failed because it does not recognise the particular parameters of this form of delivery, where there are severe limitations on construction detailing, material usage and the extent of individualisation of dwelling design. Such architectural contributions could be proposed as generic design models for adoption by developers as used in *The Age's* 'small homes' scheme and the Merchant Builders' cluster housing projects such as Winter Park.

2.9 Environmentally sustainable design

Enduring housing solutions require a shift in understanding of residential design and use. Large community-scale developments are able to incorporate district-wide systems that benefit from efficiencies gained through collective management of water, energy, waste and transport.

Such an integrated approach requires an alignment in the planning and design of supporting infrastructures, community services, appropriate building solutions and effective management and operation by the end-user. New settlements, 'eco-towns', have demonstrated some degree of success in this area. They are able to redevelop land, construct appropriate supporting infrastructure and network solutions at the beginning of a project. The increased capital costs can be justified through a projected payback period based on a known quantity of residences and demand. For example, eco-towns of 2 000 to 5 000 dwellings are being pursued in the UK regeneration areas at approximately 50 dwellings per hectare.

Similar innovations are not considered viable for mid-scale housing projects without external subsidy or progressive development models. Similarly, problems associated with incorporating sustainable components are further heightened for infill projects located in existing urban contexts. Infill developments involve density levels that could utilise collective conservation initiatives (approximately 100 dwellings per hectare), but they contain lower overall dwelling numbers on smaller sites. The type, scale, cost and staging of networked systems need to be considered in reference to how they could be used in the future. Balancing the short-term and long-term sustainability benefits requires input from an integrated design team that understands the value of long-term considerations.

The partial consolidation of lots, or the operational linking of dispersed sites, offers potential for the adoption of large-scale ESD systems. Intervention at this scale would reduce pressures on ageing infrastructures as well as offering reduced installation costs. The parameters of these interventions would be dictated by the nature of the precinct and by broader municipal and state government directions. Systems may range from the prosaic—solar power generation and storm-water treatment and mitigation—to the more ambitious—communal infrastructures for shared electric vehicles and precinct level production of food. Core questions remain as to the economic viability, extent and industry capacity to deliver these systems and designs.

2.10 Key design considerations for a new development model

Residential greyfield precinct regeneration is a potential vehicle to make large parts of Melbourne's middle suburbs more sustainable. In addition to the infrastructural and environmental upgrades that would be possible, a key benefit of the proposed scale and type of redevelopment would be increased housing choice and a new generation of place making in these locations. For a precinct approach to work in Melbourne's residential greyfields, substantial shifts in how our urban environment is envisaged, designed and delivered will be required.

A *narrative* for urban regeneration needs to be created, that connects the elements outlined in this report and that is capable of being read and *understood* by a large majority of residents of the city. An editorial in *The Age*, Melbourne's flagship newspaper, has come closest thus far in crafting such a narrative for the city's future (Figure 13).

Figure 13: A narrative for Melbourne's future development: 'Growing pains are not something a city simply gets over'

There is no end to Melbourne in sight. That's a problem

WHEN people think of Melbourne, the image that comes to mind is not of a great natural asset, such as Sydney's harbour, nor even of great man-made landmarks such as the northern city's bridge and opera house. It is more likely to be of commonplace things that make life easier for residents and visitors, such as the tram network. It is not that there is nothing to admire in what has been made by human hands in Melbourne – a stroll along Collins Street means passing some of the best, and best preserved, neo-Gothic architecture in the world. But you have to be at street level to appreciate it properly. A helicopter view is for the enjoyment of massive bridges and multi-sailed opera houses.

From time to time a notable Melburnian will suggest that the city needs a landmark of its own to rival the Harbour Bridge or the Eiffel Tower or Rio's statue of Christ the Redeemer. The proposal sparks a media flurry, as anyone who has ever wanted to build a Really Big Thing eagerly explains what it should be and where it should be placed. But the flurries usually end almost as soon as they have begun, and thus far, fortunately, they have ended without result. Melbourne does not need a Really Big Thing to make it special. On the contrary, what makes it

a desirable place in which to live is that this is a city built on a human scale.

The challenge is to keep it that way, but it is not a challenge posed by desperate campaigners for a landmark that might have their name attached to it. The deeper problem, one far more difficult to resolve, is that metropolitan Melbourne has already swollen beyond the scale that for so long helped to make it one of the world's most liveable cities. And it will keep growing, with a population rising from 4 million to an estimated 7 million by 2050.

As 2010 draws to a close, Melbourne's suburbs have already sprawled 50 per cent beyond the official urban growth boundary, spanning 150 kilometres from east to west. That is greater than the distance from the CBD to Bendigo. The expansion has been relentless, fuelled partly by the elasticity of the boundary and partly by the propensity of developers to leapfrog it, eating up what had hitherto been productive farmland and turning country towns into new suburbs. Several tiers of government have been complicit in this process. Country shires have sometimes been all too willing to approve developments that come packaged with the allure of an expanded rates base. The former state Labor government twice shifted a boundary it had once promised would be immutable – in 2005 and again this year. In consequence, the urban planning strategy, announced with great fanfare in the 2002 document Melbourne 2030, was effectively negated. The Coalition, newly returned to office, has been content to be all things to all lobbyists, acknowledging the need for orderly development but also sympathetic to developers' calls for the release of more land for housing on the urban fringe, and hostile to Labor's 2030 plans for higher-density housing along major public transport routes.

The mushrooming of Melbourne is, of course, also a measure of success. The city is growing because its economic opportunities draw people to it, or at least as close to it as they can get in the great suburban sprawl. The fact that increasing numbers of people cannot get as close as they would like to be was perhaps the underlying reason for the Brumby government's defeat in this year's state election, for Labor faced the dilemma of having to satisfy demands for affordable housing and for better provision of services, especially reliable public transport. The more the city has expanded, however, the more evident it has become that attempting to overcome the first difficulty by developing new land on the metropolitan fringe only makes it all the harder to resolve the second difficulty. A transport system that has been under-resourced for many years is not able to effectively service even already developed outer suburbs, let alone new ones. The Coalition clinched office on the back of the anger this generated among voters, but it has not come equipped with any ready-made solution to the problem of the city that knows no limits.

The simplest but most reckless solution would be to submit to the urgings of those who believe that the very idea of an urban boundary is nonsense. Last month, when The Age reported that developers were leapfrogging the boundary, Urban Development Institute of Australia chief Tony De Domenico said: 'If you try to limit the market, it never works; there is always a way around.' It is an argument, as this newspaper commented at the time, that is persuasive only if the problems created by unregulated markets are ignored.

The notion that only releasing new land on the urban fringe can provide sufficient affordable housing for a Melbourne of 7 million people is seductive but false. Nor is the proliferation of high-rise developments along public transport routes the only alternative to unchecked sprawl. Large tracts of vacant or underused land are still available even close to the city, and it has been the failure to unlock these, rather than the supposed shortage of land at the fringe, that has kept inner-city house and apartment prices high and forced home buyers to move ever outwards.

If Victoria's new government is to avoid some of the pitfalls that caused its predecessor to stumble, it must remember that what has made Melbourne one of the world's most liveable cities has never been the gifts of nature. It has all been the work of human hands, and human foresight. A lack of foresight may make it much less liveable.

Source: Editorial, *The Age*, 29 Dec. 2010

The consolidated precinct model is the most attractive and appropriate for development. However, there are inherent difficulties in securing and assembling the necessary land parcels. Conversely, the dispersed model would be the easiest precinct typology to fund, acquire and administer but initially appears too similar to current infill approaches to offer substantial benefits.

District-wide approaches to energy, water and waste, along with community facilities and shared open space arrangements, are considered most viable on consolidated or hybrid assemblages of land, whereas dispersed precinct models might dilute the benefits of centralised systems. However, a strategic precinct approach to distributed infill could create opportunity within conventional development processes. For example, market forces and regulations restricting the level of densification possible on a single land parcel might be reconsidered when viewed across a dispersed precinct that included, for example, collective parking, a community garden or a community 'hub'.

It is important that each precinct typology is capable of being visualised and communicated. More design development is required to demonstrate how each model could contribute to the broader urban environment and social contexts and goals, especially the opportunities to increase housing choice and community interaction that low-rise high-density housing typologies could offer. *Communal character* may contribute to the interest in such precincts as identity-driven development is already apparent in retirement and singles' villages, and some newer-edge urban estates. Similarly, a clear framework that measures the life cycle performance of residential greyfield regeneration will be required. The assessment should include both the environmental and community capital advantages provided by these precinct models.

3 PLANNING FOR GREYFIELD PRECINCT REGENERATION

3.1 Planning controls and policy

Recent periods of rapid population growth in Australia have exerted significant pressure on the housing market and the housing industry. The National Housing Supply Council (2010) identified the gap between demand and supply as 178 000 dwellings at June 2009, projected to increase to a cumulative gap of 640 000 dwellings by 2029. The role our major cities play as demographic absorbers—expected to accommodate 80 per cent of the nation's future population (Newton 2006)—has intensified focus on the ability of metropolitan planning and management to provide the infrastructure to accommodate this growth.

Debate surrounds both planning structures and planning processes. In relation to the former, the Governing Sydney Project (www.clg.uts.edu.au/research/sydney.html) and the Committee for Melbourne's Shaping Melbourne Taskforce's report on governance (www.melbourne.org.au) are leading examples of an emerging debate regarding governance structures. A recent Grattan Institute report (Kelly 2010) that undertook a comparative assessment of 10 leading cities, found that no one type of governance structure was associated with the city's performance across a range of social, economic and environmental indicators. However, evidence does exist that the creation of 'redevelopment agencies', usually as a temporary replacement for local government (e.g. East Perth Redevelopment Authority, Subiaco Redevelopment Authority, Docklands Redevelopment Authority), results in more rapid regeneration and redevelopment of the areas under their control (Council of Capital City Lord Mayors 2010, p.24).

The lack of bipartisanship between the two principal political parties in Victoria in relation to the planning of Melbourne (Austin 2010; Rood 2010) represents a major barrier to sustainable long-term development as the process remains too tightly linked to short-term electoral cycles.

3.2 Urban planning process

Urban planning is complex. At a macro level is meant to provide long-term strategic direction to the development of our large cities enabling them to meet the key performance measures articulated by COAG (Council of Australian Governments) in December 2009: productive, competitive, liveable, environmentally sustainable and socially inclusive. At a micro level it is meant to provide residents with affordable housing, high amenity neighbourhoods, access to public transport and a range of quality services, for example, water and energy.

Urban planning is also meant to provide effective guidance—by way of land-use planning, zoning, development assessment and building approval processes—to property developers, business and government agencies (including local government). As such, there are a variety of plans, strategies, schemes, guidelines, frameworks, policies, principles, regulations and controls that have been developed over time for different *responsible agencies* to manage the process of urban planning (see Goodman et al. 2010 for an overview).

The following pillars of urban planning process contribute to the challenge of urban regeneration:

1. The most recent strategic plans for major Australian cities (again, refer to Table 1) clearly reveal an attempt to move away from greenfield development as the

principal means of delivering new housing for metropolitan residents: all have targeted 50 per cent plus of new development to be built within established residential areas—principally, the inner and middle ring suburbs. The challenge of meeting these targets, especially in the middle ring suburbs (and under current industry, government and community processes) may be insurmountable unless there is a major transformation in the process by which, and the scale at which, the existing built environment can be regenerated/redeveloped.

2. In their policies for the strategic long-term development of the capitals, state governments have aimed to achieve more compact and sustainable urban development through:
   - → Land-use intensification and reduced automobile dependence.
   - → Provision of a greater variety of housing options for an increasing diversity of household types.
   - → Promotion of more sustainable communities, with particular reference to water and energy.

Exploring pathways for such a transformation are at the heart of this AHURI Investigative Panel project:

1. State planning policy framework where more intensive housing development is envisaged (e.g. in or close to activity centres, along tram routes, orbital bus routes, close to train stations or large redevelopment sites).
2. Planning schemes—for the control of land use and development within a municipality—contain zones, overlays and other provisions that effect how land can be used and developed. Differences between zones, for example, can include not only the types of uses (e.g. residential and commercial), but also other development features, such as setbacks, building heights, parking requirements, allotment sizes, densities and building styles.
3. Development assessments are required to ensure that a proposed development is consistent with the local policy, as set out in the area's development plan and the zoning of the land.

Much of Australia's present urban planning apparatus was established in the industrial era, when zoning of non-conforming uses had more relevance; there were few resource (e.g. water, petroleum, food) or climate constraints of significance; the social-demographic was simpler in terms of types and sizes of household, lifestyles, cultures and work-life structures (e.g. dual income households); and when the detached dwelling with garden was, with few exceptions, the acclaimed living environment for the nation's population.

With transition to a post-industrial economy (service, information, creative and green industries) a requirement for more sustainable cities, and where built environment industries (housing, transport, energy, water) are becoming more demand-driven than supply-led, state planning systems must also be able to transform themselves:

> 'The continuing exclusionary nature of states' and territories' planning and zoning systems tend to constrain the introduction of new or unfamiliar land uses, whilst tending to force older uses out, through the creation of non-conforming uses in new zones.' (Australian Property Institute and Spatial Industries Business Association Australia 2010.)

3.3 Inquiries into planning regulation

When planning and building regulations are not coordinated across the different tiers of government, or when their relevance is being tested by new products, processes or development initiatives, the implications for all urban stakeholders are negative. The costs and benefits of good versus poor urban governance are summarised in Table 3.

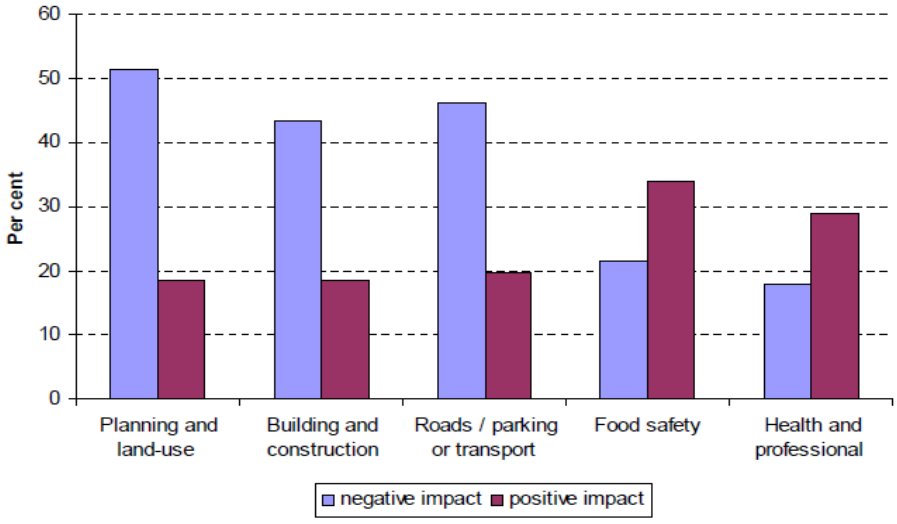
Table 3: Costs and benefits of good versus poor urban planning

	Costs of poor coordination	***Benefits of good coordination***
Property developers	Holding charges, access to finance, delayed release of product, inconsistent advice for decision making, excessive compliance/study costs	Higher confidence, quicker approvals, greater certainty
Businesses	Loss of trade due to delays, higher compliance costs	Less red tape, opportunity to streamline business practices and business expansion, innovation and research through cost savings
Government	Greater frustration, poor image	Easier work environments, better environmental or development outcomes
Residents	Lack of confidence in system, disillusionment with processes, developers and governments, political reaction	Confidence in outcomes, greater support for and trust in government

Source: Planning Institute of Australia 2010. Submission to Productivity Commission Inquiry

Undertaking a survey for the Victorian Competition and Efficiency Commission's (2010) Inquiry into Streamlining Local Government Regulation in Victoria, Roy Morgan Research contacted 1900 businesses about their regulatory interactions with councils. Land-use planning and building and construction regulations featured prominently as areas with potential for improvement: over half the businesses involved with land-use planning regulation issues reported that their most recent dealings with local government had resulted in a negative impact on their business (see Figure 14).

Figure 14: Perceived impact of local government regulations on business



Source: VCEC 2010, p.17

The announcement in May 2010 of a Productivity Commission inquiry into the operations of the states' and territories' planning and zoning systems, 'particularly as they impact on business compliance costs, competition and the overall efficiency and effectiveness of the functioning of cities' (Productivity Commission 2010, p.33), represents an acceleration in the drive for planning reform in Australia. It advances the following performance propositions:

1. *Efficiency*

   An efficiently functioning city would achieve an optimum allocation of urban land between alternative possible uses, achieving a balance between household and business preferences for different ways of using land taking account of the costs and benefits involved (including social and environmental impacts)

   Taken to the extreme, efficiency in the functioning of a city may be impractical and involve complex tradeoffs. It requires consideration of the complete range of land sites within the city, alternative land uses and availability of supporting infrastructure and other services, both at the current point in time and into the future. In practice, planning, zoning and DA [development approval] systems should aim to improve the efficiency in the functioning of a city by, for example, reducing the costs of production per unit of output, increasing the supply of goods and services provided to the community, and removing barriers to innovation and flexibility.

2. *Effectiveness*

   Complementing the notion of an efficiently functioning city, an '*effectively*' functioning city may be considered to be a city for which the core goals or objectives of the city are achieved and activities facilitated. In practice, a planning, zoning and DA system can be considered to be supporting the effective functioning of a city if it engenders a significant improvement beyond what would have happened anyway.

To ensure the adequate supply of land for different uses in cities, the Productivity Commission will examine the role of planning, zoning and DA systems in affecting:

- The amount of land available for urban development, including the proportions allocated across the broad alternative uses of residential, business, community services and facilities, infrastructure (often serving the needs of both residents and businesses) and the environment.
- The further allocation of these broad aggregates, for example, between single detached residences and high-rise residences, or between different types of business uses (e.g. industrial, commercial and rural). Different jurisdictions, and even areas within jurisdictions, can vary in the extent to which these further allocations are determined via planning and zoning systems or by market forces.

3.4 Amending planning, zoning and DA policies

A challenge for greyfield precinct regeneration under current planning, zoning and DA practices are the difficulties inherent in assembling small, separately held land parcels into larger plots in order to facilitate larger-scale development and regeneration. The restrictions on the nature and scale (height, density and so on) of the redevelopment are also an issue.

The Council of Capital City Lord Mayors (2010, p.12) have advocated amending planning and zoning policies 'to provide increased development potential of land on larger allotments (that is, allow higher densities). This will incentivise and encourage

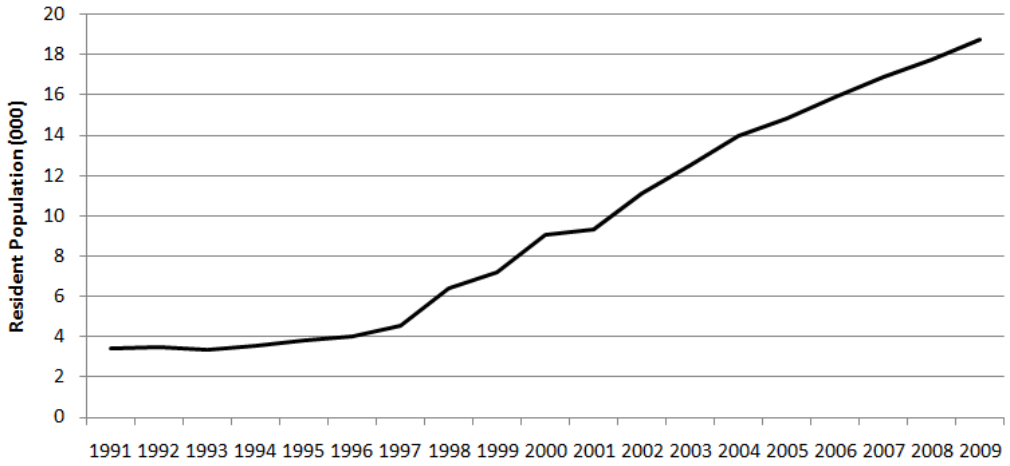
land-owners and property developers to consolidate their allotments in order to achieve a higher economic return.'

Postcode 3000 and ResCode are two examples of initiatives introduced to stimulate urban regeneration and revitalisation, and which entailed change in planning and building regulations and practice, in Melbourne in the last 20 years.

3.4.1 Postcode 3000

Postcode 3000 was a program, initiated in 1992 as a result of coordinated policy development between the City of Melbourne and the state government of Victoria, designed to attract more residents to the centre of the city. It has proven to be a major success, with a 12.5 per cent per year average rate of population increase from 1997 to 2009 (Figures 15 and 16).

Figure 15: City of Melbourne, resident population, 1991–2009



Source: ABS, Regional Population Growth, Cat. no. 3218.0

Figure 16: Growth of dwellings in City of Melbourne, 1983–2002

Source: City of Melbourne

This transformation required changes to a number of building and planning regulations that up to that point constituted a barrier to more intensive residential development in the heart of the city.

3.4.2 ResCode

ResCode is a residential design code comprising state-wide provisions for residential development. Its provisions are incorporated into planning schemes and building regulations, and are designed to protect neighbourhood character and amenity and ensure environmentally sustainable residential development. The residential zones do not distinguish between the use of a site for a single dwelling or for multi-units, unlike other state planning controls. This has contributed to concerns about the siting, scale and design of multi-unit medium-density development in established areas and the formation of lobby groups such as Save Our Suburbs (SOS).

ResCode encompasses issues such as site controls on overshadowing, overlooking, front and side setbacks, wall and building heights, together with many other elements of a building's design, including overall height, roof pitch, external colours and materials and fence heights, as well as helping to protect neighbourhood character.

Many of the planning disputes about development in Melbourne centre on the interpretation of ResCode. The kinds of issues that are commonly part of community opposition to developments include:

- Height and mass/bulk that are considered visually unacceptable.
- Overlooking and overshadowing adjoining residences.
- Car parking and traffic, especially for multi-unit developments.
- Insufficient private open space.
- Lack of integration with neighbourhood character—important characteristics include roof form, building height, building materials, landscape and fencing.
- High density of developments.

ResCode has been criticised by some for not going far enough to limit the allowable changes to neighbourhood character that are associated with residential developments in established areas. Others have been critical of its conservative interpretations of neighbourhood character, which involve qualitative aspects and therefore subjective judgement. Many architects regard its constraints on architectural design as limiting to innovation.

Because the neighbourhood character provisions of ResCode only apply to certain types of development, the code cannot regulate buildings that fall outside its scope, which in established residential areas, are residential buildings of four or more storeys (these are subject to different planning policies).

3.5 Case study: Boisdale Street, Surrey Hills

Projects abound that are held-up in the planning process. However, the reasons why they succeed or fail are often complex. One such example, which could be conceived of as a greyfield regeneration project as it had four contiguous parcels of land, was at Boisdale Street in Surrey Hills (see Figure 17). This project, a combination of townhouses and a medium-density apartment block, was ultimately rejected by the Victorian Civil and Administrative Tribunal (VCAT). What was most interesting about this project was that, although the development faced significant community opposition, it was finally rejected on the basis of poor design rather than other planning issues.

Figure 17: Boisdale Street redevelopment

VCAT was not opposed to the scale of the development, but rather the development's response to neighbourhood character (J and C Australia Unit Trust v Whitehorse CC [2009] VCAT 2759 (30 December 2009):

> 'We find the proposal cannot be supported principally on the failings of neighbourhood character … we do not agree with the objectors that the number of units is necessarily the issue, simply the building bulk. We find there is no magic number of units that would be appropriate for the site. Smaller living units are needed as part of housing diversity … we simply find a design response that better addressed the preferred neighbourhood character of the area is required … '

In order to address these and other concerns, the state government is undertaking policy work through a number of programs to increase housing supply, expand housing choice and improve housing quality, affordability and accessibility. The Victorian Integrated Housing Strategy (Victorian Government 2010) aimed to make the planning process more efficient and effective by increasing the supply of housing in existing urban areas. In another program, the state government has commissioned planning experts to work with local councils to calculate the housing capacity of each municipality in order to establish clear housing growth requirements for the future and to develop local strategies to plan for and meet this growth. This work will be completed by all municipalities in 2011 (Department of Planning and Community Development 2009). The state government has also drafted three new residential zones to replace the existing Residential 1 Zone. The government proposes that these new zones have been developed to provide councils with better tools to manage new development in residential areas and to give communities greater certainty about the type of development they can expect in their neighbourhoods. They are:

- Substantial Change Zone, providing for housing growth through a mix of housing types that includes medium- to higher-density housing in appropriate locations.
- Incremental Change Zone, allowing for a variety of housing types including medium-density housing provided it respects the character of the neighbourhood.

→ Limited Change Zone, enabling specific characteristics of the neighbourhood to be protected through greater control over new housing development.

When finalised, these new zones will enable councils to identify key requirements for new housing in residential neighbourhoods, including building height limits, setbacks from the street frontage, distances between buildings including the size of side and rear setbacks, the provision of smaller or larger backyards, and the area of a property that can be built on.

However, there remains uncertainty in the planning system, and medium-density developments continue to be rejected at appeal by VCAT. In a recent review VCAT acknowledged this and argued that there is a requirement to give priority to government-sanctioned local zones and overlay variations which have been incorporated into planning schemes specifically to modify state policy to reflect local conditions, as described above (Bell 2009).

3.6 Regen Code

As indicated in the previous section, ResCode has no applicability to developments above three storeys. This means that development assessments for what could be classed as low-rise high-density—typically four to six storeys in height—have no planning principals, guidelines and regulations to facilitate their development, much less 'as of right' provisions. Indeed, features of ResCode relating to privacy, overlooking, car parking, neighbourhood character and so forth, can be used to exclude potentially innovative precinct designs. There is nothing to encourage the development of higher performing, low-rise high-density precincts in established suburbs. This is the primary motivation for the creation of a new Regen Code.

3.7 Key planning considerations for a new development model

Current planning is structured to manage impacts, rather than to deliver visionary outcomes. It is oriented towards separation of land uses rather than an articulation of place-based outcomes that are capable of achieving COAG's performance objectives for Australian cities. Current planning focuses on historical precedent and has little ability to address shifts in modes of living or new housing approaches or typologies, or the urban challenges of the 21st century, which depart significantly from those of the 20th when our current planning regimes were first instituted. The limitations of current planning regimes prevent the uptake of greyfield precinct redevelopment and unless otherwise convinced, developers will continue to pursue well-tested, 'safe' approaches. Therefore, there is a need for a robust planning instrument or code for the redevelopment of greyfield residential precincts. There is no statutory guidance for low-rise high-density greyfield precinct regeneration in current Metro plans.

Such a code would need to define special attributes of 'place' that should not be lost in the future 'DNA' of the precinct. These may be physical characteristics—building form, vegetation patterns—or social markers. The code would also need the potential to improve universal design standards by enabling the reappraisal of density requirements, sustainability standards and accessibility codes. It would focus on higher performing community infrastructures over the existing mandates for individual provision. There may be a need for a framework for independent design and environmental performance panels to assess mandated performance elements.

Automated performance-based tools for precinct or neighbourhood assessment would need to be in place to guide the regeneration process and deliver agreed outcomes, for example the GBCA's (Green Building Council of Australia) Green Neighbourhood

tool, the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) for Neighbourhood Development tool, and the New South Wales government's PRECINX tool are all precursors to such an automated system.

Goals for precinct regeneration would need to be clearly articulated, with developers' costing-against-yield outlined at a suburb or precinct level. Clearly stated yields, environmental performance, and affordability targets and goals would help to alleviate developer concern and confusion. It would also pre-empt negative community responses by outlining exactly what can and cannot be undertaken in the region.

A new 'regen' organisation with the responsibility for urban renewal is required. Such an agency would transcend municipal boundaries and would need to be equipped with appropriate government funding, extensive technical depth and financial, statutory and planning powers. This may be via the coordination of existing public funding for the region, or the direction of new capital accrued through development contributions. Whatever mechanism prevails, the authority would need to secure its own capital before private lenders could be convinced that the approach is not only viable, but economically attractive.

The agency could not be risk averse, nor overly sensitive to short-term pressures. It would operate within long-term and large-scale strategic planning goals, over 20 year timeframes and engage in the development of greyfield precincts within middle and inner regions. It would be required to deliver consistent results at the scale of the city, yet should be flexible enough to function as both statutory authority and coordinating point for non-government delivery, guaranteeing regular small precinct regeneration projects rather than one or two 'major' developments, as has been the common practice (e.g. Docklands Authority and Growth Area Authority).

Ideally, the agency would control government expenditure in the greyfield precincts, but this would occur with oversight and cooperation between all relevant agencies. This level of interconnectedness could include linkages between greyfield and greenfield sites and authorities, both in financing (e.g. new greenfield levies could help to fund greyfield development) and planning (with coherent design approaches and narratives across both realms).

The authority could also have a land assembly role, although there are a range of other organisations that could adopt this function. Irrespective, the bulk of community consultation for land assembly must be undertaken early in the precinct regeneration process by an organisation with the authority to deliver outcomes. Once assembled, the consolidated precinct can be made available for development, with some certainty regarding calculations of yield and delivery timeframes.

4 LAND ASSEMBLY

4.1 Identifying prospective greyfield residential redevelopment precincts

A housing capacity assessment process, Housing Growth Requirements—Capacity Assessments Projects, has been initiated by the state government (Department of Planning and Community Development 2010) to establish a method by which realistic growth targets can be determined for each municipality in Melbourne to 2026. This will be achieved via a detailed land analysis across the region to identify land available for future housing development. In addition, the government is providing grants to local government to undertake housing capacity statements.

The process outlined below shares a number of features in common with the DPCD project, but is primarily directed towards the creation of a distributed spatial information platform that is available in all municipalities for use by any stakeholders interested in exploring opportunities for area redevelopment. The platform would comprise:

- Key layers of information about housing, held, analysed and mapped at cadastre (lot) level. This permits tracking and analysis of the property redevelopment process post-2000 (when harmonised property valuation data began to emerge across Melbourne), estimates of housing yield following redevelopment, as well as a platform for data aggregation to mesh blocks and higher for more macro-level purposes.
- Additional layers of information relating to non-residential land use (e.g. roads, footpaths, public land) as well as urban planning coverages (e.g. activity centres, heritage sites, building covenants) and urban infrastructure coverages (e.g. indicating 'hot spots' of ageing infrastructure), developed for combining with the housing layers to support strategic discussions and decision making.

The assembly of such an array of integrated spatial coverages, for use by local and state government, property developers and other agencies, to search for locations and projects for future urban redevelopment, can support the design process for a particular precinct and provide the basis for community engagement (see Section 8).

4.2 Indicators for residential property regeneration: a helicopter view of potential greyfield redevelopment precincts

4.2.1 Land value versus capital value

Capital is combined with land in the production of built space, and is reflected in the two measures of value registered for each residential property in a municipality: land (or unimproved) value and capital (improved) value. Typically, higher-priced land is used more intensively (Evans 2004). Land-capital ratios are increased by:

1. Relative scarcity of land, as revealed by Moran's (2008) review of Australian capital city land and house prices, the median cost of land overtook the median cost of constructing the dwelling in all capital cities over the past decade, and by a considerable margin (this is a historic urban transition).
2. Reductions in capital investment in dwelling maintenance and refurbishment over time that impact on the value and longevity of residential property via three routes.

- Physical obsolescence whereby regular maintenance and/or replacement of building elements can maintain the physical condition of the stock for several decades (Tucker et al. 1999), for example, provide data on the life expectancy of all building elements in a dwelling, and for life cycle assessment purposes assigns 80 years as a building's average life expectancy.
- Technological obsolescence where over time, the development of new domestic products and appliances for entertainment, cooking, bathing and washing have dictated that certain spaces inside the dwelling need to be replaced in order to experience the full 'enjoyment' or benefit of these products. Typically this involves extensions or alterations to bathrooms, kitchens and living/entertainment areas, a form of building activity that is now very prevalent compared to 30 years ago (Wymond & Hill 1978).
- Social obsolescence is dictated when the style and age (not necessarily condition) of a building is deemed replaceable, especially in sought-after neighbourhoods. Based on estimates by Evans (2004), residential building will need to reach 25 to 30 years of age prior to demolition to recoup the capital costs of construction.

Land-capital ratios are decreased by intensified use of a property, for example, by an increase in number of residential units on the site.

4.2.2 Index of property redevelopment potential

An index of property redevelopment potential (PRPI) can be calculated for all individual residential properties within municipalities using property valuation data held by the Valuer-General. The property redevelopment potential metric for each parcel is calculated as the ratio of the land value (numerator) to capital improved value (land value plus value of the built assets on that site—the denominator). A PRPI approaching 1.0 indicates that the value of the property is represented almost entirely by the land component and as such is more economically viable for redevelopment compared to properties with PRPIs of 0.5 or less. This is commonly used as a principal selling feature at auction. The hypothesis that properties with a high PRPI that come onto the market are redeveloped at a more rapid rate than those with a low PRPI was tested and confirmed by Newton (2010).

Analysis of 2008 property data from the Valuer-General Victoria clearly indicates that the greatest potential for residential regeneration is located in Melbourne's middle suburbs (see Figures 18–20). For example, in 2008, over 240 000 residential properties had redevelopment potential indices of greater than or equal to 0.8 (80% or more of the value of the residential asset is vested in the land). PRPIs calculated for all residential properties in Melbourne's 31 municipalities are shown in Appendix D.

From the analysis of each municipality, it has been possible to create a generalised model of the life cycle of housing across a metropolitan region (Figure 21).

Figure 18: Residential redevelopment potential, Melbourne inner suburbs, 2004 and 2008

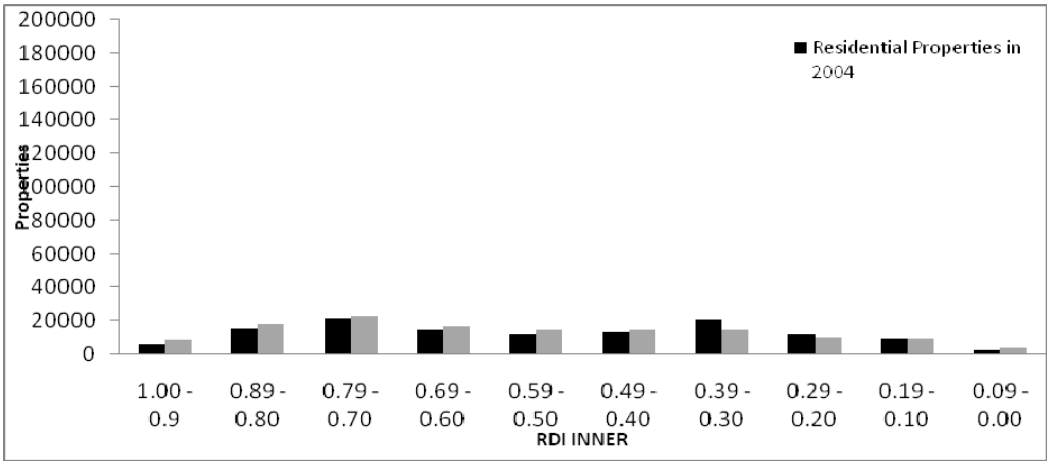


Figure 19: Residential redevelopment potential, Melbourne middle suburbs, 2004 and 2008

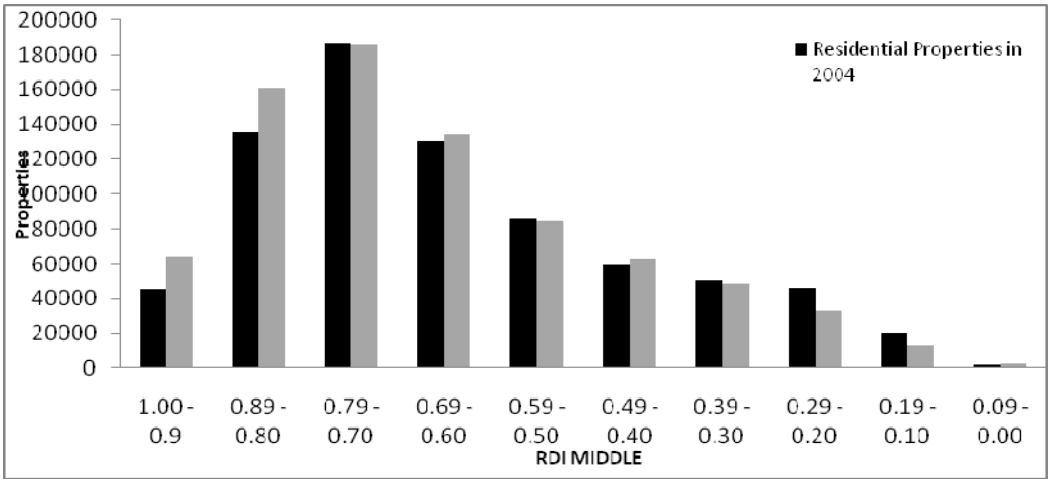


Figure 20: Residential redevelopment potential, Melbourne outer suburbs, 2004 and 2008

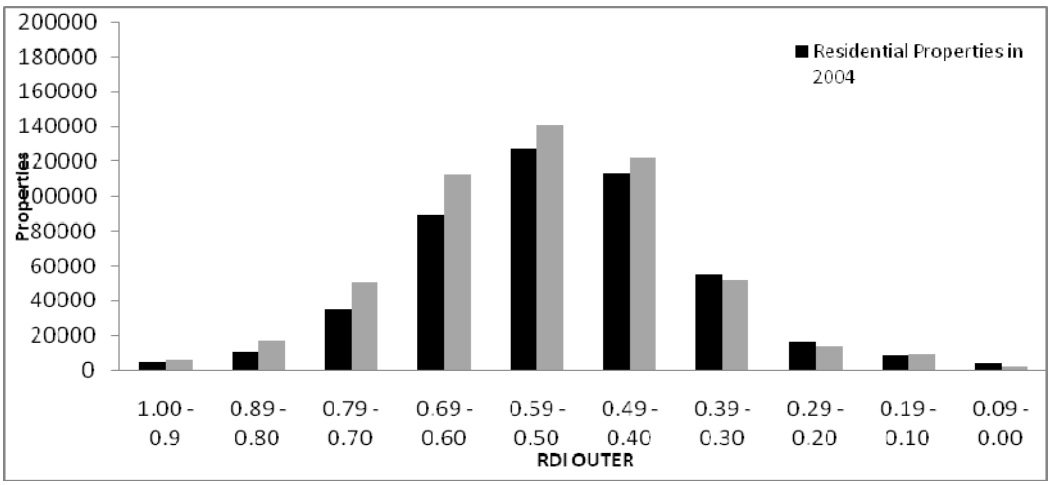
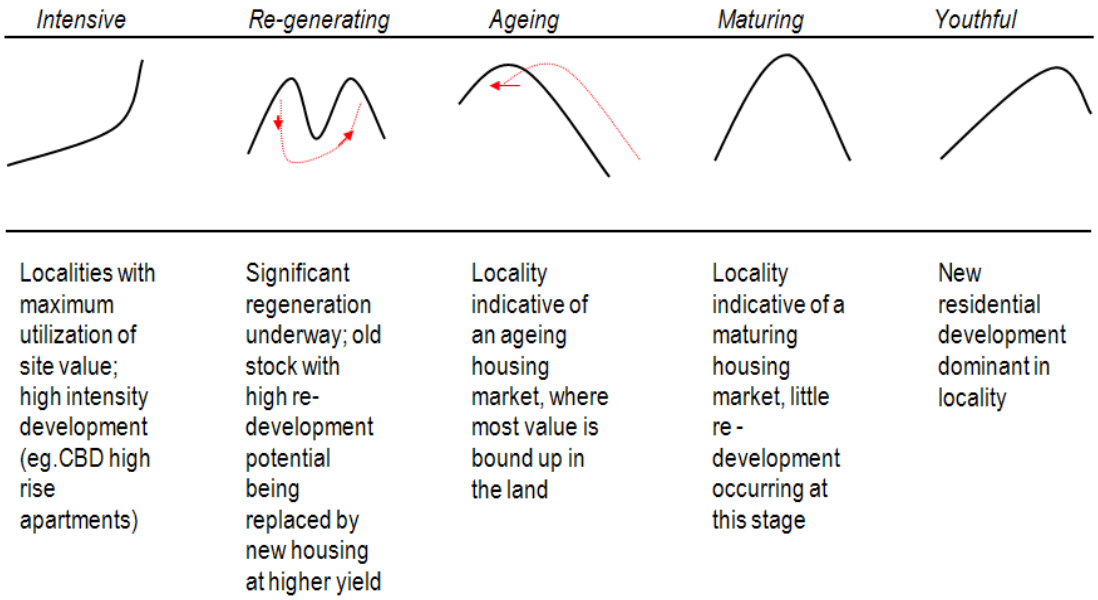


Figure 21: Stages in the housing life cycle of a metropolitan region



The most youthful housing areas have a negatively skewed distribution of dwellings where PRPIs are typically less than 0.5, indicating that the built asset contributes more value than the land. Melton, Wyndham and Whittlesea typify these new suburbs. The maturing suburbs tend to be characterised by a more normal distribution where PRPIs above 0.5 are emerging in larger proportions, typical of municipalities where new development began in the 1950s and continues up to the present. The ageing suburbs are those where the distribution of properties is positively skewed, where value of land is the most significant component of property value, most accentuated for those five municipalities (Boroondara, Kingston, Glen Eira, Manningham and Bayside) where redevelopment potential is high across most of the housing stock. A significant process of regeneration of housing is underway in Stonnington, Port Phillip and Hobsons Bay and this is reflected in a bimodal distribution of properties when their PRPIs are graphed, indicating an accumulation of property ready for redevelopment as well as property which has been redeveloped.

Intensively developed suburbs are those where the redevelopment of residential property happens quickly, typically in the form of high-rise apartment development characteristic of the CBD, Docklands and their immediate neighbourhoods. In a monocentric city such as Melbourne, such development is found in only one municipality —the City of Melbourne.

With the exceptions of Melton, Whittlesea, Wyndham, Hume, Yarra Ranges, Brimbank and Casey, all other municipalities in Melbourne have housing stock ranging from several hundred to several thousand in number where redevelopment potential is high (again, see Appendix D).

4.3 Assembling a GIS for assessing prospective greyfield redevelopment precincts

Precinct regeneration in ageing suburbs may take several forms. The most straightforward and amenable precinct type for effective redevelopment would consist of assembled contiguous allotments. While there is general agreement that better redevelopment is associated with consolidated precincts (Moseley 2007), individual ownership of housing allotments in middle suburbs makes land assemblage extremely problematic. In such areas it may prove difficult to assemble an adequate number of

contiguous allotments into one consolidated precinct. Similarly, where middle suburban housing abuts different land usages and infrastructure, consolidated precincts may also be difficult to assemble. For this reason a model may need to be considered where non-contiguous allotments make up the precinct and where these rely on continuous public infrastructure such as the street reserve, including nature strips, to act as a conduit for networked systems that link the non-contiguous elements. Such a precinct would require a different attitude towards consolidation, where the distribution of functions and activities are over an interconnected field rather than in one location. Precincts might also consist of hybrids of these two conditions, composed of contiguous assemblages and non-contiguous assemblages. The important issue would be to aim to coordinate redevelopment, even if not contiguous, in order to achieve improvements in amenity, intensity, infrastructure revitalisation, housing affordability and environmental benefits.

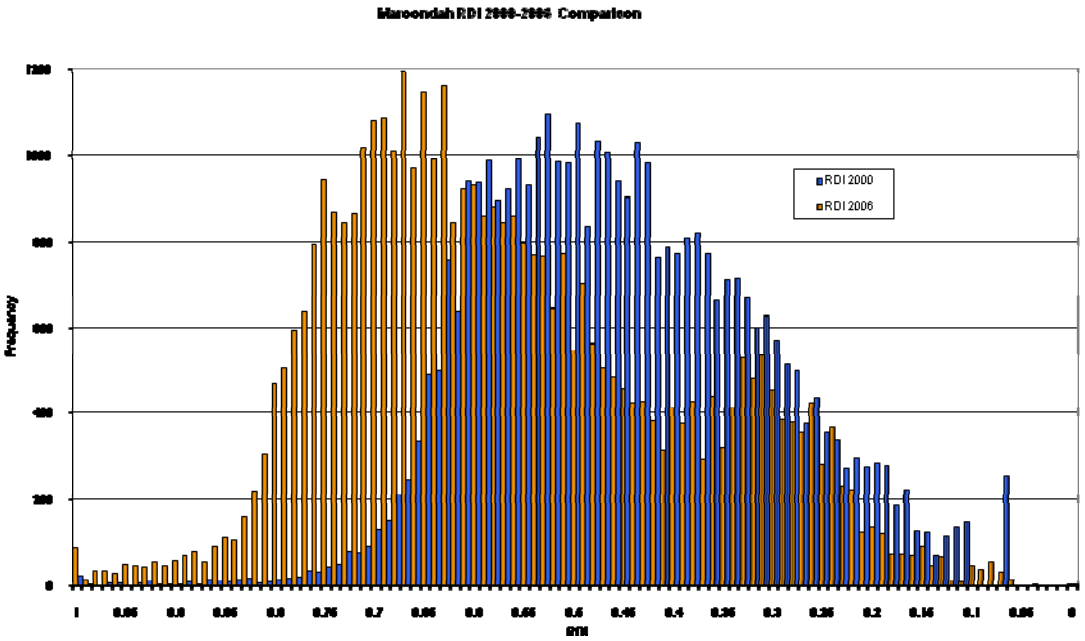
The question is: can the PRPI provide a 'helicopter view' of potential redevelopment precincts, based on a geographic clustering of sites with relatively high PRPIs (e.g. 0.8)? To illustrate this issue, all properties in the municipality of Maroondah (classed as a maturing suburb) with a PRPI of 0.8 in 2006 were mapped. The results are presented in Figure 22. Neighbourhoods with high concentrations of contiguous properties with high land to capital ratios can then be further examined with a view to them constituting a redevelopment precinct.

Figure 22: Redevelopment potential, Maroondah, 2006

Source: Derived from City of Maroondah property valuation data

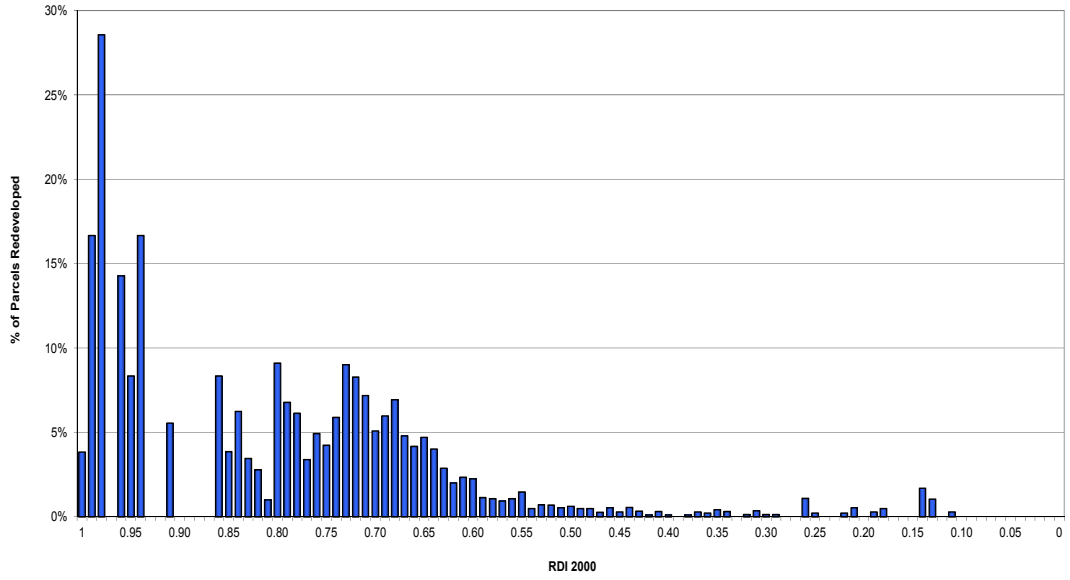
An analysis of the nature of redevelopment that occurred to individual residential properties in Maroondah between 2000 and 2006 (Figure 23) revealed that properties with PRPIs greater than or equal to 0.95 (in 2000) tended to have the highest rate of redevelopment over the following six years. Lower indices (above 0.65) also triggered redevelopment, but at lower rates (Figure 24). Higher rates of redevelopment and higher housing yields are found in the regenerating suburbs such as Stonnington (Newton 2010).

Figure 23: Residential redevelopment potential, Maroondah, 2000–06



Source: Derived from City of Maroondah property valuation data

Figure 24: Level of property redevelopment between 2000 and 2006 by 2000 redevelopment potential index, Maroondah



Source: Derived from City of Maroondah property valuation data

A key question is: what additional layers of information are needed to determine the suitability of a precinct and its scale for regeneration? The set of features should include attributes that represent potential barriers to site consolidation and redevelopment as well as those representing potential inducements. They should also canvass, wherever possible, the more intractable but equally powerful elements pertaining to a locality's socio-cultural 'signature'—the community that must be engaged in any redevelopment project.

Barriers to regeneration:

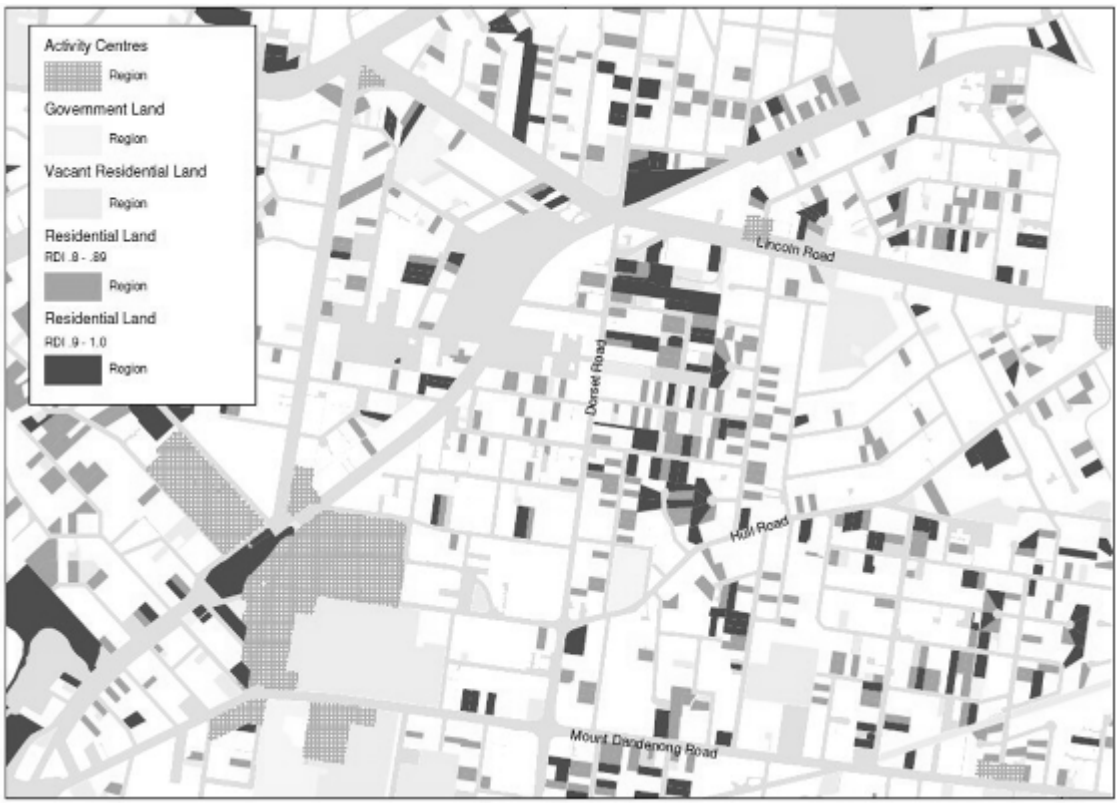
- heritage listed property
- land-use zoning
- known Aboriginal cultural heritage sensitive areas
- strata titled property
- biodiversity coverages
- socio-cultural elements.

Inducements for regeneration:

- Proximity to public transport centres and corridors.
- Proximity to central activities districts, principal and major activity centres, specialised activity centres and neighbourhood activity centres (refer to planning guidelines in Melbourne 2030 and Melbourne @ 5 Million).
- Proximity to parks and open spaces.
- Proximity to publicly owned land.
- Roads and footpaths capable of being incorporated into a precinct redevelopment.
- Socio-demographics.

Figure 25 provides an example of a multi-layer Maroondah coverage, but is relatively primitive in scope. A 21st century spatial information platform for urban analysis is required (Table 4), of the type being proposed at the CRC for Spatial Information.

Figure 25: Residential redevelopment potential with overlays, Maroondah, 2006



Source: Newton 2010

Table 4: Towards a 21st century spatial information platform for urban analysis

Scale	*Spatial information technology platform*	*Challenge*	*Outputs*
City	GIS, city information modelling	Lack of shared urban information system	Multiple coverages and metrics, e.g. transport networks, housing densities, land uses
Precinct	Convergence (integration) of: GIS and CAD; CIM and BIM	Emerging frameworks for performance assessment at neighbourhood scale, e.g. PRECINx, LEED-ND, CSTB's HOE2R, GBCA's GreenStar communities rating tool, UDIA's EnviroDeveloper Tools for project visualisation	↓ Automated assessment and visualisation of precinct projects ↑
Building	CAD, building information models	Automated, real-time performance assessment and visualisation, e.g. 3D CAD and LCADesign	Building eco-efficiency metrics, e.g. life cycle energy use, water recycling

4.4 Key land assembly considerations for a new development model

Outside of greenfield and brownfield areas, urban development tends to be reactive, with the appearance of a 'for sale' board or 'listing' often being the first signal to developers that a prospective parcel of land has come onto the market. To be effective, greyfield precinct regeneration needs to be proactive. Multiple layers of property, planning, utility and demographic data need to be brought together into distributed (shared) urban spatial information systems capable of servicing the needs of multiple locality-based (and possibly, initially, municipality-centred) development forums. Such a platform, with dynamic, up-to-date information and real-time access, provides a basis for property developers, design and construction professionals, investment organisations, local government and neighbourhood communities (in various combinations) to explore 'development opportunities'—the 'where' question—that may become apparent from a 'helicopter' view of multiple layers of spatial information.

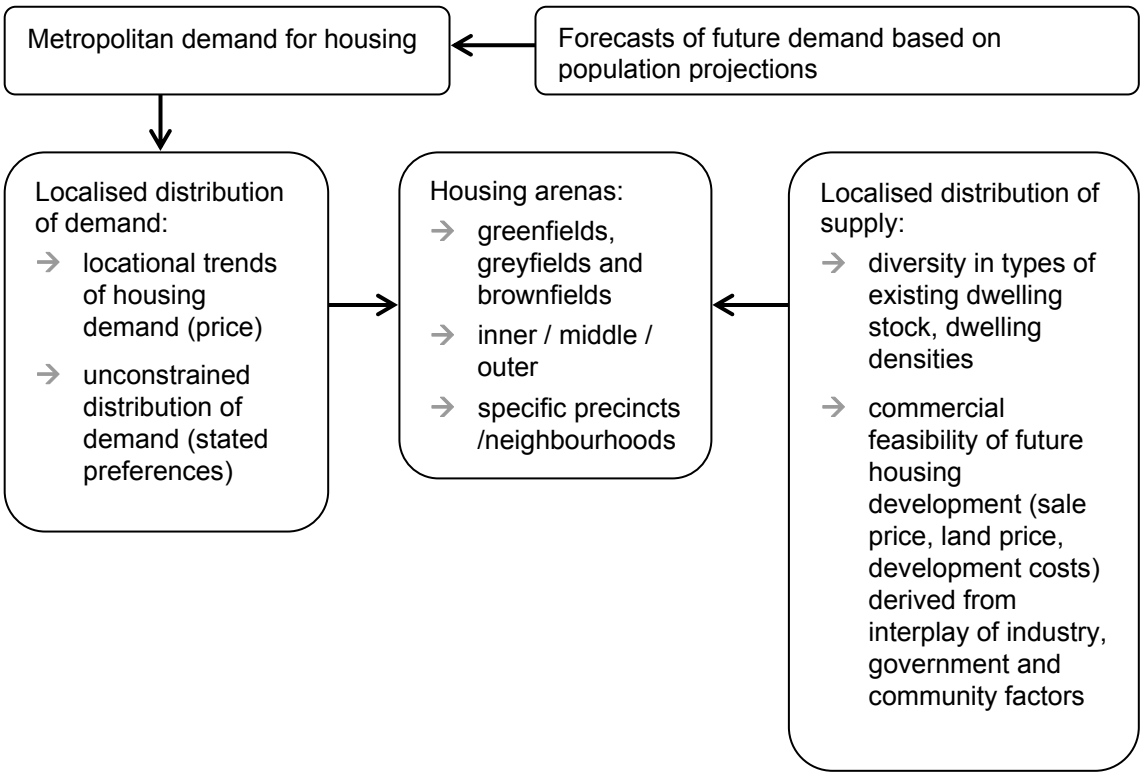
Several initiatives have recently emerged from the AURIN and the CRC for Spatial Information, as well as leading global geospatial companies (e.g. Esri's CommunityViz system) to develop spatial data platforms with query and display tools that would support more effective exploration of greyfield regeneration opportunities.

5 DEVELOPMENT VIABILITY

5.1 Designing for whom?

It is clear that the take-up of new dwelling opportunities will be a function of both demand (where people would prefer to live) and supply (what is commercially feasible within that location) (Figure 26).

Figure 26: Housing demand–supply nexus



5.1.1 Housing and locational preferences

Over the past 20 years there has been an absence of studies of similar magnitude to the federal government's Housing and Locational Choice Survey (HALCS)—undertaken for the National Housing Strategy—and its precursors (see Wulff 1992 for a review of these studies) which sought to understand household preferences for location, tenure and type of dwelling. The studies reflected a strong preference for detached housing, but significant social, demographic and urban changes have occurred since then:

- Changing household structures, for example increase in single person households, reduction in household size.
- Reduction in housing affordability.
- Desire for more compact transit-oriented cities (see special issue of Built Environment, 'The compact city revisited', 2010).
- Easthope et al. (2009) have pointed to an approximate 50:50 split among households surveyed in Sydney and Melbourne between those who would prefer to live in an apartment and those who would prefer a house.

For the present study it was important to gauge the relative attraction of the two major contrasting and competing forms of urban living 'environment' on offer to residents of major capital cities:

- → Type 1—the 'garden city': separate dwelling with a garden in a suburb where there is poor public transport.
- → Type 2—the 'compact city': medium-density dwelling with no garden, but close to public transport.

Insights can be gained from analysing the responses to the stated preference question in the *Living in Melbourne* survey:

> 'If you had to choose between the two living arrangements below, which would you prefer?
>
> Separate dwelling with a garden in a suburb where there is poor public transport.
>
> Medium-density dwelling with no garden, but close to public transport.'

Data for the analyses presented below was obtained from a survey of over 1200 households, undertaken as part of an Australian Research Council Discovery Grant in 2009 (DP087823f1), details of which are outlined in Newton and Meyer (2011).

Almost 60 per cent (N = 701) of the sample gave 'compact city' as their preferred living environment. Of these, 61 per cent were living in the inner city, 24 per cent in established suburbs and 15 per cent in 'new suburbs' (approximately 16% of the 42% preferring 'garden city' were inner city residents, see Table 5).

Table 5: Preference for garden city versus compact city

	Current location			
Preferred location	***Inner***	***Established***	***New***	***Total % (N)***
Garden city	15.9%	28.1%	56.0%	42.4% (516)
Compact city	61.1%	24.0%	15.0%	57.6% (701)
Total % (N)	41.9% (510)	25.7% (313)	32.4% (394)	100.0% (1217)

Source: Living in Melbourne survey, 2009 (Swinburne and Monash Universities)

Clearly there is a significant market and preference for both urban living environments.

Table 6 lists the attributes found to have a significant association with those households showing a preference for compact city living.

Table 6: Exploring factors associated with preference for garden city and compact city

Independent variables	***Univariate model***		***Multivariate model***	***Categories associated with a higher preference for:-***	
	df	***Chi***	***Wald***	***Garden city***	***Compact city***
1. Current housing context					
Housing	4	264.9***	35.93***	Detached 1+2 storey	Medium/high-density (1-7 storeys)
Garden	1	212.2***	15.74***	Yes	No
Number of bedrooms	3	164.0***	4.56	At least 3	1 or 2
Tenure	2	55.5***	2.14	Own with mortgage	Rent
Importance of a large home with space	4	48.4***	19.75***	Important	Not important
Crowding index: persons/bedroom	1	14.8***	1.09	<1 person	At least 1 person

2. Mobility intentions					
Future mobility intentions	4	32.42***	26.0***	10+ years	1-3 years
Move house to travel less	3	35.6***	23.5***	Not likely	Already have
3. Satisfaction level					
Satisfaction with location	4	26.9***	33.2***	Satisfied, non-committal	Very satisfied
Satisfaction with dwelling	4	3.7	11.8*		
4. Demographic context					
Age	4	6.83	12.9*	25-40	Under 25
Gender	1	.19	.2		
Birth place	1	13.0***	16.8***	Australia	Overseas
Education	5	38.7***	13.7*	At most Year 11, TAFE, diploma, certificate	University degree
Occupation	12	20.1**	3.2	Sales, clerical, technical, labourer	Manager, professional
Household income	3	17.8***	21.0***	<$119 000	>$119 000
Current living arrangements	3	46.1***	44.6***	Family with children under 18, ageing couple	Single living alone, other types
5. Transport context and preferences					
Registered vehicles in household	3	82.2***	4.25	2+cars	0-1 cars
Locational context	1	301.2***	152.4***	Outer suburb	Inner suburb
Increased public transport use	3	143.6***	34.0***	Not likely	Likely, already have
6. Environmental concern scales					
Importance of environmental action	1	36.6***	6.33*	Lower	Higher
Environmental concern scale	1	4.83*	.01	Lower	Higher
Carbon intensity sensitivity	1	60.56***	9.83**	Lower	Higher
Water sensitivity	1	7.62**	14.1***	Higher	Lower
Energy sensitivity	1	3.87*	1.7	Lower	Higher
Travel index	1	110.6***	27.1***	Higher	Lower

Note: Levels of significance * p<.05, ** p<.01, *** p<.001

Source: Newton and Meyer 2010

Preference for compact city living environments is characteristic of households that tend to be younger, overseas born, in professional occupations, university educated and on higher incomes, and living alone or with other adults. A high proportion of people with a preference for compact city living are already living in medium-density accommodation and are not attracted to a garden or larger floor space. They

consistently rate more highly on all the environmental concern and action scales, with the exception of water, where garden city residents are more highly sensitised due to extended restrictions imposed during the recent drought.

Key questions to emerging from these analyses relates to the consistency with which these relationships are likely to persist into the future:

- Will detached housing with garden constitute the preferred living environment for families with dependent children? More likely than not.
- Will single person households and other (non-family, group) households continue to find medium-density/compact city living well suited to their housing and locational needs? More likely than not.
- Will the baby-boomers/empty nesters/ageing couples continue to find that their garden city living environment meets their emerging needs? Probably not.

5.1.2 Housing price points

The comparison of costs of new construction versus extensions and alterations on a geographic basis is marked: the middle suburbs comprise 54 per cent of the alterations and extensions market, but less than 18 per cent of new construction (Table 7). Leading municipal housing upgrade expenditures are found in Boroondara ($172 million), City of Melbourne ($142 million) and Port Phillip ($107 million).

Table 7: Value of new construction versus housing upgrade projects, 2009

New construction

Region	*Mean*	*Sum*	*Count*	*Column %*
Inner	$2,427,122	$466,007,377	192	0.9%
Middle	$496,282	$1,775,201,346	3,577	17.7%
Outer	$229,486	$3,780,550,722	16,474	81.4%
Total	**$297,474**	**$6,021,759,445**	**20,243**	**100.0%**

Extensions and alterations

Region	*Mean*	*Sum*	*Count*	*Column %*
Inner	$262,824	$439,178,183	1,671	9.3%
Middle	$80,022	$782,774,315	9,782	54.3%
Outer	$39,204	$257,375,222	6,565	36.4%
Total	**$82,103**	**$479,327,720**	**18,018**	**100.0%**

Source: Derived from Building Commission Victoria Building Permit Applications for 2009

Urban containment and densification policies have been less than successful and in the case of Melbourne 2030: Planning for Sustainable Growth (Department of Sustainability and Environment 2002), urban sprawl has not been contained (Dowling 2010). One significant reason cited for this has been the inability of the housing market to provide for higher-density housing which can be delivered at a price point that makes it a viable alternative to conventional detached housing (Pradolin 2009). Some argue that government policy has failed to understand the price drivers that

influence the public's purchasing decisions regarding housing, and that this failure has resulted in housing intensification being concentrated in expensive inner urban areas (Pradolin 2009; Phillips 2009).

There is anecdotal evidence (Craig & Greenblat 2008) that medium-density development in established suburbs is 'overpriced', for example:

> Consider the hypothetical case of 'Marge and Bill', a Ringwood (City of Maroondah) couple who want to 'downsize' to a new apartment. Their 18-square [approximately 170 square metres] home is valued at $387 000. For the same price they can buy an apartment only a third of the size.
>
> 'There's no trade-off to switch to high-density housing', Bill says. 'You have to pay so much for so little. You don't get much more in terms of space in the city, but you do get much better access to amenities.'

The price relativities for existing types of dwelling versus their 'new construct' counterparts is identified as a key focus for attention by the Australian Local Government Association (2010) in the context of supply/affordability problems.

Constrained preferences (as in above quote) versus unconstrained housing preferences (see Section 5.1.1) are a reflection of how a housing market is actually operating. Why there is such a gap between the price that an established greyfields detached dwelling can attain at point of sale and the asking price for a new two to three bedroom medium-density dwelling within the same locality is a central issue for any greyfield precinct regeneration project.

Data on price points for constructing different types of dwelling across a metro region is difficult to assemble, and often viewed as 'commercial intellectual property (IP)'. Research undertaken 20 years ago for the Commonwealth's Housing Development Program on the economics of medium-density housing (Woodhead 1991) revealed an average differential of at least $25 000 for equivalent sized detached versus three storey walk-up apartments, the latter being more expensive. This is in contrast to a 1983 study of single versus multi-family housing (Warszawski et al. 1983) which showed the reverse: medium-density was less expensive.

Table 8: Building cost per square metre by region

Arranged by number of projects (i.e. building permits applied for)

	Inner			***Middle***			***Outer***			***TOTAL MELBOURNE***		
	($) / m²			***($) / m²***			***($) / m²***			***($) / m²***		
	$ / m	***Number projects***	***%***	***$ / m***	***Number projects***	***%***	***$ / m***	***Number projects***	***%***	***$ / m***	***Number projects***	***%***
Detached sole occupancy[a]	1,794	117	0.6	1,152	2,565	13.8	898	15,967	85.6	939	18,649	100
Detached dual occupancy[b]	1,806	39	4.5	1,298	539	61.5	1,026	298	34.0	1,228	876	100
Total detached	**1,797**	**156**	**0.8**	**1,177**	**3,104**	**15.9**	**901**	**16,265**	**83.3**	**952**	**19,525**	**100**
Low-rise medium-density[c]	1,749	20	3.0	1,218	438	66.0	1,050	206	31.0	1,182	664	100
Mid-rise medium-density[d]	1,893	9	34.6	1,637	16	61.5	703	1	3.8	1,690	26	100
Total medium density	**1,794**	**29**	**4.2**	**1,233**	**454**	**65.8**	**1,049**	**207**	**30.0**	**1,201**	**690**	**100**
Mid-rise high-density[e]	2,351	3	14.3	1,993	18	85.7	--	--	--	2,045	21	100
High-rise high-density[f]	2,732	4	57.1	804	1	14.3	723	2	28.6	1,882	7	100
Total dwellings	**1,825**	**192**	**0.9**	**1,188**	**3,577**	**17.7**	**903**	**16,474**	**81.4**	**962**	**20,243**	**100**

a) 1 dwelling/1-3 storeys; b) 2 dwellings/1-3 storeys; c) 3-9 dwellings 1-3 storeys; d) 10-30 dwellings 3-8 storeys e) 30+ dwellings 3-8 storeys f) 8+ storeys

Arranged by number of dwellings

	Inner			***Middle***			***Outer***			***TOTAL MELBOURNE***		
	($) / m²			***($) / m²***			***($) / m²***			***($) / m²***		
	$ / m	***Number dwellings***	***%***	***$ / m***	***Number dwellings***	***%***	***$ / m***	***Number dwellings***	***%***	***$ / m***	***Number dwellings***	***%***
Detached sole occupancy[a]	1,794	117	0.6	1,152	2,565	13.8	898	15,967	85.6	939	18,649	100
Detached dual occupancy[b]	1,806	78	4.5	1,298	1,076	61.5	1,026	596	34.1	1,228	1,750	100
Total detached	**1,797**	**195**	**1.0**	**1,177**	**3,641**	**17.8**	**901**	**16,563**	**81.2**	**952**	**20,399**	**100**
Low-rise medium-density[c]	1,749	91	3.0	1,218	1,955	63.6	1,050	1,030	33.5	1,182	3,076	100
Mid-rise medium-density[d]	1,893	123	30.0	1,637	272	66.3	703	15	3.7	1,690	410	100
Total medium density	**1,794**	**214**	**6.1**	**1,233**	**2,227**	**63.9**	**1,049**	**1,045**	**30.0**	**1,201**	**3,486**	**100**
Mid-rise high-density[e]	2,351	181	17.9	1,993	830	82.1	--	--	--	2,045	1,011	100
High-rise high-density[f]	2,732	1,084	97.3	804	10[g]	.9	723	20[h]	1.8	1,882	1,114	100
Total dwellings	**1,825**	**1,674**	**6.4**	**1,188**	**6,708**	**25.8**	**903**	**17,628**	**67.8**	**962**	**26,010**	**100**

g) 12 storeys with 10 dwellings, average dwelling floor area 185 square metres; h) two buildings each 23 storeys with 10 dwellings, average dwelling floor areas 222 square metres & 195 square metres.

An analysis of Victoria's Building Commission Building Permit data for 2009 (Table 8) provides a number of insights. As there were a relatively small number of records in certain categories (mid-rise medium-density in the outer suburbs, mid-rise high-density in both inner and outer suburbs, and all high-rise high-density), our comments centre on the better populated cells:

- For Melbourne as a whole, the lowest cost residential product remains the detached sole occupancy dwelling ($939 per square metre), although it is significantly more costly to deliver in the middle and inner suburbs.
- For Melbourne as a whole, there is little difference in the cost of constructing detached dual occupancy ($1228 per square metre) and low-rise medium-density ($1182 per square metre). Construction costs increased by 27 per cent for detached dual occupancy in middle versus outer suburbs and 76 per cent between inner and outer suburbs.
- For low-rise medium-density, construction costs increased by 16 per cent between outer and middle suburbs and 66 per cent between outer and inner suburbs.

Clearly there is a significant differential in construction cost by location when type of dwelling is controlled for, which constitutes yet another area for focus in seeking to deliver more affordable housing.

In the middle suburbs, the locus for greyfield redevelopment, the construction cost differential of detached sole occupancy ($1152 per square metre) compared to low-rise medium-density ($1218 per square metre) is negligible. However, there is a jump in construction costs of mid-rise medium-density ($1637 per square metre) and mid-rise high-density ($1993 per square metre)—34 and 64 per cent respectively higher than low-rise medium-density. To make the transition to an affordable compact city living environment in the middle suburban greyfields, ways must be found to minimise this cost differential between dwelling types.

Critical to this are new modes of design and construction that can regenerate greyfields at an appropriate density and price point and that integrate the best elements of the subcontractor-built greenfields dwellings and the high-rise brownfield apartments built by the commercial residential sector (Pradolin 2009).

5.2 Economic viability

Economic viability is fundamental to the process of greyfield redevelopment. Precinct level redevelopment where 10 allotments are partially aggregated offers potential cost reduction through economies of scale. However, there are considerable obstacles to a precinct level consideration of development. The primary barrier to the precinct approach in current market conditions is the prohibitive holding cost as developers wait to acquire an adequate number of blocks in the same vicinity. The holding period would only be exacerbated by the lengthy and more complex nature of the planning process as compared with single allotment subdivision redevelopment. Even if dispersed lots can be assembled and planning approval acquired, there are operational barriers such as the management of occupational health and safety oversight across several sites, and the economic disincentives of repeated cross-over, temporary power and protection costs as compared to the single outlay required on a large aggregated site.

Nevertheless, there are potential incentives inherent in this model, primarily related to increases in operational scale and proximity. There are obvious economies of scale including advantages in use of prefabricated elements and alternative supply chain processes. Similarly, alongside operational advantages by working in the same area for an extended period, precinct level development allows sequencing of

subcontractors across several sites and minimisation of downtime due to overlap of trades. Economies of scale can make funding available to engage a design practitioner, a move in concert with higher yields and a greater typological variety.

Precinct models also offer an array of community and social benefits. One is the potential to provide guaranteed liquidity extraction for owners such as baby-boomers nearing retirement, who may be looking for an opportunity to downscale and relocate in their region (Murray 2007). Other benefits include the increased diversity in typology, the possibility of subsidised community facilities, and the provision of better open space treatment due to higher volumes of redevelopment and higher through-block porosity.

5.3 Key viability considerations for a new development model

Clearly there is demand for redeveloped greyfields housing solution but it appears that the market is only able to deliver ad hoc solutions on single or double blocks in the middle suburbs. Understanding this phenomenon leads us to the key viability considerations for a new development model.

The first consideration is planning and approval certainty. Development in the middle suburbs is regulated under ResCode. The setbacks, overlooking rules and neighbourhood character provisions result in considerable difficulty for developers. While variations to ResCode are permitted with council approval, existing residents have substantial input into approval. Large developers need more certainty in the process to be willing to progress a new development model. Tellingly, in the final Investigative Panel, a developer suggested that some of these issues are better handled in the growth area where much denser development forms are ‘pre-approved’ and in new subdivisions where new development models are being progressed.

The second key viability consideration is a mechanism for consolidating lots for the new forms of development. Developers suggest that such consolidations may only need to be three to five lots to be viable.

The third key viability consideration is the delivery of higher-density alternatives at a price point that is attractive to existing residents of the middle suburbs and non-traditional residents. This requires dealing with the previous two key considerations while also dealing with the cost of construction.

It is interesting that volume builders in the growth areas are already delivering affordable denser offerings at an attractive price point. There needs to be an economy of scale brought to development in the middle suburbs that isn’t present at the moment for medium-density development. Volume builders can provide affordable detached redevelopment solutions in such suburbs where the only difference to outer suburbs is the cost of the land.

To summarise, the key viability considerations are planning certainty, consolidation of sites and cost of construction.

6 CONSTRUCTION AND INDUSTRY PROCESSES

6.1 Construction innovation

Different construction methods and forms of organising housing delivery may offer a solution for more efficient delivery of denser housing solutions in the middle suburbs. Hybrids of existing systems have the potential to provide higher performance outcomes at a more affordable price. These will require substantial changes in the types of housing solutions and the physical and information technology platforms to support the delivery process. Recent local developments in modular construction show great potential within the commercial sector. What alterations to these systems would be required to allow them to work over the smaller precinct scale, and to be delivered by smaller building practitioners?

6.2 Economic viability

A precinct approach can create economies of scale, including advantages in the use of prefabricated elements and alternative supply chain processes. Other advantages may include working in the same area for an extended period, the sequencing of subcontractors across several sites and minimisation of downtime due to overlap of trades. At a more general level, economies of scale permit more design input, by making funding available for the involvement of design practitioners. It is anticipated that this increase in designed outcomes would move in concert with higher yields and a greater typological variety. If any of this is to be achieved, new incentive mechanisms and frameworks for owners to sell their land to the developer will be required. Speculation revolves around what form such bodies would take, for example, the formation of terminating collectives in order to achieve more consolidated site aggregations.

6.3 Housing construction

Housing construction in Melbourne is characterised by two forms of delivery. The first are self-employed suburban builders who produce less than five to six projects a year, and mid-sized, middle tier builders who build residential structures to a maximum of three storeys in suburban areas. For our purposes, these are called the domestic residential sector. Commercial builders operating under quite different labour conditions build apartment buildings of four or more storeys constructed on larger sites, for example, at activity centres (Pradolin 2009). For our purposes, these are called the commercial residential sector.

There is a significant cost differential between the two forms of delivery, with the domestic residential sector providing much cheaper housing, on an area basis, as affordable one and two storey dwellings (Phillips 2009). The commercial residential sector provides more expensive, on an area basis, multi-storey apartments that require lifts and often complex construction systems. In addition, contextual factors outside of *construction costs* have considerable influence over driving the *market price* of housing.

As a large amount of infill is provided by the domestic residential sector, providing new development models for higher-density housing solutions requires an understanding of the drivers of this sector. This is a balancing act where strategies for achieving higher dwelling densities, better open space design, more varied housing typologies, better environmental outcomes and improved material and construction systems are pursued while still remaining within appropriate price points.

There are numerous international and local examples of high quality low-rise medium-density housing development demonstrating the value of architectural design in the process. However, there has been very little research on how this may be delivered at price points associated with the domestic residential sector.

6.4 Housing construction types

Housing construction types in Australia tend to fall into three categories:

1. Timber-framed houses are built from discrete pieces of material cut, joined and put together on-site, so-called sticks and bricks.
2. Panelised construction involves panels that are fabricated off-site and delivered to the site in a complete or semi-complete state (use of prefabricated trusses or wall frame are examples of this type of construction).
3. Modular construction, where prefinished volumetric modules are manufactured off-site and delivered to the site for erection.

All forms of construction have their advantages and disadvantages. Timber-framed construction, which requires very low levels of capitalisation, is the most flexible and is favoured by most residential builders in the Australian construction industry. It has the advantage of familiarity but it does rely on having a substantial pool of highly trained trade subcontractors to execute the process. Because of the fragmentation of the actual work, timber-framed construction is more susceptible to scheduling difficulties (longer construction times) and quality problems across subcontracts and is less able to innovate. As qualified subcontractors become less available, the problems with this type of delivery are likely to become more prevalent.

Panelised methods of construction offer some advantages over timber-framed methods in that some of the work can be carried out off-site, with consequent improvements in speed of on-site construction, automation, dimensional accuracy and waste reduction and less reliance on skilled contractors. Disadvantages include the degree of capitalisation required to set up panelisation facilities, the increased design input required in the construction process, the extra precision required in the on-site construction process and the material handling challenges presented on-site in moving the prefabricated panels.

Modular systems building offers advantages over panelisation in that on-site construction can be completed in days, the quality of the manufactured module is assured and skilled site labour is not essential to the building process. However, the construction process design is more challenging and the capital required to set up the modular factory is substantial. Module handling on-site is an order of magnitude more difficult, requiring cranes and large transportation systems.

Blismas et al. (2010) have identified a number of barriers to innovation in the housing industry. These include high levels of fragmentation, low levels of industrialisation, a complex and inefficient supply chain, poor capitalisation, a heavy reliance on subcontractors, a declining skills base and a flagging training effort. These barriers also present opportunities for innovation. However, they suggest ‘unfulfilled housing demand, together with a sub-optimal supply chain, has created opportunities for investigating alternative delivery systems for the housing market in Australia’.

Small-scale developer builders utilising stick-building processes undertake the majority of informal middle suburban infill redevelopment. Economies of scale resulting from a precinct level approach lead to a number of efficiencies and improvements, including:

- The potential to utilise higher levels of industrialisation, including panelised and modularised construction systems.
- The potential to provide higher levels of design and project management in the overall development process.
- Concurrent design, where communication among designers and producers (construction foremen, site supervisors, trade contractors) can significantly improve efficiency of production.
- Time and space based scheduling that facilitates keeping track of who is where, doing what and when. This is especially appropriate for construction activities, as crews move between sites.

6.5 Labour force innovations

In order to utilise the construction methods identified above in an optimal manner, labour force innovations may be required.

Firstly, it is important to identify the current situation. The cost of building in the growth areas is approximately $1000 per square metre. The cost of residential building in the CBD and inner suburbs is approximately $2500 per square metre.

While some of the differences in cost can be attributed to different building types, multi-storey construction and occupational health and safety requirements, it is important that new forms of middle suburban development do not incur the higher per square metre construction costs. To be viable, new construction methods must be able to deliver medium-density outcomes at the $1000 per square metre level. Developers are delivering medium-density outcomes at this price point in outer suburban areas.

Construction method innovations also make it possible to deliver labour force innovations that may reduce delivery cost. Panelised and modularised construction systems make use of factory based labour forces that can be more specialised and multi-skilled. This labour force will be working in a more controlled environment not subject to the vagaries of weather, site access and difficult manual material handling. Similarly, the site construction labour force required for this type of construction will be greatly reduced and can potentially be more highly skilled in a reduced number of trades. As the process of building is more carefully designed and dimensionally controlled, more efficient labour schemes will be possible.

The new development systems should also enable more efficient management and utilisation of multi-skilled construction teams across the site.

Clearly the new development model offers the potential of a more efficient utilisation of the existing labour force. This would require retraining, more flexible packaging of work and a greater sophistication in process design, planning and management.

6.6 Key construction considerations for a new development model

While the construction industry is an important driver in housing delivery, it is not often at the forefront of change. Timber-framed approaches remain the most economical mode for volume housing delivery due to the industry's independent subcontractor labour arrangements. However, a lack of skilled apprentices and tradespeople has severely circumscribed the potential of future delivery, especially in new domains of density and environmental responsiveness.

Innovative construction processes and changes to the labour force may provide some attractive solutions to medium-density housing developments. Industrialised processes that include combinations of prefabricated panels, service systems and interiors can provide fast turnaround options for replacing existing low-density housing. These may make medium-density options available to residents in existing greyfields.

For example, three to five existing home-owners agree to consolidate or connect their blocks and contract with a builder to build 15 new medium-density dwellings on the precinct. The existing owners receive ownership of five dwellings; the rest are sold with a split of proceeds between the builder and the owners. With design, pre-design, prefabrication and project management it would be possible to deliver the new dwellings in three months from the demolition of the existing dwellings. This minimises dislocation for existing residents, disruption of the neighbourhood and holding costs to the developers.

This option is also applicable for developers who may wish to buy out the existing residents, although this option would be more attractive at greater densities. Further advantages could be achieved with volumetric modularisation but existing greyfields sites may have access issues due to overhead utilities and road and site access restricting access for the equipment required to deliver and position modules. This industrialised approach could, with greater volumes, result in considerable manufacturing economies of scale.

Other possibilities for medium-density development that could result in attractive and affordable solutions are the design of a limited kit of parts for delivery of medium-density developments. The kit could be mass produced, delivering economies of scale to manufacturers and a much simpler construction approach undertaken by multi-skilled assemblers on-site. This would reduce the ‘parade of trades’ that occurs on sites with all the coordination, management and quality issues that result from having independent subcontractors undertaking much of the work.

A shift away from conventional modes of domestic construction practices is needed. However, the viability of introducing new techniques and technologies into this sector of the construction industry is not certain. Greyfield residential precincts, positioned as they are between large-scale commercial construction, volume residential construction and small-scale infill housing, have the ability to act as a catalyst for innovative practices.

7 FINANCE AND PROCUREMENT

Precinct-scale redevelopment offers a number of design and delivery opportunities that are unachievable through piecemeal approaches to urban infill. Murray and Wakefield (2010) examined the possible advantages of developing 10 residential land parcels in a coordinated manner. The proposed design models demonstrated a range of community and environmental benefits provided by this scale and type of work, the viability of which was predicated upon assembling appropriate land and overcoming financial challenges associated with multi-unit developments and complex stakeholder groups.

This section of the report discusses the key financial barriers to greyfield precinct regeneration, outlines existing finance and procurement arrangements relevant to multi-residential projects and provides a framework for discussion of potential opportunities for a more effective development model.

7.1 Financial barriers

7.1.1 Financial viability for existing owners

The second investigative panel focused on issues of viability for greyfield developers, including construction and delivery efficiencies and new building typologies. It identified the assembly of adjacent land parcels as the greatest barrier to achieving a viable form of precinct regeneration. Suggested solutions ranged from community brokerage processes, to compulsory acquisition of possible sites, to the establishment of a land agency, such as VicUrban, that would be solely concerned with assembling existing residential property for precinct regeneration. This final suggestion is loosely aligned with Bunker and Ruming's (2010) recognition of the potential role of a national land development agency for the 'consolidation of key development sites which could either be on-sold to the private sector or developed in public/private partnership'. Such approaches could remove issues of uncertainty regarding assembly, and strengthen the model's development viability.

These considerations address viability at a macro level, comprising strategies for policy and implementation. However, successful top-down approaches are contingent upon the actions and attitudes of the engaged resident at a micro level, where issues of development viability converge with personal financial viability. What approaches and mechanisms could drive individual participation in the type of land consolidation necessary for greyfield precinct development?

7.1.2 The baby-boomer horizon

A core driver identified in Section 7 is the take-up of precinct regeneration by existing residential property owners. Ageing baby-boomers experiencing the effects of an 'empty nest' are likely to be key participants in the overall process of assemblage. Occupying larger homes which are no longer typologically appropriate for their manner of living, they appear well placed to downsize and relocate to more appropriately scaled dwellings. Given that housing wealth is a high proportion of net wealth amongst those of retirement age (Disney 2009), one benefit of such a move is the extraction of equity for the supplementation of pension and superannuation funds. Yet, if new dwelling options are outside their existing area of residence, such populations are less likely to relocate, preferring to 'age in place' in familiar neighbourhoods (Olsberg & Winters 2005; Murray 2007).

To facilitate participation by this group, the price point and location of new housing are paramount. Competitive price points can result in undesirable design outcomes, such

as drastically reduced floor areas, minimised frontages and interior bedrooms with borrowed natural light or no cross-ventilation. In order to be viable for a downsizing market, new housing needs to be of a quality comparable with the original dwelling, at a cost that allows extraction of equity from the exchange and in an area reflecting their desired location.

In general, the cost, quality and location criteria for existing greyfield owners are not fulfilled by current development offers. Higher-density developments in activity centres cannot be delivered at a price that allows the extraction of equity, and new builds on greenfield sites are not desirable areas for relocation. To facilitate the relocation of this market group, this type of housing would need to be accommodated within the greyfield precinct redevelopment itself.

7.2 Ongoing costs and potential barriers

Elevated costs can be expected when implementing any innovative mode of development. The administrative outlay associated with the initial delivery of greyfield precinct regeneration may be significant. In addition, unfamiliar processes associated with land assembly, holding costs, community brokerage and development capital streams are likely to be construed as more complex than traditional, known models of redevelopment. The cost and time required to implement these kinds of transformations will not be shouldered solely by the private development industry. Without careful structuring, the increased costs could be inadvertently passed on to the new precinct community.

Similarly, enhanced dwelling design and more efficient infrastructure, as outlined by Murray and Wakefield (2010), will initially require more capital investment. Over the life cycle of the precinct, the benefits of increased construction quality, sustainable design systems and higher provision of community amenity will become apparent. To avoid these expenses being incorporated into the final price point of the housing product, new approaches to development finance and procurement will be required, for instance, partnerships with housing providers that have long-term interests in the redevelopment.

A core concern of individual home-owners is the taxation framework surrounding the act of downsizing—housing is not asset tested, but equity extracted from the move could be. The implications that this shift would have upon a retiree's pension income provides a powerful argument against relocation. As Disney (2009) notes: 'it seems apparent that the combination of tax treatment of housing and of retirement saving assets gives strong incentives to defer downsizing for as long as possible.' In such situations, financial approaches such as reverse mortgages could be more appropriate engines of equity conversion.

Such barriers are not exclusive to those baby-boomers ageing in place; indeed, price points have implications for all greyfield precinct residents. However, it is recognised that the ability to tap into the desires—the use, for example, of a house as lifestyle tool rather than an end in itself (Olsberg & Winters 2005)—and aspirations of a recognised baby-boomer submarket may expedite the assemblage of new precincts. As such, some effort should be made to provide affordable and appropriate housing for this sector which will require new finance and procurement methods to deliver appropriately priced replacement housing for the community displaced by land assembly.

7.3 Existing development finance and procurement

Greyfield precinct regeneration proposes a new approach to multi-unit redevelopment in the middle suburbs, encouraging more housing choice, higher quality public spaces and shared amenities and increased building efficiencies. The second Investigative Panel addressed issues of development viability specific to the design, construction and delivery processes required by higher-density housing. This section of the report expands the discussion to encompass relevant finance and procurement mechanisms impacting the feasibility and quality of housing outcomes.

7.3.1 Private sector

Most multi-unit housing developments are delivered by the private sector. In response to the dynamics of the housing market, this sector has split into the domestic residential sector, and the commercial residential sector. In general, the domestic residential sector provides, on an area basis, relatively affordable one and two storey dwellings, while the commercial residential sector provides more expensive four or more storey apartments in multi-unit developments. Different financing and procurement mechanisms are available to each sector and impact the outcome in different ways.

Commercial multi-unit housing can cost up to three times more to build than one or two storey residential developments. To offset the high level of risk, developers require higher profit margins and in fact, bank finance is often provided on the stipulation that this level of profit is secured. As a result, commercial developers tend to focus on large-scale projects that can justify both the increased costs of construction and those costs associated with project establishment and financing.

Medium sized developers working on projects of up to 30 units tend to use private capital to finance the works. This has important implications for the overall redevelopment capacity of this sector. This form of development requires a risk averse approach and therefore design innovation is infrequent; familiarity and lowered costs are achieved by using established housing types where planning outcomes are clear-cut and any issues are minimised (Ruming 2010).

This pattern of reliance on private equity also holds true for the smallest scale of developer —the ‘mums and dads’ and ‘one-man bands’ working on developments of up to six units, often without the use of any subsidiary consultants. Working over single blocks, often their own, such developers are constrained not simply by financial issues, but by their own lack of institutional knowledge of the planning process.

Within the middle suburbs, large commercial development is restricted to activity centres, transport corridors and brownfield redevelopment. Feedback from the second investigative panel suggests that within current labour and financial frameworks, the only greyfield sites that would appeal to a developer of this scale would be larger, consolidated assemblages of land, less frequently available. Concurrently, small-scale developers appear to lack the institutional and operational familiarity required to navigate planning structures and may not easily adapt to new and unfamiliar structures required for a greyfield precinct model. A more secure, coordinated medium-scale industry may provide an avenue for the private procurement of new greyfield housing.

7.3.2 Public sector

As of 2008, direct public housing accounted for less than 4000 new builds nationally each year. The yearly growth rate for the entire public sector hovers at around 0.5 per cent (Jacobs et al. 2010), small enough to be considered essentially static. Initially, it

appears unlikely that the sector, which is hampered by reduced funds and social stigmatisation, might offer new models for the procurement of greyfield precincts. However, public housing estates offer examples of both contiguous and dispersed residential precincts in middle suburbs. Jacobs et al. (2010) note that there has been an ongoing process of tenure diversification and regeneration programs in these estates, centred upon achieving asset sustainability and stock reconfiguration and dispersal. The general ambitions of these processes parallel the overarching goals of greyfield regeneration, and it is possible that new greyfield precincts could augment existing public housing estates. There are significant opportunities to develop these new precincts on estates where allotments are contiguous.

A second prospect, examined in greater depth below, addresses the established linkages between public tenure, private equity and not-for-profit housing corporations, and the possibilities these present for greyfield development.

7.3.3 Public/private partnerships

Public/private partnerships have formed the basis for much of Victoria's regeneration of the larger high-rise public housing estates, alongside other infrastructural investments. Projects and works over $50 million must consider a PPP as a method of procurement and delivery. Less intensive projects may also consider the framework if there is substantial cost benefits (Partnerships Victoria 2010). However, there are lower bounds to what may be considered a viable PPP, but these are likely to be restricted to larger consolidated sites.

Smaller public/private arrangements between public housing bodies, private equity and housing associations may be suitable for the scale and scope of greyfield regeneration. Grants and subsidies that fund housing association developments create concentrations of need, as only social housing clients are funded. However, good tenure mix is ensured by housing associations buying into private sector development. There is a need to make sure that they are able to continue to cross-subsidise developments with units sold in the open market to subsidise community housing.

7.3.4 Housing associations

Housing associations are non-profit organisations that own, develop and maintain a range of dwelling stock, focussed on the supply of affordable housing. As specialist providers, they tend to pursue innovative financial partnerships and procurement models. Internationally, including in the UK, Canada and the Netherlands, housing associations operate as large, independent, non-profit housing organisations that are able to deliver and manage large numbers of dwellings each year.

In Victoria, almost 5000 properties are owned or leased by registered housing associations in a range of locations. A barrier to further growth in the sector lies in its inability to retire debt on housing developments. This is partly due to the inability to secure enough capital from rental yields, as well as the uncertainties caused by the sporadic nature of public funding. Many government schemes target large-scale projects, which often precludes housing associations from participating. Housing Choices Australia, one of the largest housing associations in Victoria focusing on the development of new stock, has proposed a model that balances government subsidies with other funding sources in a manner that allows them to retire development debt in a timely fashion and thus concentrate on growth of the property portfolio. Alternative models such as this need further exploration.

7.3.5 Housing cooperatives

Housing cooperatives form a separate stream for the procurement and delivery of new housing stock. Broadly, they can be grouped into terminating and continuing models, with the former simply providing for the assembly and construction of a development, while the latter forms the core of a new body corporate structure.

7.4 Potential opportunities

Any number of combinations of the above models may provide for the finance and procurement of greyfield precinct redevelopments. These models should consider several different stakeholders and participants from both public and private sectors. Several examples in Australia and overseas could be built on or adopted. These include:

- Cross-subsidisation whereby tax revenue from retail and commercial tenancies is allocated to housing redevelopment, as in the Rive Gauche mixed use development in Paris.
- Air-right development that creates housing assets over existing ground floor community infrastructure, such as at-grade parking.
- Inclusionary zoning, where local government can leverage through planning controls.
- Shared equity and rent-to-buy schemes that provide systematic development of new funding and partnership models.
- Tax increment financing (TIF) leverages future rate rises to fund the activities of a nominated redevelopment agency, a mechanism predominantly used in the US.
- Property Assessed Clean Energy (PACE) is an investment/loan scheme operating in the US that allows municipal lenders or finance institutions to offer a loan that is to be used for sustainability improvements.
- 1200 Buildings Program, undertaken by the City of Melbourne, assists building owners to obtain finance for retrofit works that will reduce energy use, save water and lower carbon emissions.
- Land trust schemes where the trust owns the land in perpetuity and members buy only the dwellings on it, dramatically reducing their mortgages.

7.5 Key finance considerations for a new development model

It is reasonable to expect that new forms of greyfield development may be facilitated by different forms of finance or financial incentives. Recently, the Property Council of Australia advocated the creation of Growth Area Development Bonds to finance infrastructure development in growth areas on the city fringe. Interest on the bonds is financed by the growth in property tax resulting from the new development. Similar logic can be applied to greyfield development, where Greyfield Development Bonds could be used to finance land consolidation and infrastructure improvements in areas subject to redevelopment. The provision of improved infrastructure may help to overcome local opposition to consolidation.

Other forms of finance include allowing access to superannuation funds to fund consolidated development, new financial structures similar to cooperative building societies in which home-owners and buyers pool savings and assets to finance denser precinct development, and land tax and stamp duty rebates.

8 PROACTIVE COMMUNITY ENGAGEMENT

Cities are a complex mosaic of communities which differ from each other socially, demographically, economically and culturally as well as geographically. They are also dynamic—changing over time at different speeds and in different directions.

Cities host multiple housing submarkets, differentiated by dwelling type, density and price. Housing is also dynamic, with a life cycle which is seen to vary geographically across the city. As housing ages, and depending upon the relative attractiveness of its location, redevelopment can occur at differing rates. However, this tends to be piecemeal, fragmented and sub-optimal (insofar as enabling broader-based infrastructure regeneration, viz. energy and water, as well as more intensified forms of housing).

The principal reasons for this include:

- The housing is privately owned and occupied and accordingly will not typically come onto the market other than as individual, non-contiguous parcels.
- There has been little or no interest by property developers in assembling land on the 'occupied greyfields', apart from the smaller developers or 'mum and dad' developers who look to build between two and six townhouses on land resulting from the sale and demolition of an existing detached dwelling and possibly its immediate neighbour.
- Building and planning regulations are unsympathetic to more intensive redevelopment in suburbia.
- Absence of a proactive approach to community engagement in areas defined as 'high redevelopment potential' with a view to land assembly and precinct redevelopment (involving community strengthening as well as housing redevelopment at higher densities, introducing high levels of of environmental sustainability through energy and water innovation).
- Community resistance (NIMBYs) to development related issues of maintaining neighbourhood character.
- Lack of exemplars that demonstrate alternative models to both providers and consumers.

8.1 On community engagement

A number of terms including public or citizen participation (Sandercock 1975), community participation and community engagement (Sarkissian et al. 2009) have emerged in the urban planning context. They all share a common objective of seeking a collective decision on urban development projects or plans, that is collaborative, comprehensive, effective, inclusive, fair, democratic: high engagement but with associated transaction costs. The success or otherwise of community engagement processes in urban planning varies greatly (from the cursory to the highly participatory) and is an area that is continually contested and debated in public fora.

Urban planning and development has been characterised as authoritarian and bureaucratic, expert-oriented, more efficient and timely but alienating to community, where 'community engagement' is seen as more of an 'advisory' process.

As Kelly (2010, p.45) recently observed after an international comparative study of cities:

> 'Residents of cities must be involved in decisions at a metropolitan and at a local level. In our sample, such involvement appears to have been critical to

making tough decisions that were then actually implemented. This level of engagement is an order of magnitude different from what happens in Australia today.'

For the purposes of considering greyfield precinct regeneration, there are three tiers of 'community' to be engaged:

1. The community who hold properties and may be willing to sell as part of group (this group can also be differentiated as resident-owner or owner-investor, each having a different mix of interests in property).
2. The community who live in the nearby neighbourhood on whom the development may impact, including residents and local business and other organisations.
3. The larger Australian community represented by governments and organisations which have a key role in the establishment and procurement of new housing for an expanding population and more sustainable living environments.

8.2 Community engagement in greyfield precinct regeneration

In situations where residents might be prepared to make significant changes to how and where they live, for example, residents who might sell their existing properties in order to participate in a neighbourhood/precinct regeneration project (or landlords for purely financial reasons), meaningful engagement and participation will be essential.

The type of entity (organisation) capable of coordinating greyfield precinct regeneration is a key part of the process, and the principles and processes by which community engagement takes place need to be articulated and embedded in practice. These principles are found in Sarkissian et al. (2009) and include:

- Ethical: 'in a democratic society, those whose lives are at stake should be consulted and involved in the decisions that affect them directly (Sarkissian et al. 2009, p.47).
- Pragmatic: 'support for programmes and policies often depends on people's willingness to assist the process' (Sarkissian et al. 2009, p.47).
- Transparent: 'a critical element that requires no withholding of information' (Sarkissian et al. 2009, p.163).
- Accountable.
- Participatory, where all parties are fully engaged in the process.
- Persistent and patient.
- They must create an environment of trust where agreed GO: NO GO decisions can be made.

8.3 Defining community for the purposes of land assembly and greyfield precinct regeneration

Broadly, two types of greyfield residential precinct exist in most cities in developed countries:

1. Where a group of private property owners (resident and landlord) that together represent potential participants in an (intensified) regeneration of their combined land parcels.
2. Public housing estates, where ownership is vested with government. In Victoria they represent approximately 5 per cent of total stock and exist as high-rise tower

blocks, walk-up medium-density flats, and detached housing, some in ‘estates’ or their vestiges and others distributed among private housing.

In this study, the focus is on the former, although it is clear that involvement by public housing agencies and their stock in some precinct regeneration projects could be instrumental in achieving a viable outcome.

The spasmodic fashion, both temporally and spatially, that properties with high redevelopment potential (see Section 4.2.2) emerge for sale/auction presents a major challenge for the property development industry (Figure 27). Under current planning and delivery structures, consolidated and hybrid precincts are considered more viable options for increasing dwelling densities and environmental performance. The time required assembling such precincts and the holding charges involved, as well as uncertainty in gaining planning permission to redevelop in a more intensified manner, are significant barriers for these types of projects.

Figure 27: Typical middle suburban greyfield auction signs

A proactive approach is proposed here, whereby ‘communities’ of property owners in a defined greyfield precinct with high redevelopment potential are involved in discussions about their future mobility intentions, housing and locational preferences, and level of interest in participating in a precinct redevelopment project. The extent of background information that needs to be gathered prior to the engagement process with the community is uncertain. The demographic and social profiling enabled by Know Your Area types of analysis based on ABS Census data is often quickly out of date. It also lacks any indication of those elements traditionally used to define community, for example: ‘any group that shares a location, interests or practices, defined by patterns of interaction among individuals, perceptions of commonality or common interest’ (Sarkissian et al. 2009, p.44).

8.4 Move or stay?

Each year approximately 10 per cent of Victoria’s population change their place of residence (ABS 2009). The most common reasons were related to neighbourhood or access issues. Research indicates that when people move house, a high proportion seek to relocate nearby, in the same neighbourhood or activity space (Newton 1977).

Mobility rates for neighbourhoods from surveys such as the ABS will always give a historical picture, that is, those who has already moved out of an area. A proactive approach to area redevelopment requires an assessment of the likelihood of residential movement in the short-term future.

A recent *Living in Melbourne* survey (Newton & Meyer 2011) which asked 1200 residents across the city ‘How long they expected to be living in their current

dwelling?' ,confirmed that approximately 10 per cent of residents will change or anticipated changing their residential location annually (see Table 9). However, the typical (and more widely researched) mover-stayer location decision process may be very different to the factors involved in a household's preparedness to engage with a neighbourhood regeneration project.

Table 9: Mobility intentions, Melbourne, 2008

How long do you expect to be living in your current dwelling?	***Location***							
	Inner suburb		***Established suburb***		***New suburb***		***Total***	
Less than one-year	69	13.6%	27	8.4%	14	3.5%	110	8.9%
A year to less than three years	185	36.3%	48	15.0%	54	13.4%	287	23.3%
Three to less than five years	70	13.8%	29	9.0%	35	8.7%	134	10.9%
Five to less than 10 years	77	15.1%	46	14.3%	87	21.6%	210	17.0%
10 years or longer	108	21.2%	171	53.3%	213	52.9%	492	39.9%
Total	**509**	**100%**	**321**	**100%**	**403**	**100%**	**1233**	**100%**

Source: Swinburne University

The *Living in Melbourne* survey confirmed the trend of ageing in place (see Table 10). Not unsurprisingly, there is massive under-occupancy of housing in Australian cities by those aged between 55 and 80 years (see Table 11).

Table 10: Mobility intention by age

How long do you expect to be living in your current dwelling?	***How old are you?***							
	Under 45 years		***45-64 years***		***65+ years***		***Total***	
Less than one year	84	14.4%	26	5.5%	0	0.0%	110	9.0%
A year to less than three years	209	35.9%	68	14.4%	8	4.8%	285	23.3%
Three to less than five years	68	11.7%	52	11.0%	13	7.8%	133	10.9%
Five to less than 10 years	74	12.7%	91	19.2%	43	25.7%	208	17.0%
10 years or longer	147	25.3%	236	49.9%	103	61.7%	486	39.8%
Total	**582**	**100%**	**473**	**100%**	**167**	**100%**	**1 222**	**100%**

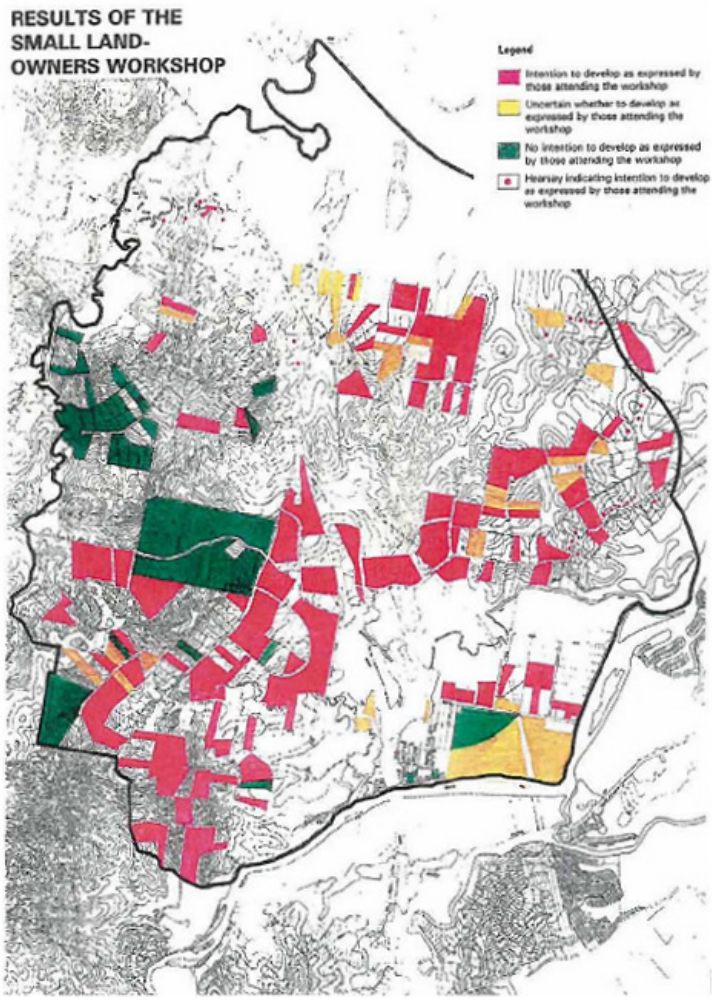
Source: Swinburne University

The key challenge presented by these statistics is this: can the baby-boomer cohort be motivated to move residence (but not location) in order to make prime residential land available for more intensive and more sustainable redevelopment? They represent an enormous market segment that has previously created new patterns of consumption.

8.5 Redevelopment potential and mobility intention

A ‘traffic light’ system has been advanced (Wendy Morris, Environmentally Sustainable Design) capable of being aligned to residential mobility intentions. Following neighbourhood consultations or survey it is possible (see Figure 28) for land parcels to be shaded/coloured according to mobility intentions. In this example, those shaded green are looking to move house now or within the next 12 months, amber in one to two years, while red are adamant they will not move within the next three years.

Figure 28: Residents’ intentions



Source: Wendy Morris 2010 for TTM Consultants

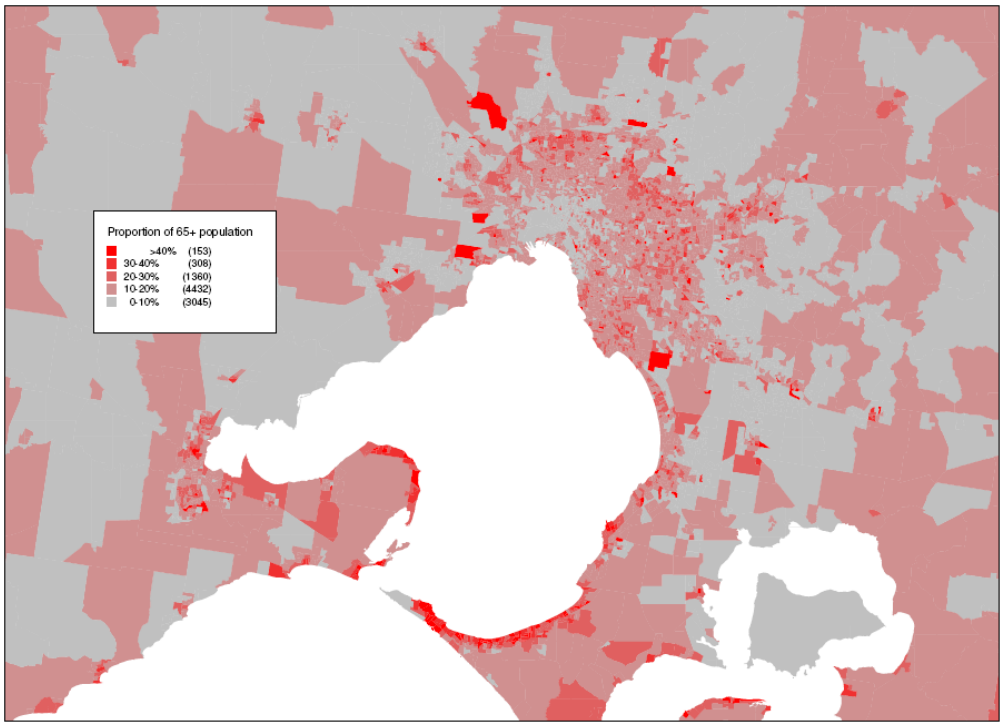
An overlay of mobility intention with redevelopment potential (refer Section 4.2.2) for individual residential properties in a greyfield precinct would indicate the likelihood of achieving contiguous land assembly for precinct regeneration within a realistic timeframe (see Figure 29). Greyfield precinct regeneration will focus on those municipalities and neighbourhoods where residents are prepared to entertain change.

Figure 29: Mobility intention: Potential GIS tool

8.6 The baby-boomers: Their next frontier

Baby-boomers are potentially poised to initiate one major final impact on Australia's cities as they look for appropriate places and locations to live in post-retirement. The types of places and spaces that will be most sought are those located as close as possible to the neighbourhoods with which the residents are already familiar: these are currently in low supply. It is predicted that by 2036 a quarter of the population will be over 65 years of age (ABS 2006, 2008). In Melbourne, there is a high concentration of this cohort in the middle ring suburbs, of whom a significant proportion would have aged in place (Figure 30).

Figure 30: Distribution of population aged 65+, Melbourne, 2006



Source: ABS Census 2006

The Residential Development Council (2009, p.10) suggests that much of the projected population increase is going to occur in the 'empty nester' market (60–74 years old), 'many of whom, if the right residential product is available, could downsize'. There is clearly a major barrier to mobility for this age cohort, with relocation being ultimately forced on the 'old old'. Recent research on Melbourne's home-owning empty nesters (Sweeney Research 2006) identifies two segments that exhibit both similarities and differences in relation to future housing decisions: the stayers and the shifters. The stayers have not yet seen a real reason to move, are either attached to their home or location, or both, and even if they wanted to move, many do not see it as financially viable. Many empty nesters will remain stayers until some life event triggers a change. For the shifters who are not forced to sell due to divorce or financial setback, staying in the same area is also preferred; a sea or tree change is not preferred by many, and they are looking for the same style of housing with some downsizing. Both segments appear to favour housing solutions that do not require shifting too far from their current suburb.

Table 11: Under-occupancy of housing in Australia, 2006: Percentage of households with two or more bedrooms spare

						Age cohort							
<20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
3.8	24.1	34.2	31.4	27.3	29.3	33.9	46.5	59.7	61.2	64.4	64.6	64.4	45.7

Source: ABS Census 2006

Recent research by Judd et al. (2010) on dwelling and neighbourhood attitudes held by older home-owners also found a strong preference for housing in the general community, rather than segregated and age-specific housing (for example, retirement villages and aged persons hostels). To obtain their preferred housing would therefore require either home modification to permit ageing in place or a shift to affordable and suitable housing within their established activity space.

8.7 Creating a community narrative

There are multiple steps involved in achieving greyfield precinct regeneration, but one initial stage is the creation of a narrative that resonates with a target community, enabling a common vision for redevelopment, the individual and community benefits that can flow, and how to be part of it.

As an example, for baby-boomers, the narrative could refer to alternative methods for ageing in place—a new dwelling and garden better suited to their changing needs, opportunity for lower utility and maintenance costs as a result of local energy generation and water capture, community strengthening, moving to new and smaller architect-designed dwelling with the prospect of a reasonable 'profit' from the transaction.

This is just one example. The narrative would need to be specifically tailored for each particular community segment, demographic or housing submarket. Equally important would be the creation of narratives for the neighbouring communities that may be impacted by greyfield precinct development, and the larger organisations that have a key role in facilitating this.

8.8 Key community engagement considerations for a new development model

A proactive approach to greyfield residential regeneration involves a multi-step process that begins with the identification of residential precincts where there is a high percentage of properties which could be classed as having high redevelopment potential; followed by a process of community engagement with the property owners of the precinct.

This requires a radical departure from the established 'placatory' or 'adversary' models of community engagement that are often employed with populations targeted for redevelopment. Greyfield precinct regeneration offers opportunities to engage citizens (both owner-occupiers and owner-investors) as 'partners' in development, in both planning/design and finance aspects.

Who would operate as the community broker? There are a number of possibilities, ranging from new specialist departments created within established organisations, such as local government, a state authority (e.g. VicUrban), a major developer or some new entity, possibly emerging from the community and specific to a particular precinct development (Cunningham 2008).

With whom would they engage? Both the owner-occupiers and the owner-investors of the properties, the latter being motivated by financial gain, the former being interested in community/locality benefits as well as individual financial considerations. As such, the narratives that need to be created as the 'pitch' for involvement need to be coherent, will need to vary from precinct to precinct (reflective of different spatial housing submarkets across a city), as well as within a particular precinct (for example, the financial interests and motivations of a retired baby-boomer couple are different to those of a young single professional or a sole parent household and so on, and thus narratives must be tailored to each class of participant).

The process of engagement will also be critical. The key process elements are fundamentally linked to the establishment of trust—in the broker as well as the process. Importantly, this trust would not only come from interactions with official sources of information, but from other members of the community. The expression or investigation of community intent must be emphasised as genuine while acknowledging the tension between demonstrating genuine avenues for citizen intervention and the need to inject certainty into the outcomes. The latter may be bolstered by contractual outlines, with participants rewarded with 'good faith' gestures such as first right of return into the development. How residents will be rehoused for the duration of the project will also need to be explained.

Staging and possible disruptions should be noted in the timeline for each project. The adage of 'stay, change or go' requires elaboration, outlining housing choices and financial benefits for each approach. As some residents may choose the latter option, the financial implications of selling and moving need to be explicitly stated. This information would also be essential in engaging owner-investors in the assembly process and may be accompanied by focus on new forms of title or part sales.

Finally, the potential for a 'non-start' will need to be addressed. The results of the 'do nothing' option will need to be discussed, stressing the implicit community-building elements of the process. Even if the act of assembly fails, the community is better informed, more coherent and more aware of their constituent members.

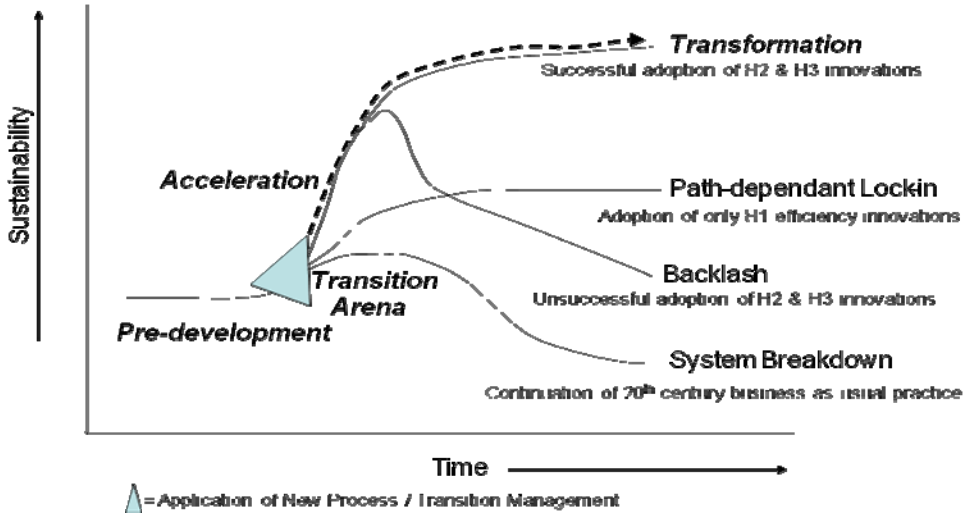
9 RESEARCH SUMMARY

9.1 Transition management and transition arenas

There are several trajectories that the future development of Australian cities could take, as outlined in Figure 31. The current trajectory appears to be headed for path-dependent lock-in, with change depending primarily on what Newton (2007) has termed 'Horizon 1' innovation—capable of delivering some improvement in performance without any need for radical change on the part of institutions or consumers—but not of a type or magnitude capable of delivering environmental sustainability, resilience and liveability outcomes required in the face of a raft of urban system pressures (Newton 2008). There is a prospect of system breakdown in key urban infrastructures over the next 20 years, especially for those cities facing rapid growth and operating within the context of late twentieth century 'business as usual' practice. The barriers to be overcome in implementing transformational change (that is, successful adoption of step change Horizon 3 innovations, such as greyfield precinct regeneration) are significant.

Geels and Schot (2010) indicate that transitions are difficult because of the lock-in or path-dependent tendencies within existing socio-technical systems (STS). These comprise complex groupings of people and practices that surround current production processes and products and their related institutions and infrastructures. They are evident across all contemporary urban infrastructure systems: water, energy, transport, building and property development. STSs also include marketers of the products, social groupings of users who are familiar with the product or service, policy makers who provide the operating regulatory frameworks, industry associations which manage the government, and community interface for key industry segments and together form networks with mutual dependencies. As a rule, STSs are resistant to all but incremental change.

Figure 31: Transition and horizon pathways for socio-technical innovation in cities



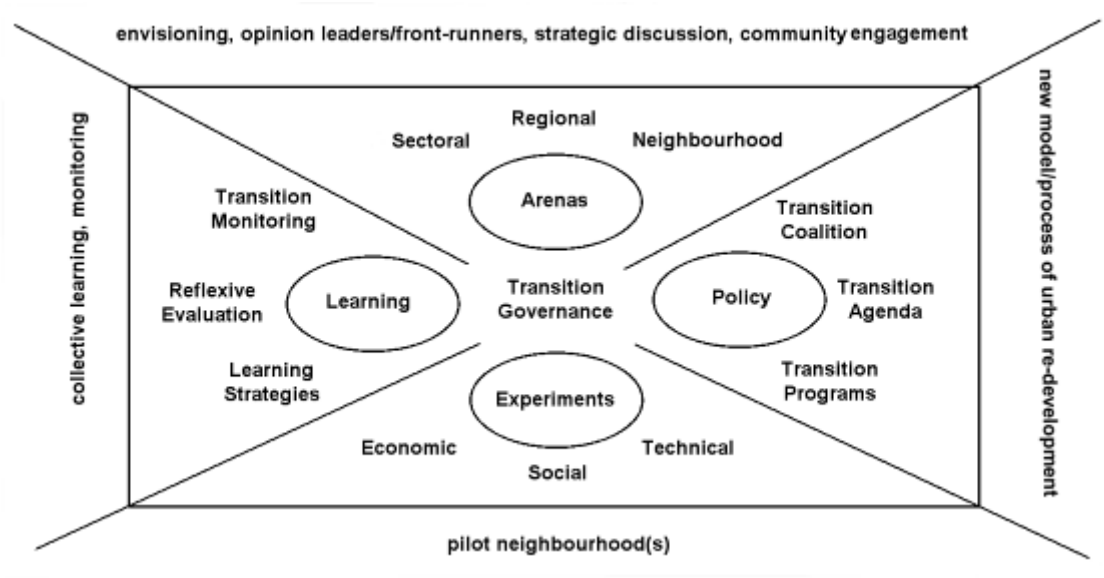
Source: Newton 2011

A generalised model of system transition advanced by Geels and Schot suggests that windows of opportunity for transitioning existing and typically stable STSs arise as a result of pressure from exogenous forces on an existing regime (for example, the impact that a carbon price would have on a regional energy system, how prolonged

low rainfall regimes associated with climate change would impact an urban water system design, how peak oil would impact urban car dependency, how rapid rates of population growth would impact on housing demand and supply) and how key elements of a new and more innovative regime can break through to create a new system of urban infrastructures.

Transition arenas (see Figure 32), centred around key urban infrastructures and their transition pathways, are emerging in some cities to engage with the challenge of urban transformation to levels of performance required to meet 21st century challenges (Loorbach 2007). This AHURI project is focused on one such transition—that associated with greyfield residential precincts in the middle suburbs of our cities. The challenge of greyfield redevelopment as distinct from its greenfield and brownfield counterparts (Newton 2010) rests with the absence of an established model to drive the process in other than a piecemeal, fragmented and sub-optimal fashion, as has been occurring up to the present. The challenge of regenerating greyfields, at precinct scale, is fundamental to achieving more sustainable cities.

Figure 32: Transition governance for 'wicked' urban issues



Source: Adapted from Loorbach 2007

9.2 Transition arenas for greyfield precinct regeneration

This project has revealed that there are multiple—and interconnected—innovations that need to occur as a precursor to a more sustainable regeneration of greyfield residential precincts within the middle suburbs of Australia's cities. Most of the innovation required is organisational and institutional—there are strong path dependencies that need to be redirected. The scale of the technological innovations required is not as pronounced, but both aspects will require attention. The investigative panels identified multiple arenas (Figure 33) where major transformation should occur:

- new urban policy
- a new urban renewal organisation
- shared urban spatial information system
- new design models for greyfield residential precincts

- construction and labour force innovations
- proactive community engagement
- a new planning and approval process / Regen code
- new finance models.

9.2.1 New urban policy

The current federal government has registered an explicit interest in the nation's cities and their planning, after a decade in which the previous Liberal government abdicated responsibility to the states. In 2007, the new Labor government developed a vision of using the power of the Commonwealth to improve the planning and transport policies and regimes of our major cities. The Major Cities Unit was established within the (now) Department of Infrastructure and Transport in 2008 to develop a national urban policy; *Our Cities: A National Strategy* was released in December 2010 (Department of Infrastructure and Transport 2010).

To achieve its objectives and to transform key aspects of how urban land is used, significant intervention will be required if business-as-usual development is to be avoided. *Our Cities* provides no indication of *where* it is most prospective to develop transformational projects that address common challenges as Australian cities are not homogenous urban spaces. The current intractability of middle suburban regeneration is central to the achievement of all 15 liveability, sustainability and governance objectives of the national urban policy.

The connection of the urban policy objectives with land-use alternatives is not identified or explored in *Our Cities*. In seeking to identify a future logic for the planning of Australia's cities, it is critical to jointly engage in an examination of urban land-use alternatives with performance objectives and the policy options that may underlie them. In the context of land-use alternatives it is desirable to identify 'types' of urban places that feature in the 21st century Australian cities (see Table 12).

Table 12: Urban land-use alternatives

More compact cities	
Brownfields	
Brownfield precinct regeneration	Small- and large-scale brownfield industrial and retail precincts; high-density redevelopment; mixed use; public transit oriented.
Greyfields	
Greyfield piecemeal/fragmented residential redevelopment	Replacement of one–two dwellings (typically detached) with two–eight medium-density townhouses
Greyfield residential precinct regeneration	Low-rise high-density; mixed use; regenerated water and energy systems; community-centred; mixed layouts, floor areas etc.
Activity centre development	Higher-density development (residential, commercial) centred on state government designated activity centres; in some instances with related TOD enhancements.
Transport corridor development	Higher-density residential and commercial development along major (public) transport corridors, e.g. tram routes.

More urban sprawl	
Greenfields	
Business-as-usual greenfields	Low-density predominantly detached housing; car dependent; little or no mixed use.
Smart greenfields	Mixed uses and moderate densities (mixed housing types); energy and water efficient; walkable with public transport access.

Source: Newton 2010

The expanse of greyfield localities in the middle suburbs of Australia's cities and the relatively small percentage of new housing completions in this region (Goodman et al. 2010 estimate that the proportion of new housing built within either one or three kilometres of a railway station has declined since 1990) represents a major failure of recent urban policy. As long as a suitable supply of brownfield land exists and outer greenfield land supply remains unlimited, the greyfield areas will struggle to attract major property developers in anything other than a piecemeal fashion, unless new planning frameworks and infrastructures are established that reduce the level of risk and uncertainty associated with larger-scale redevelopment in the middle suburbs. In addition to housing redevelopment, there are also social and environmental imperatives driving the need for regeneration that are aligned with 21st rather than 20th century conditions.

Our Cities provides no organising sets of principals or programs for how to coordinate planning and investment in Australia's cities in an innovative way that involves the three levels of government, industry and community; that is, a delivery process. What is possibly required is something similar to the *Building Better Cities* program—a nation-building initiative of the Commonwealth government between 1991 and 1996 that can be credited with leading the revival of Australia's inner cities (Neilson 2008).

An urban regeneration program focusing on the middle suburbs would seek to:

- Achieve the multiple objectives outlined in the Our Cities strategy.
- Establish an 'umbrella' intergovernmental agreement that sets out the objectives of the program and the nature of the collaboration required from governments and industry in order to receive federal funds.
- Stimulate regeneration in a selected number of greyfields areas in the capital cities (activity centre, transport corridor, housing precinct) where the property industry and local communities have been reluctant to engage in a significant scale of (re)development, as urban regeneration exemplars.
- Provide opportunity for innovation and experimentation allowing new regen organisations and processes to emerge as a result of the reduced risk and greater certainty required for the regeneration projects, and innovation in design of low-rise high-density precincts as well as in modes of delivery and assembly.
- Create tangible demonstrations of a new model of urban development for established but failing middle suburbs where new housing typologies/arrangements deliver substantial triple bottom line performance benefits and is replicable across multiple localities in Australia's capital cities.

9.2.2 Creation of a new urban renewal organisation

A new regional body or urban authority with the responsibility for greyfield regeneration would transcend municipal boundaries and would need to be equipped with significant political influence, appropriate government funding and extensive technical depth (equivalent to growth area authorities in the greenfields and urban redevelopment authorities in the brownfields). The greyfields regeneration authority would be distinguished from its counterparts in the brownfields and greenfields by managing a 'pipeline' of perhaps hundreds of small to medium precinct projects, which aggregate to a much more significant vehicle for net new housing delivery than current 'business as usual' practices in the middle suburbs.

This greyfields regeneration authority may be equipped with financial, as well as statutory and planning, powers. This may be via the coordination of existing public funding for the region or the direction of new capital accrued through development contributions. Whatever mechanism prevails, the authority will need to secure its own capital and/or greyfield sites before private lenders can be convinced that the approach is viable.

The authority would not be risk averse, nor overly sensitive to short-term pressures. It would operate within long-term and large-scale strategic planning goals, working over 20 year timeframes and engaging in the development of greyfield precincts within middle and inner regions. It would be required to deliver consistent results at the scale of the city, yet should be flexible enough to function as both statutory authority and a coordinating point for non-government delivery.

Ideally, it would control government expenditure in the greyfield precincts, but this would occur with oversight and cooperation between all relevant agencies. This level of interconnectedness could include links between greyfield and greenfield sites and authorities, both in financing (for example, new greenfield levies could help fund greyfield development) and planning (with coherent design approaches and narratives across both realms).

The authority could have a land assembly role, although there are a range of other organisations that could adopt this function.

9.2.3 Understanding your local area's development potential: shared urban spatial information platform

Outside of greenfield and brownfield areas, urban development tends to be reactive, with the appearance of a 'for sale' board or 'listing' often being the first signal to developers that a prospective parcel of land has come onto the market. To be effective, greyfield precinct regeneration needs to be proactive. Multiple layers of property, planning, utility and demographic data need to be brought together into distributed (shared) urban spatial information systems capable of servicing the needs of multiple locality-based (and possibly, initially, municipality-centred) development fora or 'think-tanks'. Such a platform, with dynamic, up-to-date information and real-time access, could provide a basis for property developers, design and construction professionals, investment organisations, local government and neighbourhood communities (in various combinations) to explore development opportunities—the 'where' question—that may become apparent from a 'helicopter' view of multiple layers of spatial information.

9.2.4 New models for low-rise high-density precinct design, visualisation and performance assessment

Residential greyfield precinct regeneration is a potential vehicle for transitioning large parts of Melbourne's middle suburbs to more sustainable urban environments. In addition to the infrastructural and environmental upgrades that would be possible, a key benefit of the proposed scale and type of redevelopment would be increased housing choice and a new generation of place-making in these locations. Substantial shifts in how our urban environment is envisaged, designed and delivered will be required for a precinct approach to be successful in Melbourne's residential greyfields.

For the purposes of this investigation, the scale of a greyfield residential precinct has been assumed to consist of 10 middle suburban land parcels. The configuration of these allotments include a fully consolidated assembly of sites, hybrid precincts (partial assemblage), and fully dispersed precincts. These distribution types can be observed in current infill development patterns.

The consolidated precinct model is the most attractive and appropriate for development, but with inherent difficulties in securing and assembling the necessary contiguous land parcels. Conversely, the dispersed model would be the easiest precinct typology to fund, acquire and administer, but initially appears too similar to current infill approaches to offer substantial benefits.

District-wide approaches to energy, water and waste, along with community facilities and shared open space arrangements, are considered most viable on consolidated or hybrid assemblages of land, whereas dispersed precinct models might dilute the benefits of centralised systems. However, a strategic precinct approach to distributed infill could create opportunity within conventional development processes. For example, market forces and regulations restricting the level of densification possible on a single land parcel might be reconsidered when viewed across a dispersed precinct that included, for example, collective parking, a community garden or a community 'hub'.

More design development is required to demonstrate how each model could contribute to the broader urban environment and social contexts and goals, especially the opportunities to increase housing choice and community interaction that low-rise high-density housing typologies could offer. *Communal character* may contribute to the interest in such precincts as identity-driven development is already apparent in retirement and singles' villages, and some newer-edge urban estates. Similarly, a clear framework that measures the life cycle performance of residential greyfield regeneration will be required. The assessment should include both the environmental and community capital advantages provided by these precinct models.

9.2.5 Construction and labour force innovations

Conventional methods of domestic construction and housing delivery have limited capacity to provide the quantity, diversity and quality of medium-density housing needed for effective regeneration of middle suburban areas. Conversely, commercial construction techniques are difficult to deliver on a lot-by-lot basis. The scale and type of redevelopment proposed by greyfield residential precincts provides an opportunity for construction and labour force innovations that could enhance housing outcomes in these areas.

Precinct-scale redevelopments encompass an economy of scale for manufacturing and industrialised construction types which is currently unavailable to single-lot redevelopments. Industrialised processes can include combinations of prefabricated panels or modules, service systems and interiors. The benefits of working in

controlled environments include increased construction quality and efficiency where unexpected delays can be avoided (e.g. due to inclement weather).

Hybrids of industrialised and existing domestic construction methods have the potential to provide higher performance outcomes at a more affordable price. This will require substantial changes in the types of housing solutions and in the physical and information technology platforms used to support the delivery process. New development systems that integrate design, pre-design, prefabrication and project management procedures would provide more efficient utilisation and scheduling of multi-skilled construction teams, both within manufacturing plants and across development sites.

The construction and labour force innovations proposed by this model would require retraining, more flexible packaging of work and greater sophistication in process design, planning and management. Further investigation would be needed to resolve issues such as equipment access to greyfield residential sites for module delivery and assembly (linked to benefits in reduced time required for assembly on-site compared to traditional construction, and the reduction in disruption to local residents and local traffic).

9.2.6 Proactive community engagement

A proactive approach to greyfield residential regeneration involves a multi-step process that begins with the identification of residential precincts with a high percentage of properties which could be classed as having high redevelopment potential, followed by a process of community engagement with the property owners of the precinct. This requires a radical departure from the established 'placatory' or 'adversary' models of community engagement that are often employed with populations targeted for redevelopment. Greyfield precinct regeneration offers opportunities to engage citizens (both owner-occupiers and owner-investors) as 'partners' in development, in both planning/design and finance aspects.

Who would operate as the community broker? There are a number of possibilities, ranging from new specialist departments created within established organisations, such as local government, a state authority (e.g. VicUrban), a major developer or some new entity possibly emerging from the community and specific to a particular precinct development (Cunningham 2008).

With whom would they engage? Both the owner-occupiers and the owner-investors of the properties: the latter are motivated by financial gain, while the former will be interested in community/locality benefits as well as individual financial considerations. As such, the narratives that need to be created as the 'pitch' for involvement need to be coherent, will need to vary from precinct to precinct (reflective of different spatial housing submarkets across a city), as well as within a particular precinct (e.g. the financial interests and motivations of a retired baby-boomer couple are different to those of a young single professional, and thus narratives must be tailored to each class of participant).

The process of engagement will also be critical. The key process elements are fundamentally linked to the establishment of trust—in the broker as well as the process. Importantly, this trust would not only come from interactions with official sources of information, but from other members of the community. The expression or investigation of community intent must be emphasised as genuine while acknowledging the tension between demonstrating genuine avenues for citizen intervention and the need to inject certainty into the outcomes. The latter may be bolstered by contractual outlines, with participants rewarded with 'good faith' gestures

such as first right of return into the development. How residents will be rehoused for the duration of the project will also need to be explored with that group.

Staging and possible disruptions should be noted in the timeline for each project. The adage of ‘stay, change or go’ requires elaboration, outlining housing choices and financial benefits for each approach. As some residents may choose the latter option, the financial implications of selling and moving need to be explicitly stated.

This information would also be essential in engaging owner-investors in the assembly process and may be accompanied by focus on new forms of title or part sales.

Finally, the potential for a ‘non-start’ will need to be addressed. The results of the ‘do nothing’ option will need to be discussed, stressing the implicit community building elements of the process. Even if the act of assembly fails, the community is better informed, more coherent and more aware of their constituent members.

9.2.7 A new planning and approval process for greyfield precinct regeneration: Regen Code

Current planning is structured to manage impacts rather than to deliver visionary outcomes. It focuses on historical precedent and has little scope to address shifts in modes of living, new housing approaches and typologies, or the urban challenges of the twenty-first century—which depart significantly from those of the twentieth, when our current planning regimes were first instituted. The limitations of current planning prevent the uptake of greyfield precinct redevelopment and unless otherwise convinced, developers will continue to pursue well-tested ‘safe’ approaches. Therefore, there is a need for a robust planning instrument or code (Regen Code) for the redevelopment of greyfield residential precincts.

Such a code would need to define special attributes of ‘place’ that should not be lost in the future ‘DNA’ of the precinct. These may be physical characteristics—building form, vegetation patterns—or social markers. The code would also need the potential to improve universal design standards by enabling the reappraisal of density requirements, sustainability standards and accessibility codes. It would focus on higher performing community infrastructures over the existing mandates for individual provision. There may need to be a framework for independent design and environmental performance panels to assess mandated performance elements. Automated performance-based tools for precinct or neighbourhood assessment would need to be in place to guide the regeneration process and deliver agreed outcomes, for example the GBCA’s (Green Building Council of Australia) Green Neighbourhood tool, the U.S. Green Building Council’s LEED (Leadership in Energy and Environmental Design) for Neighbourhood Development tool, and the New South Wales government’s PRECINX tool are all precursors to such an automated system.

Goals for precinct regeneration would need to be clearly articulated, with developers’ costing-against-yield outlined at a suburb or precinct level. Clearly stated yields, environmental performance, and affordability targets and goals would help alleviate developer concern and confusion. It would also pre-empt negative community responses by outlining exactly what can and cannot be undertaken in the region.

9.2.8 New finance models

It is reasonable to expect that new forms of greyfield development may be facilitated by different forms of finance or financial incentives. Recently the Property Council of Australia advocated the creation of Growth Area Development Bonds to finance infrastructure development in growth areas on the city fringe. Interest on the bonds is financed by the growth in property tax resulting from the new development. Similar logic could be applied to greyfield development, where Greyfield Development Bonds

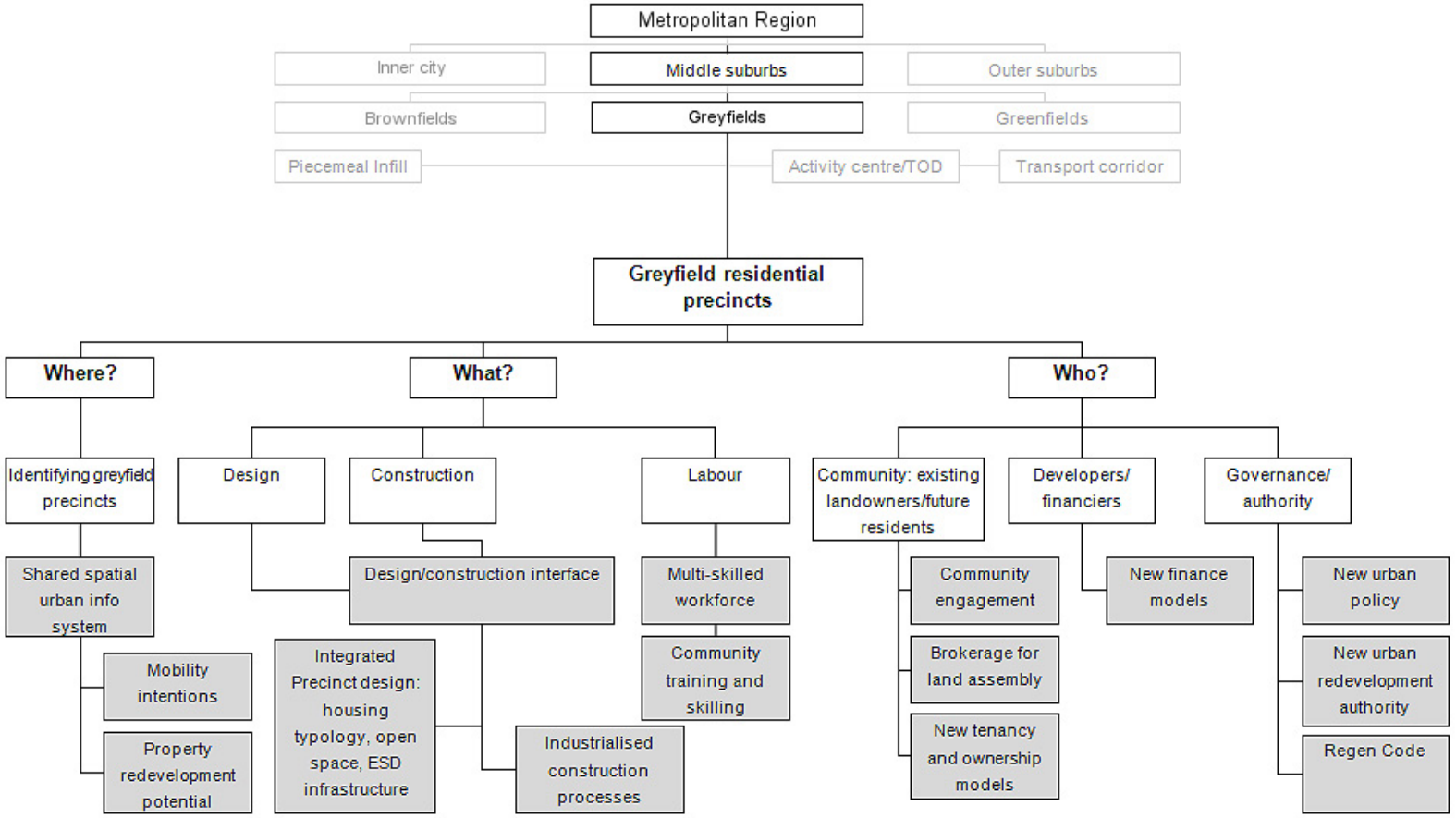
could be used to finance land consolidation and infrastructure improvements in areas subject to redevelopment. The provision of improved infrastructure may help to overcome local opposition to consolidation.

Other potential forms of finance include allowing access to superannuation funds to fund consolidated development, new financial structures similar to cooperative building societies in which home-owners and buyers pool savings and assets to finance denser precinct development, tax increment financing, and land tax and stamp duty rebates.

9.2.9 Barriers to innovation

The sections above represent strategic thinking for new processes and models for precinct scale infill development. The investigative panel process revealed that the precinct regeneration approach is feasible; however, a number of barriers would need to be overcome for successful implementation. These include issues of land assembly, planning processes, finance and procurement models and community attitudes. These challenges have been captured in the panel mind maps in Appendix C. Each section of the report discusses potential avenues for addressing the barriers identified by this process, although detailed development of a precinct pilot would be required to determine and illustrate actual solutions.

Figure 33: Innovation and 'future logic' for greyfield residential precincts



9.3 Reflection on the Investigative Panel research process

The Investigative Panel process made it possible to canvass the opinions of a range of experts from relevant fields regarding the scope and merit of the research proposition. The collective fora allowed face-to-face engagement with industry, government and academic contributors which benefited the research progress enormously. The collaborative research method enabled panel members to overlay their expertise and voice a comprehensive range of concerns and suggestions. Each event encouraged constructive debate and a cooperative development of ideas.

Feedback from the contributors has been positive in general, recognising the strength of a multidisciplinary approach. Panel members noted that exposure to, and learning from, experts in parallel fields were incentives to participate. The success of this research has depended on a broad cross-section of inputs, ensuring that the project outcomes could be implemented within industry as well as academic spheres.

Articulation of a new urban redevelopment model for the middle suburbs was an ambitious and complex research agenda. A limitation of this Investigative Panel process is the restricted time for participants to digest unfamiliar concepts. Without proper gestation of new or innovative proposals, there was a tendency to revert to conventional views and solutions. Additionally, an appropriate balance of disciplines and representatives is vital so that discussions are not biased in one particular area and equally, mechanisms to resolve conflicts of opinion are critical if the project is to adequately develop.

9.4 Future directions

Two major areas of research have been identified for further development:

Feasibility study of a precinct redevelopment: Identify a precinct for greyfield redevelopment in order to test the feasibility of the regeneration model. This would include visualisation of the proposed models through sketch design of buildings and urban design, cost estimates of planning and construction processes that incorporate time allowances for community engagement and land assembly as well as a life cycle assessment of the proposed environmental and community benefits.

Transition arena for residential greyfield precincts: Applying the transition management approach (refer Section 9.1), organisational and institutional processes would be developed by a range of experts to execute the greyfields model within industry. This might involve a range of scales of development, construction operations and alternative planning frameworks.

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APPENDIX A

Local and international case studies were examined to provide a framework for the possible design approaches for a new redevelopment model in residential greyfield precincts. Projects ranged from small-scale infill housing models which could be repeated across a number of dispersed sites, to larger-scale, consolidated communities comprising between 40 and 250 dwellings. The case studies included both existing and proposed projects, revealing a number of spatial, program, social and environmental innovations that could enhance housing quality and public amenity in middle suburban locations.

The following section outlines key observations from the case studies reviewed and provides a detailed examination of six projects that demonstrate the benefits that could be achieved in the middle suburbs through the regeneration of residential greyfield precincts.

Case study observations:

Building form and densities

Redevelopments in suburban locations tended towards low-rise medium-density building forms. Housing typologies varied in response to the site context and scale of the redevelopment but included semi-detached housing, terraces and apartments.

Shared open space and common facilities

Sitting and open space arrangements were used to provide different levels of privacy and interaction. Community facilities and shared open space can help to defray the effect of increased density or reductions in private open space. Private programs or amenities typically duplicated in suburban homes, such as garages, work sheds or rumpus rooms, could be provided at a larger scale and shared by a cluster of residents.

Housing diversity

Flexible, adaptable dwelling designs allow for a variety of occupations and household types. This encourages healthy, diverse communities and can also expand the financing options available to a particular development.

Car parking

Collective parking was used to prioritise walkable environments and encourage incidental interactions between residents. Car pooling arrangements and alternative modes of transport are integral components of high-performing ESD projects.

Program mix and distribution

Cultural, commercial and community programs provided in housing redevelopment projects allowed more opportunity for social integration between residents and the surrounding community. Shared facilities or a mix of programs that were dispersed across a number of sites tended to also initiate broader community benefits such as public space upgrades.

Hybrid construction processes

Modular or prefabricated techniques that can combine with conventional building labour have the potential to increase construction quality while reducing delivery times and costs.

Future proofing

Consideration of future upgrades to site services and infrastructure allows for ongoing improvements and maintenance over the life of the development. This might include incremental additions of ESD equipment and technology as costs decrease or adapting to new innovations as they get taken up in mainstream markets and approaches, for example, charging stations for electric vehicles.

POSTgreen Homes

Philadelphia, USA

Year: 2007-10

Type: Townhouses and row houses

Architect: I-S Architects

Developer: POSTgreen

Location: Fishtown, Philadelphia

Site area: Narrow blocks, 5.5m x 30m

Project cost: US$250-330 000 per residence

Overview

The first project completed by developer POSTgreen was a modest, affordable but highly sustainable house called the *100K House*. The small-scale infill model has been further developed into a range of housing products that employ hybrid construction processes and target a LEEDS platinum rating. The consistent visual language and formal resolution of the POSTgreen homes, as well as their accessible cost and exemplary efficiency, is capable of bootstrapping precinct-scale regeneration in Philadelphia's middle and inner suburbs.

POSTgreen offers these houses across a number of their developments around middle and inner Philadelphia, delivering individual houses to a diverse range of clients. The two storey timber framed townhouses are clad with distinctive, highly insulated panels. The average parcel sizes of suburban Philadelphia have dictated the basic building footprints, but each type can be rapidly customised to suit a variety of living arrangements.

This type of incremental infill creates a dispersed precinct of functionally separate but physically consistent and linked elements. Approaches currently deliver one dwelling per lot in what is an already relatively dense, albeit decaying, urban condition. There is no subdivision, and any increase in density is drawn from rehabilitation of vacant or disused properties.

POSTgreen co-opts traditional developer-led processes, including the end-user's customisation of a base house plan and interior fittings. However, the focus on affordable design, build quality and ecological performance, as well as POSTgreen's commitment to the gradual rehabilitation of the neighbourhoods in which they build, distinguishes this approach from conventional development outcomes.

The original 100K houses.

The skinny/loft houses, four lots away from the 100K houses. The 100k houses are visible to the extreme right of the image. Distinct formal cues, panel set-outs and glazing arrangements lend a sense of precinct consistency to otherwise separated and independently staged residences.

Infill development around POSTgreen's original 100K house

Source: POSTgreen (2010) 100K House Project, http://postgreen.com/projects/100khouse/

Tassafaronga Village

Oakland, USA

Year: 2005

Type: Townhouses and apartments

Architect: David Baker Architects

Developer: Oakland Housing Authority, Habitat for Humanity

Location: Oakland, California

Site area: 3 ha

Units: 157 affordable units, 22 Habitat for Humanity units

Density: 59 units/ha

Project cost: US$21.3 million

Overview

Medium- to high-density infill development on the boundary between industrial and suburban regions of Oakland, this project serves as an example of how innovative financing and community capital initiatives can support the success of urban regeneration projects.

The site is a consolidation of two major parcels: an existing social housing estate to the south, and a mixed use industrial zone to the north. The Oakland Housing Authority had managed the southern part of the site as low cost housing since 1955, with 87 walk-up units across two hectares. The OHA purchased the northern site outright in 2005 and a revitalisation project was pursued under the HOPE VI funding auspice, which entails mixed-tenure and meshes with established new urbanist ideals.

The new housing stock is a mixture of small clusters of townhouses, coupled with a larger low-rise apartment building. Opportunistic reuse of existing infrastructure provided assisted living units in the old factory buildings.

The development has been certified at LEED gold level, with the residences attracting 30-50% lower operational footprints than conventional dwellings of comparable size. The co-commitment to affordability remains within what is now a mixed tenure development. Habitat for Humanity dwellings were completed with the help of sweat-equity labour. Participating residents could then purchase the housing at very low interest rates.

The development comprises two and three storey semi-detached townhouses and row houses, alongside two larger multi-unit apartment complexes. The larger of the complexes is a U-shaped screen of apartments over a single podium of car parking. The building conceals parking infrastructure behind ground floor entryways to individual town house units. Additional semi-public open space is provided at the first floor level, with a shared courtyard over the parking structure. The smaller of the apartment complexes repurposes an existing warehouse shell to provide individual studio apartments and assisted living suites.

Public space is provided within a tiered hierarchy, graduating from small private balcony and garden spaces, to the spaces shared between clusters of buildings or units, through to the three core public ‘neighbourhood’ spaces. The latter are productive green spaces, with provision for fruit trees and public gardening plots.

The smaller apartment complex houses a medical clinic intended both to support the wider community and offer specific care to a local population of HIV/AIDS patients. The larger apartment complex incorporates a community centre and other shared public infrastructures.

Rainwater collection and storm-water run-off measures are employed, alongside site-wide photovoltaic solar energy collection. However, district heating and cooling measures (CHP systems) are conspicuously absent.

Detail of the community room and apartment entry.

The site sits at the interface of existing suburban and industrial sites.

Source: David Baker + Partners Architects (2010) Tassafaronga Village, Oakland, California, http://www.dbarchitect.com/project_detail/2/Tassafaronga%20Village.html

BedZED

Sutton, UK

Year: 2002

Type: Terrace, Maisonettes, Row

Architect: Bill Dunster

Developer: Bioregional/Peabody Trust

Location: Sutton, London

Site area: 1.7 ha

Units: 82

Density: 48 units/ha

Project cost: £11.8 million

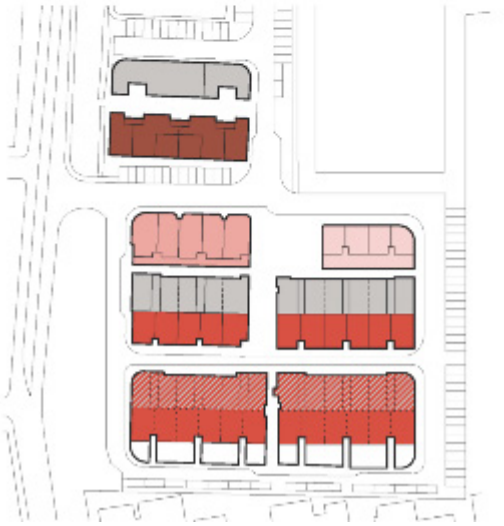
Overview

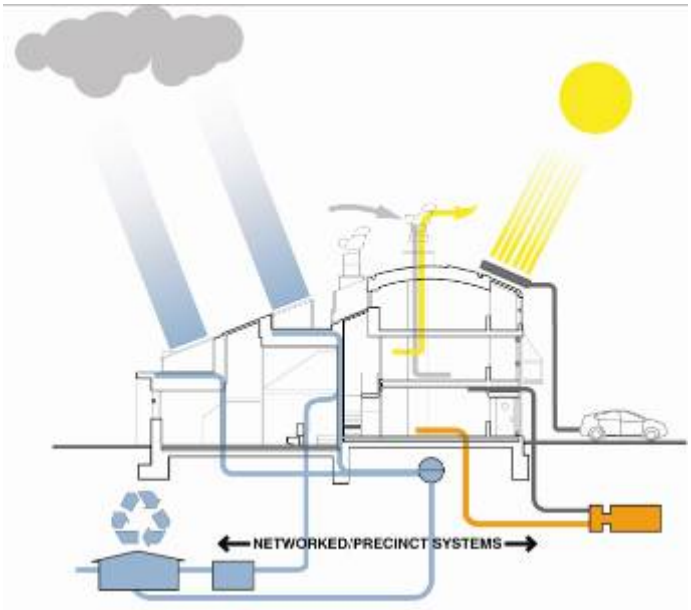
BedZED is a medium density mixed use development by Peabody Trust and designed by Bill Dunster Architects. The highly publicised development was embarked upon as a demonstration project for zero carbon residential redevelopment.

Located on an under-utilised browfield site, BedZED comprises 82 dwellings, commercial and community spaces within a three storey, terrace typology. The tenure mix consists of private ownership, affordable rental and key-worker residences. The project was funded by a combination of government and industry grants (for project inception and the environmental initiatives pursued) and Peabody Trust's commercial model.

BedZED is arguably the most comprehensive ESD project to date. Amongst the design and construction innovations are associated waste and transport management plans and community building initiatives. The dwellings have adapted conventional construction methods to achieve high-performing thermal envelopes. Sky bridges link the housing units to shared open space and rooftop gardens. Reclaimed and recycled materials are used for cladding and joinery, sourced through local suppliers where possible. Passively operated wind cowls assist ventilation and a combination of solar panels and an on-site CHP system provides renewable energy to the development. Greywater and blackwater is managed with an on-site reed water biofiltration system. The development included a transport plan where residents have access to vehicle pooling and fixtures for electric transport.

High levels of post-occupancy evaluation and project reporting have been undertaken to track the success of the initiatives pursued. Although there were some growing pains with the new technologies implemented, learning from the various approaches trialled at BedZED is perhaps the project's greatest value.





Source: Dunster, B. et al. (2008) *The Zed Book*, Taylor & Francis, Milton Park

Five Dock

Sydney, Australia

Year: Not built

Type: Suburban redevelopment, public space and infrastructure

Architect: Neeson Murcutt

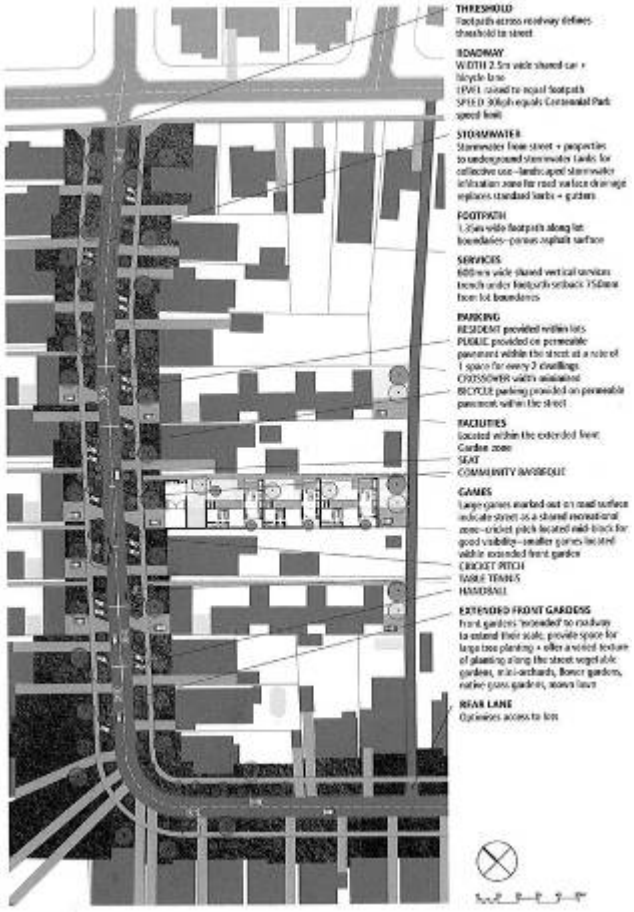
Overview

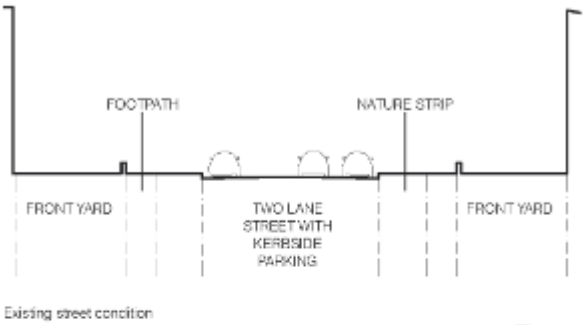
Neeson Murcutt's scheme – a response to changing planning approaches in metropolitan Sydney – proposes denser dwelling typologies, as well as a streetscape intervention to augment the reduction in private space and amenity.

The streetscape construction narrows the traditional two lane road, anticipating reduced vehicular traffic and a shift to smaller vehicles, as well as bicycle and pedestrian transport. The site becomes a conduit for the mediation (and remediation) of storm-water run-off, as well as an armature for future infrastructures (fibre-optic cables, precinct energy systems, neighbourhood grey and black water recycling).

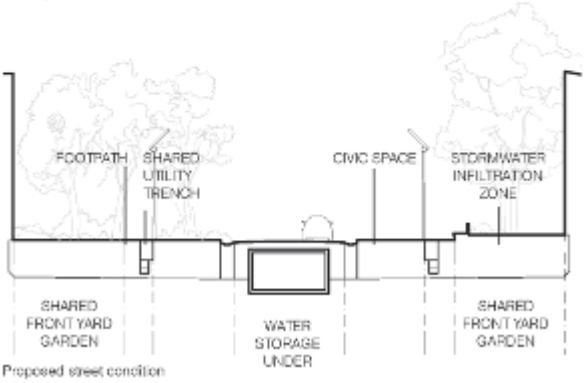
The area gained from the reduction of the roadway is turned over to shared public front gardens— a new terrain between the public and private realms of the suburban dwellings. This space is given over to recreational facilities—barbeques, table tennis and handball courts—as well as the whims and proclivities of each individual owner.

This pattern is extended into the program of the individual dwellings. Private spaces are minimised, to allow three dwellings to sit comfortably on one lot. However, amenity is preserved with the inclusion of a shared common room and workshop, larger than would be available to any single dwelling, as well as a shared swimming pool and garden.





Existing street condition



Proposed street condition

Source: Neeson, R. et al. (2008) 'On density and street reactivation' in G. London and S. Anderson (eds) *Take 7, Housing Australia; How Architects Can Make a Difference*, Australian Institute of Architects, Canberra

Ashwood Chadstone Gateway

Victoria, Australia

Year: Ongoing

Type: Townhouses

Architect: FSMA

Stakeholders: Port Phillip Housing Association

Location: Ashwood, Victoria

Site area: 2 ha

Units/storeys: 272 units

Density: 136 units/ha

Project cost: $140 million

Overview

Urban densification of both vacant and occupied lots within the suburbs of Ashwood and Chadstone, this project provides an example for development on hybrid land assemblies. Distributed across six different scaled lots in a roughly 1 kilometre x 1 kilometre zone, a range of collective benefits and public amenity upgrades have been achieved in the areas that lie between the various redevelopment sites.

The development comprises 272 dwellings overall. The two larger sites, proximate to the existing Warrigal Road commercial corridor, are taller apartment style complexes. The remainder of the sites, in more established suburban settings, are dominated by townhouses. As the development edges away from described retail and activity sectors, a transition is made from urban to suburban forms.

The project encompasses ancillary design works: renewal of landscapes and streetscapes near the development, pedestrian linkages to existing reserves, new linkages to railway stations and provision of additional public space.

The rhetoric is not one of simply increasing the density of housing stock, but of re-enabling or re-creating an armature that increases community amenity. Nevertheless, the project has elicited a vast groundswell of community opposition, primarily around the seven storey tower on the Power Avenue site.

The development aims to improve pedestrian linkages between the dispersed sites. As a consequence, there are implicit improvements to the general accessibility and walk ability of the surrounding neighbourhood. Development costs will cover the construction of a new pedestrian bridge over the railway line that presently bisects the precinct.

SITE PLAN, SHOWING DISPERSAL OF DEVELOPMENT SITES

TOWNHOUSE SITE TYPOLOGIES

INFILL SITE A
Rowhouse Typology with under-residence parking. Single point of entry

INFILL SITE B
Rowhouse Typology with at grade parking. Shared point of entry for rear houses - private driveways to street frontages.

INFILL SITE C
Dispersed semi-detached residences with cluster parking and garages

INFILL SITE D
Triplex housing with cluster parking

Source: Port Phillip Housing Association (2010) *Ashwood Chadstone Gateway Project*, http://www.ppha.org.au

Living Places Dandenong

Victoria, Australia

Year: Incomplete

Type: Townhouses

Architect: BENT Architecture

Stakeholders: Office of Housing, Office of Victorian Government Architect

Location: Dandenong

Site area: 0.3 ha

Units/storeys: 15 units

Density: 50 units/ha

Project cost: $3 million

Overview

This project involves the redevelopment of six conventional detached houses in suburban Dandenong with 15 semi-detached one and two storey units. Living Places demonstrates mechanisms for densification and consolidation of suburban lots. The minimal ecological footprint suggests methods by which infill might inexpensively allow the densification of ageing suburbs. Reliance on its own water and power resources, as well as lowered consumption and the mitigation of storm-water run-off eases pressure on fragile, existing infrastructural networks. In addition, new community and shared spaces are made available to the residents of surrounding dwellings to encourage neighbourhood building and social interaction.

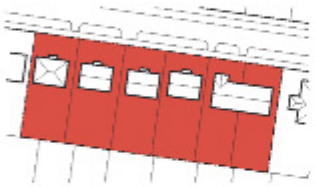
The existing cross-overs are retained and incorporated into an on-site network of vehicle and pedestrian access-ways. Parking is uncovered and on-site. The remaining space is given over to the semi-public domain, with shared seating, play spaces and resources for gardening. The possibility for integration of communal spaces with the wider community also exists.

The units are designed to be high-performing in ESD metrics, achieving seven or eight energy stars and encapsulating novel passive and active sustainability systems. Photovoltaic (PV) panels provide a third of the energy required by each residence, rainwater tanks are concealed in the waffle slab, and the walls are constructed with a reversed block-work veneer. Owing to their status as Office of Housing dwellings, every unit meets the Disability Discrimination Act standards. On a micro-precinct level, the landscaping is instrumental in channelling, storing and gradually releasing storm-water, minimising pressure on sewage systems ill prepared for higher densities; all planting is native and drought tolerant, to minimise town-water consumption. Power for site lighting is provided by PV panels.

The development comprises one and two storey dwelling typologies. Formal elements of the building are dictated by passive solar design considerations, and the necessity of preserving privacy over an intensified terrain. While each unit possesses a small outdoor ‘room’ which is screened for privacy, the bulk of the public open space is shared, with a proportion given over to a community vegetable garden.

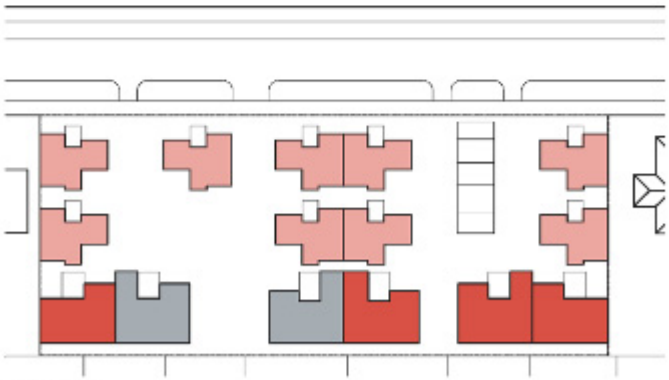
Environmental and energy systems terminate at the boundary of the site. The project’s principal mechanisms of integration into wider precinct or neighbourhood scales lie in its ability to provide high-quality public spaces—activated ‘shared’ spaces rather than unoccupied land—in areas in which they are traditionally absent.

Typical Dwelling



Existing Conditions

Project Proposal



Source: Department of Human Services (2010) http://www.housing.vic.gov.au/buildings-projects/current/living-places

APPENDIX B: CONTRIBUTORS

Investigative Panels 1–4

Nick	Alsop	Sustainability Victoria
Tom	Alves	Victorian Government Architect
Dominic	Arcaro	VicUrban
Janine	Armstrong	Henley
Lloyd	Baggot	Minter Ellison
Michael	Ballock	City of Darebin
Bob	Birrell	Monash University
Hal	Bissett	Affordable Housing Solutions
Neville	Boyd	RMIT University
Kate	Breen	VicUrban
John	Bruzzaniti	Australian Unity
Peter	Burke	VicUrban
Terry	Burke	Swinburne University
Michael	Buxton	RMIT University
Lorraine	Calder	Australian Unity
Chris	Chaplin	Community Housing Federation Victoria
Roger	Collins	City of Moreland
Halvard	Dalheim	Department of Planning and Community Development
Tony	De Domenico	Urban Development Institute of Australia (Victoria)
John	Eckert	AV Jennings
Casey	Farrell	Master Builders Association (Victoria)
Rod	Fehring	Australand
Karl	Fender	Fender Katsalidis
Christine	Ferguson	Department of Human Services, Victoria
Jill	Garner	Office Victorian Government Architect
Noel	Gately	VicUrban
Graeme	Gunn	Graeme Gunn Architects
Ken	Guthrie	Sustainability Victoria
Victoria	Hart	Sustainability Victoria
Alison	Holloway	SGS Economics and Planning
Andrew	Hollows	AHURI
Kevin	Hunt	MAB Corporation
Andrew	Iles	VicUrban
Paul	Jarman	Department of Planning and Community Development
Liz	Johnstone	Municipal Association of Victoria
Caryn	Kakas	Residential Development Council
Michael	Lennon	Housing Choices Australia
Kirsty	Leong	Department of Planning and Community Development

Geoffrey	London	Victorian Government Architect
Rob	McGauran	McGauran Giannini Soon Pty Ltd
Simon	McMaster	Department of Planning and Community Development
Derek	McMillan	Australian Unity
Simon	McPherson	SJB
David	Moeller	Affordable Housing Solutions
Wendy	Morris	Ecologically Sustainable Design
Clare	Mouat	Melbourne University
Ashley	Murdoch	Icon Construction
Catherine	Murphy	Monash University
Shane	Murray	Monash University
David	Newnham	Master Builders Association (Victoria)
Peter	Newton	Swinburne University of Technology
Kerry	O'Neill	Bushfire Reconstruction Authority
Natasha	Palich	Sense Architecture
Graeme	Parton	Charter Keck Cramer
Graeme	Parton	Charter Keck Cramer
Stefan	Preuss	Sustainability Victoria
David	Rayson	Save Our Suburbs
Richard	Reed	Deakin University
Jason	Shaw	Stockland
Andrew	Spencer	SGS Economics and Planning
Marcus	Spiller	SGS Economics and Planning
Garry	Spivak	City of Port Phillip
Robert	Stent	Hayball
Kirsten	Thompson	Kirsten Thompson Architects
Ron	Wakefield	RMIT University
David	Wheeler	Hyder Consulting
Michael	White	Monash + Hayball
Carrie	White	Municipal Association of Victoria
Ian	Winter	AHURI
Ian	Wood	Save Our Suburbs

Robin Boyd Dinner, 2010

Brian	Boyd	Trades Hall Council
Rosemary	Hartnett	Housing Choices Australia
Alison	Holloway	SGS Economics and Planning
Andrew	McLeod	Committee for Melbourne
Derek	McMillan	Australian Unity
Jane	Monk	Department of Planning and Community Development
Daryl	Patterson	Vivas Lend Lease
Paul	Ramadge	*The Age*
Rob	Nerlich	Hayball

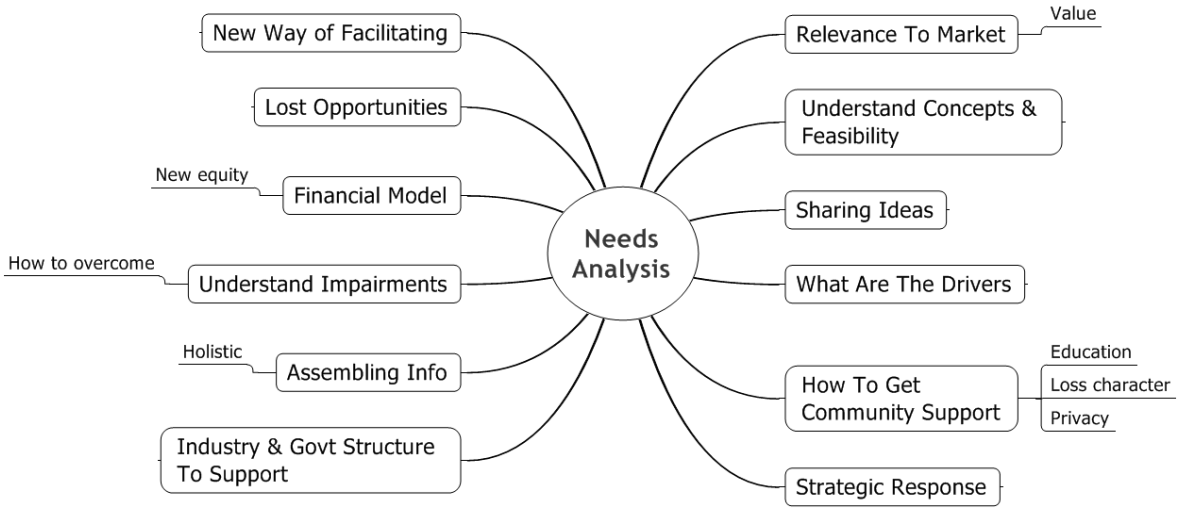
Ann	Lau	Hayball
David	Tweedie	Hayball
Sarah	Buckeridge	Hayball
Robert	Stent	Hayball
Len	Hayball	Hayball
Tom	Jordan	Hayball
Noral	Rich	Ernst and Young
Rob	Taber	Villawood Properties
Ashley	Williams	Evolve Development Pty Ltd

Greyfields redevelopment was the topic chosen for the 2010 Robin Boyd Dinner to which Professors Newton, Murray and Wakefield were invited.

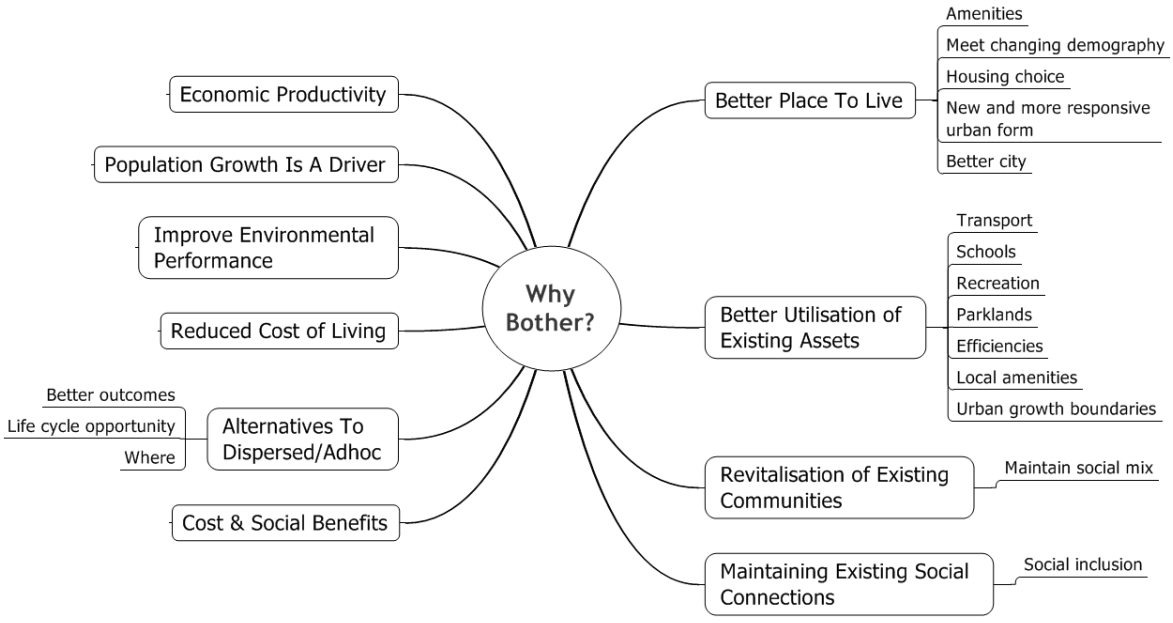
APPENDIX C: INVESTIGATIVE PANEL 'MIND MAPS'

Workshop 1

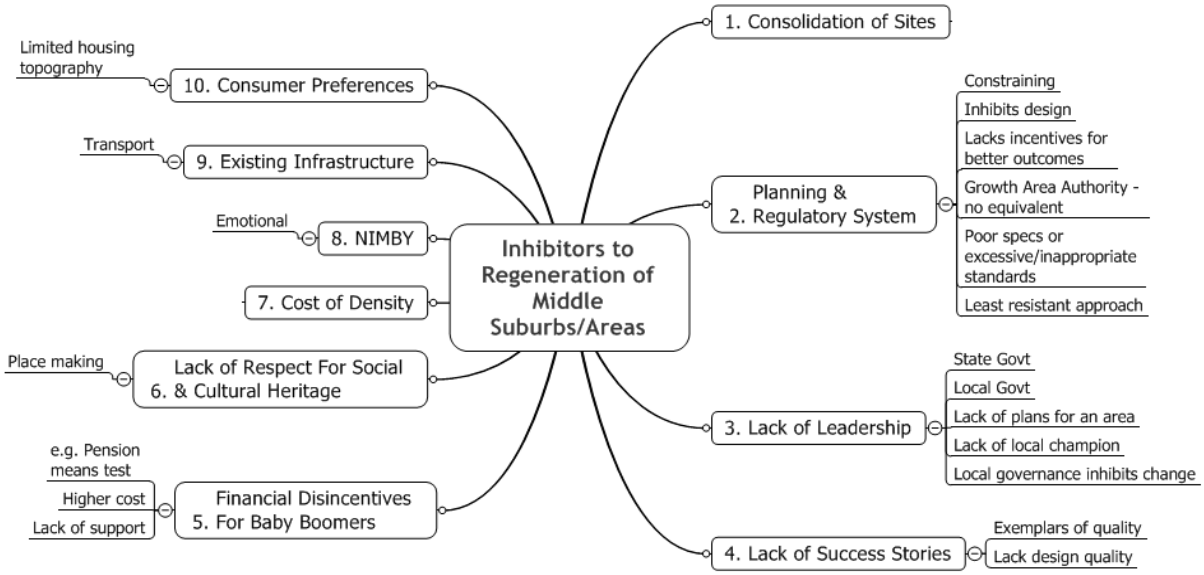
Needs analysis



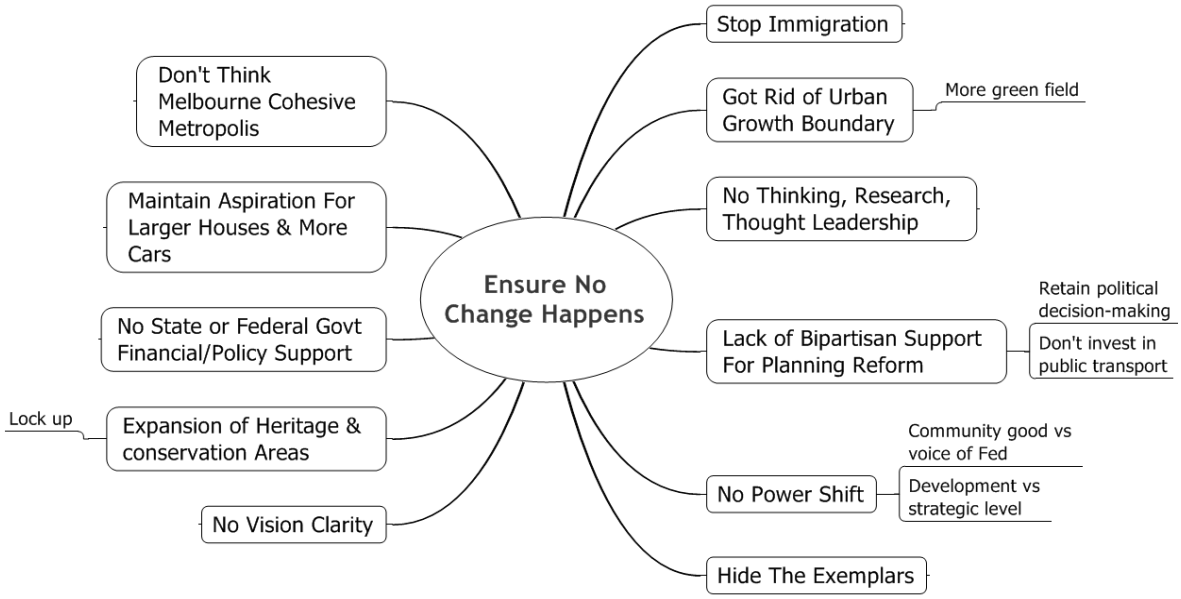
Why bother?



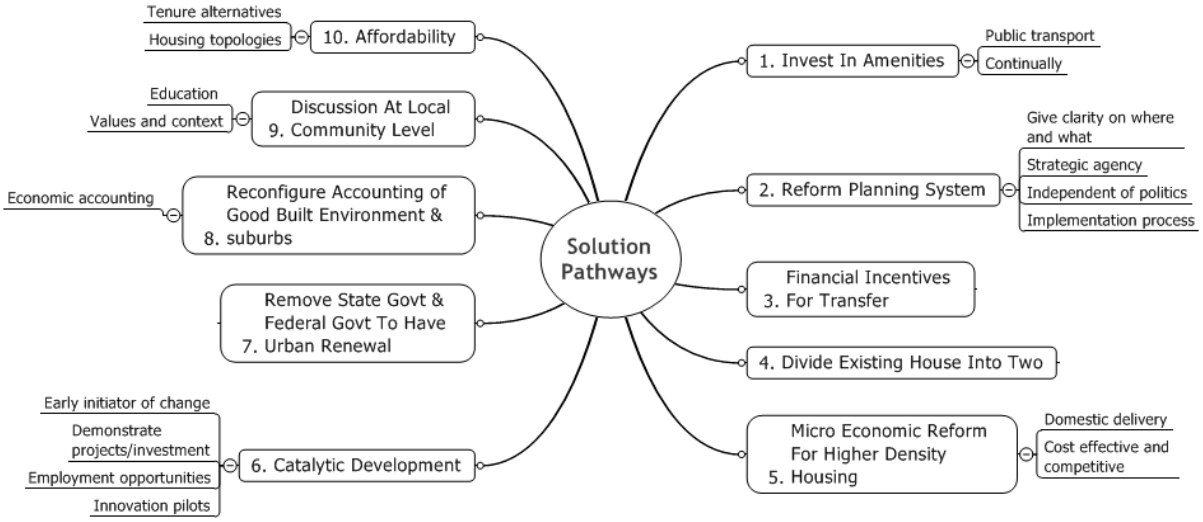
Inhibitors to regeneration of middle suburbs/areas



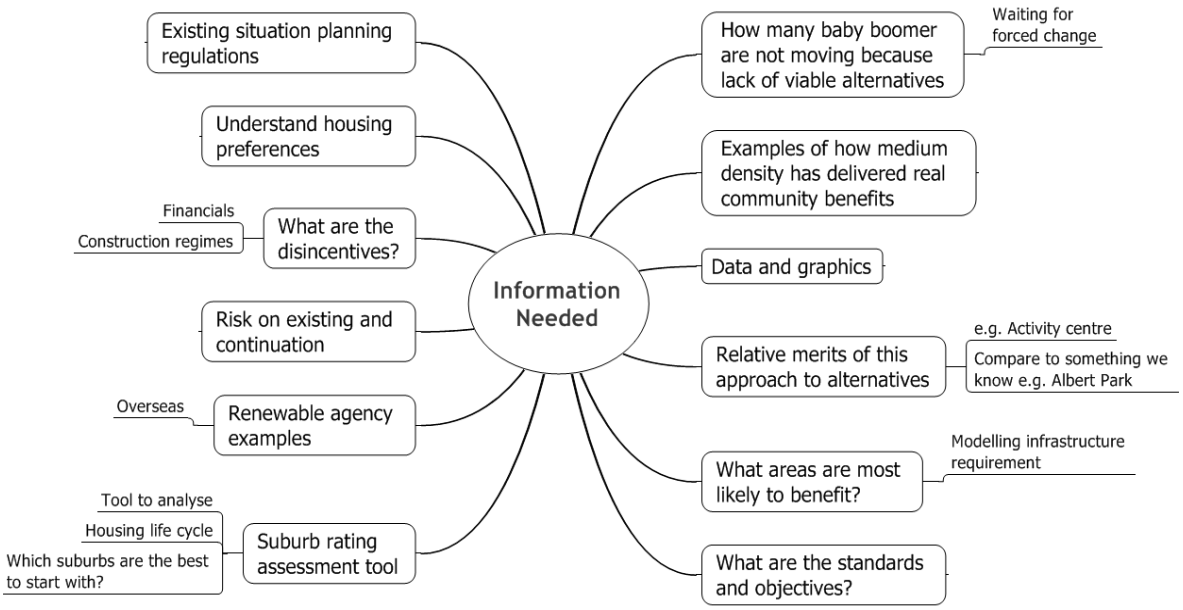
How to ensure no change happens



Solution pathways

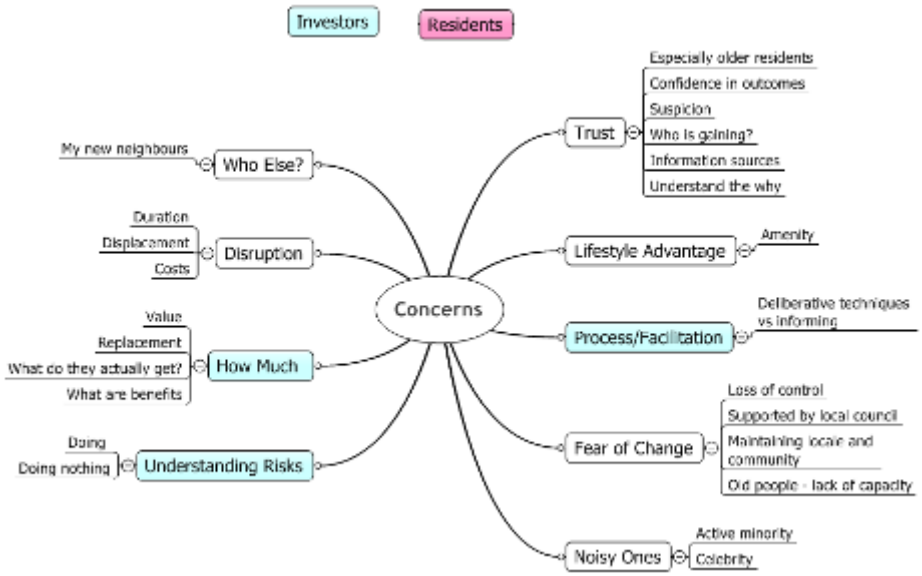


Information needed

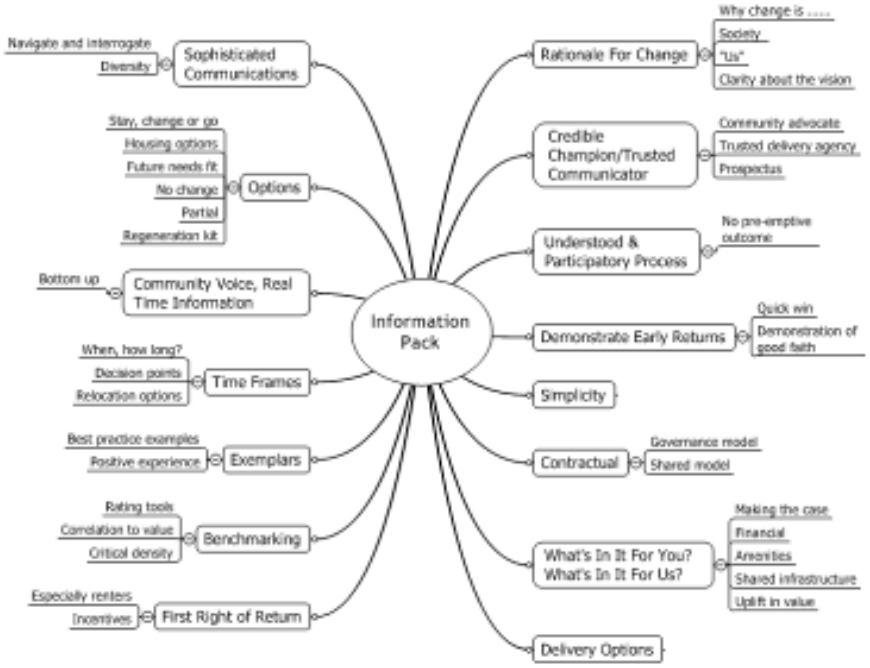


Workshop 3

Investor and resident concerns

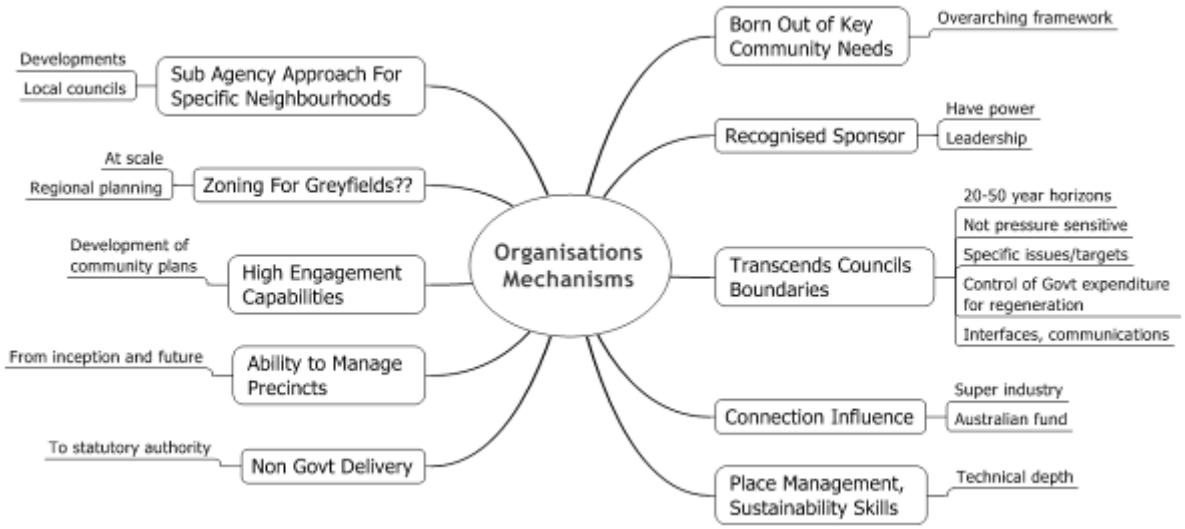


What information would be needed?

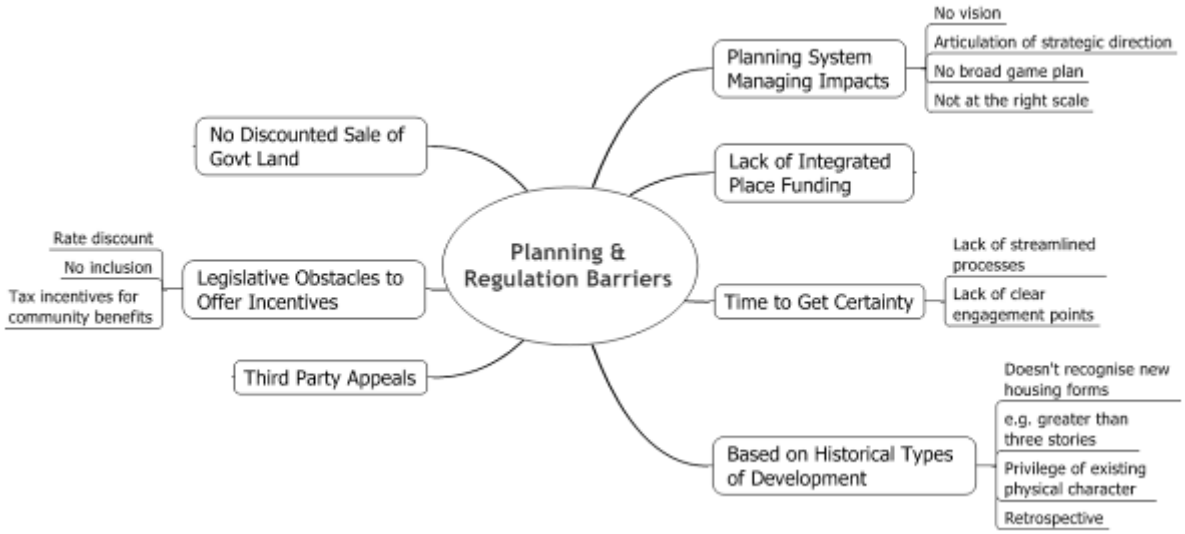


What would the initial narrative need to be?

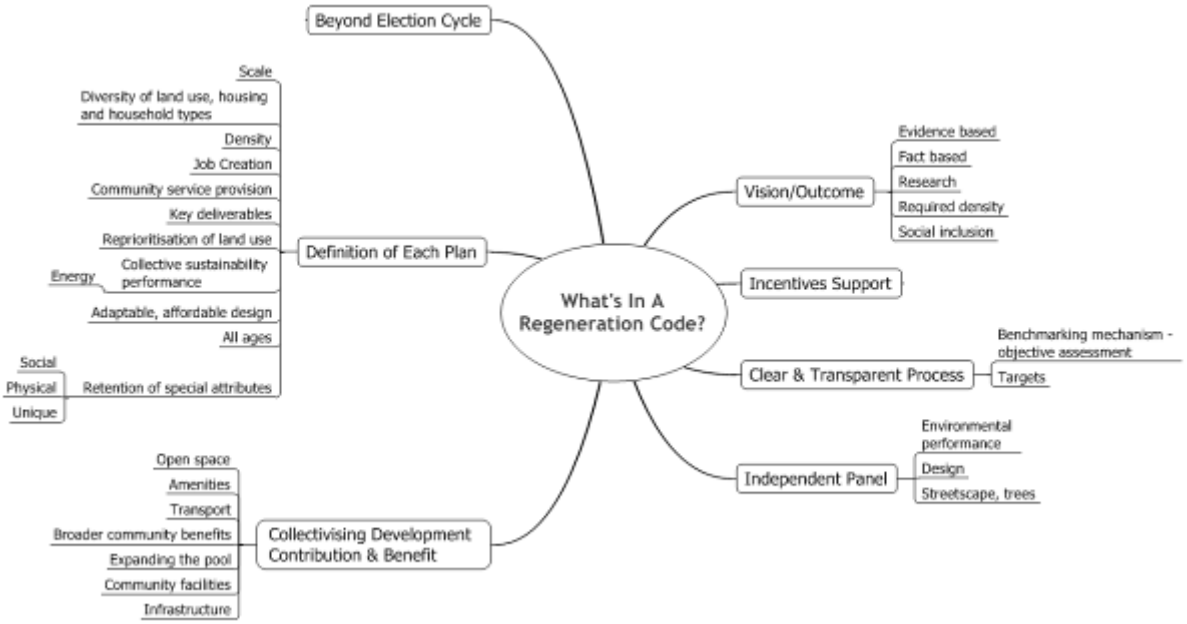
What form would these agencies take?



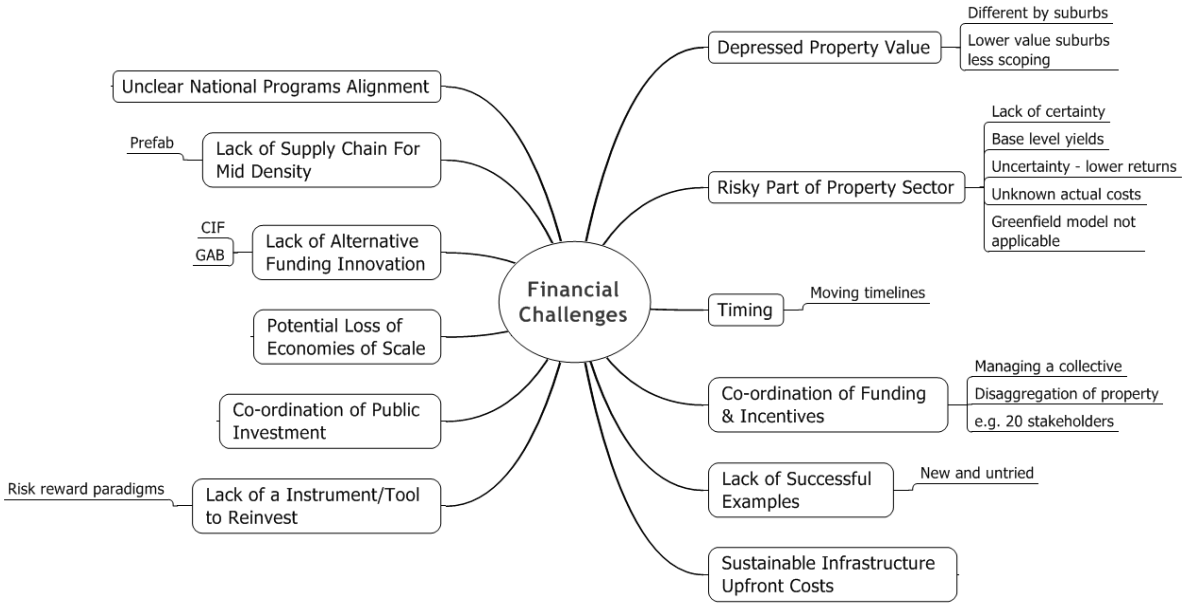
What are the barriers within existing planning structures?



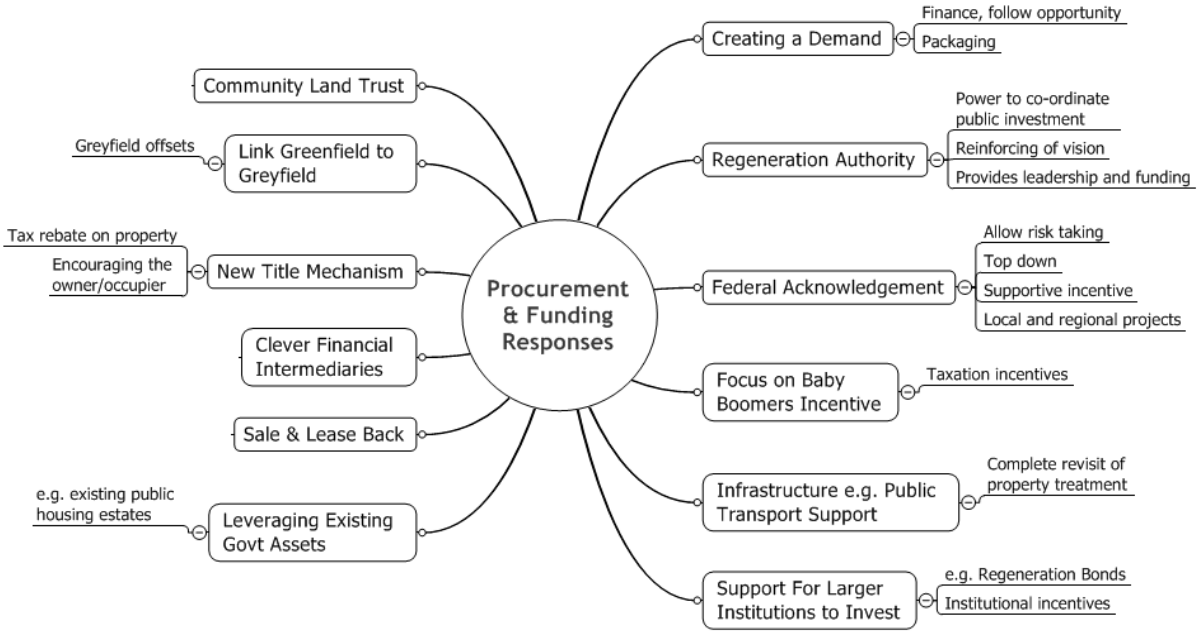
A regeneration code



What are the financial challenges?

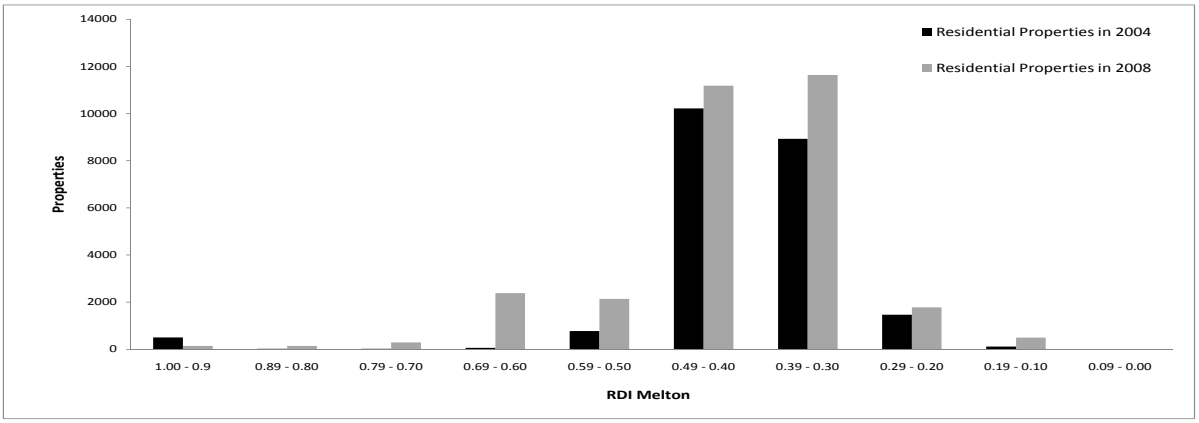


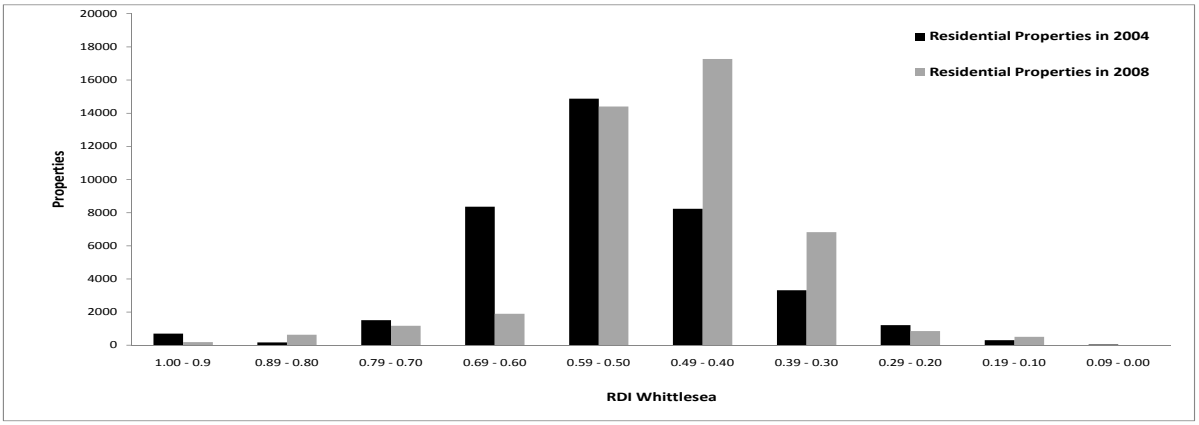
How could these financial challenges be addressed?

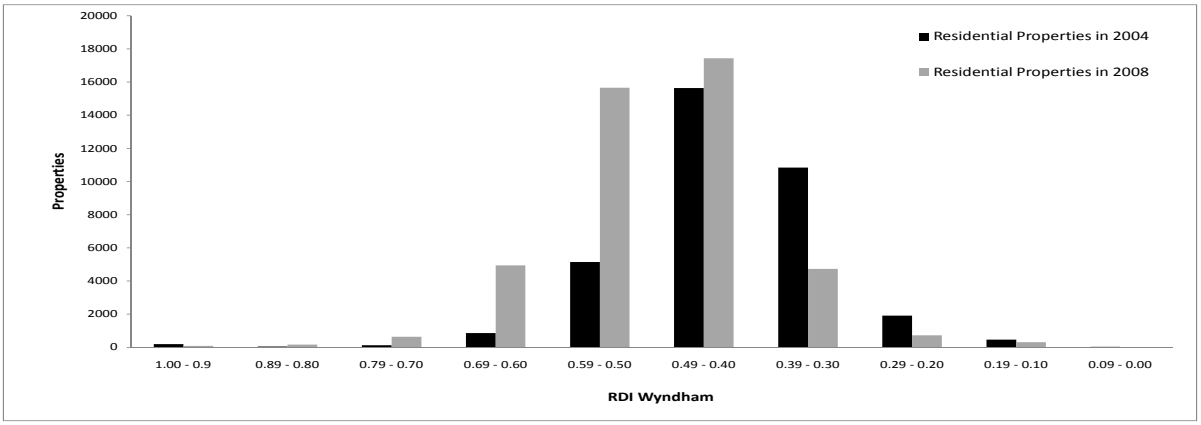


APPENDIX D: STAGES IN HOUSING LIFE CYCLE ACROSS MELBOURNE MUNICIPALITIES

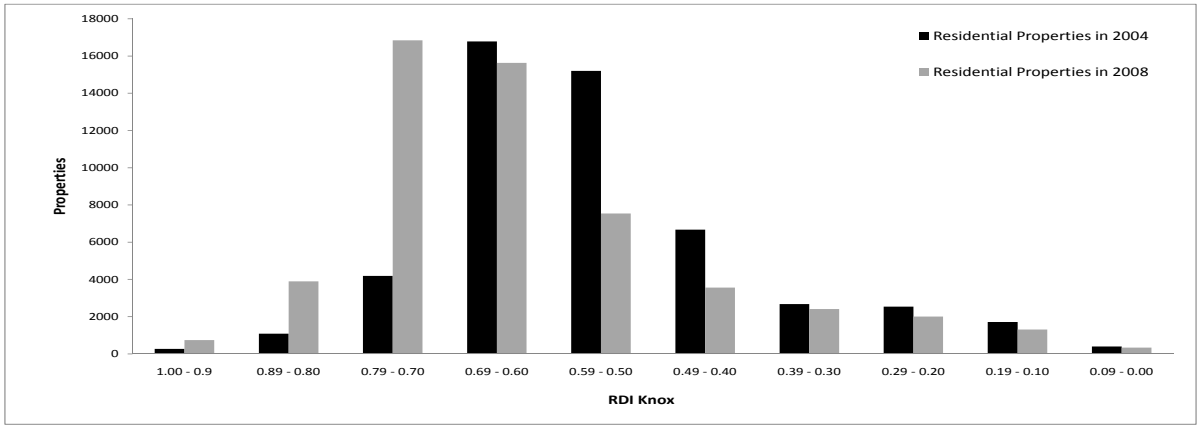
Youthful stage in area housing life cycle

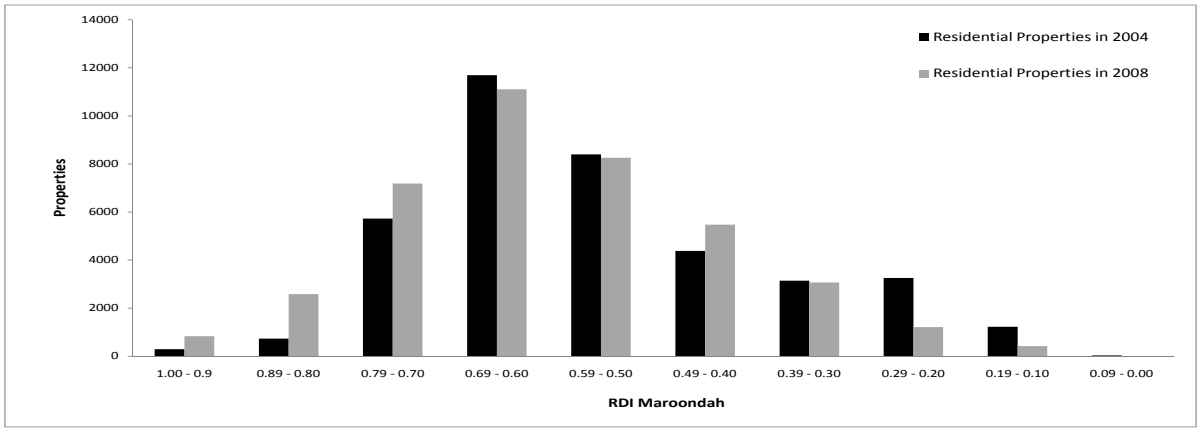


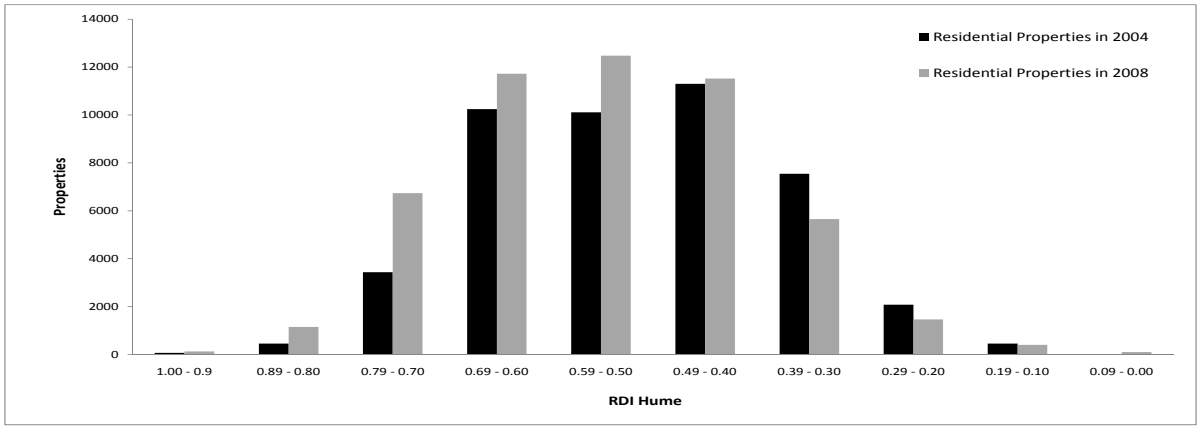


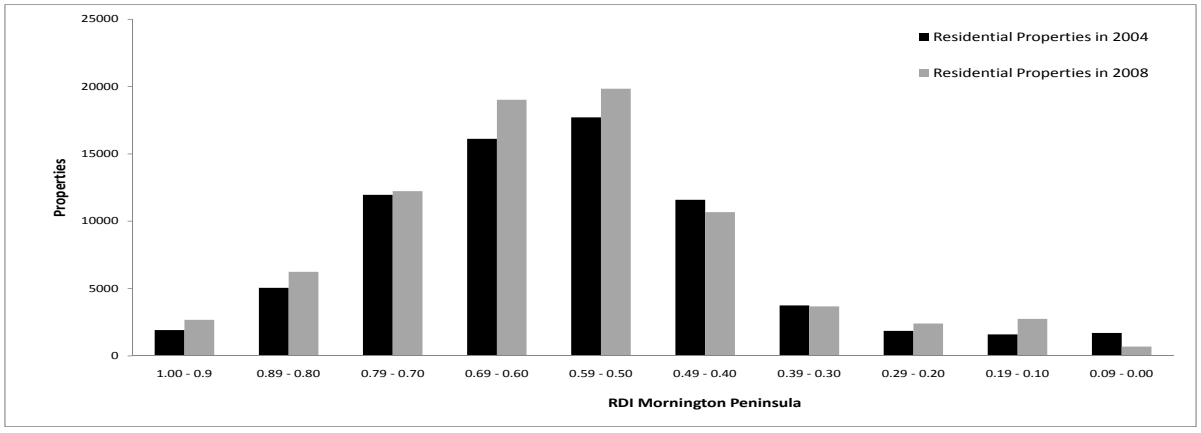


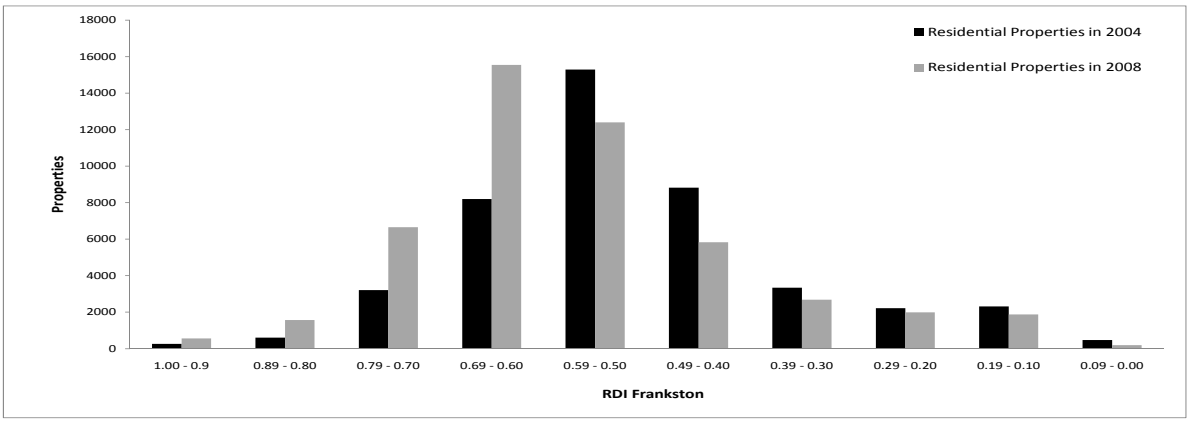
Maturing stage of area housing life cycle







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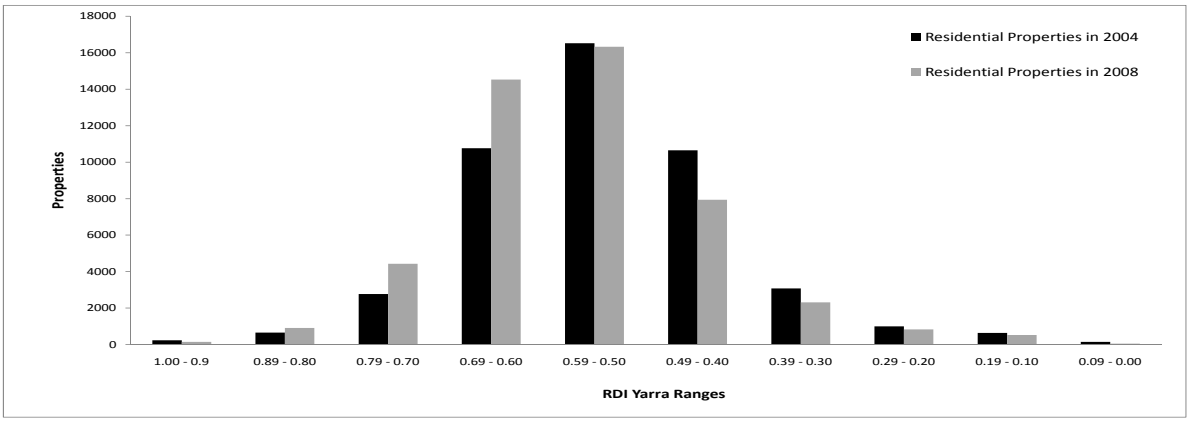
RDI Frankston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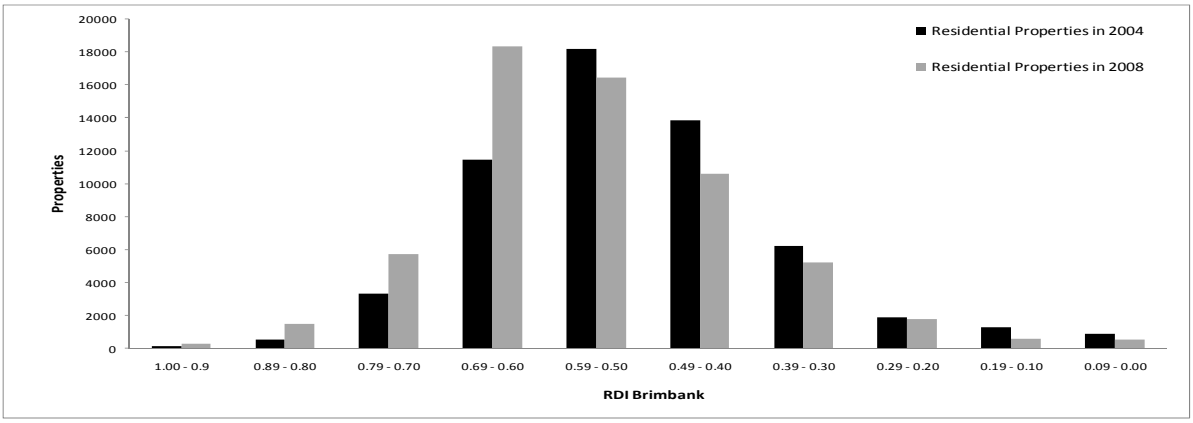
RDI Yarra Ranges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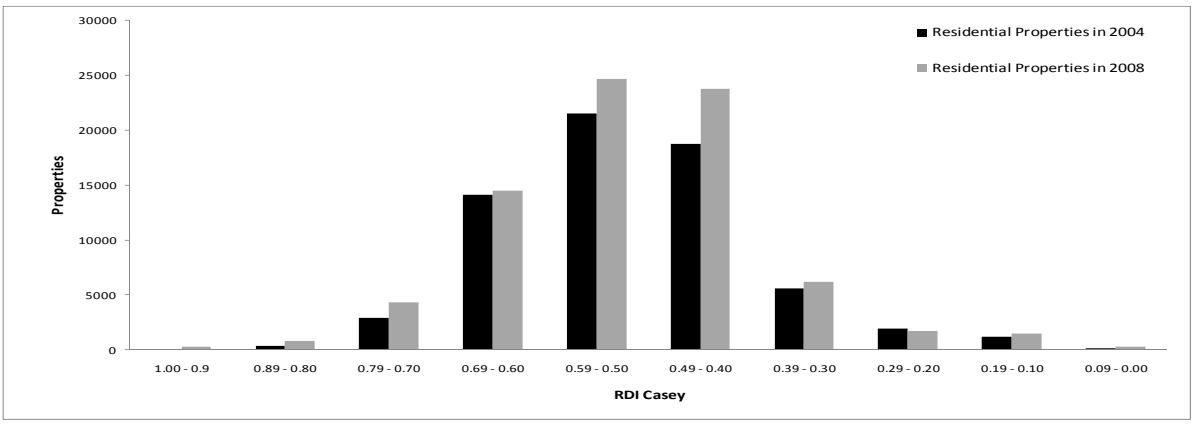
RDI Brimbank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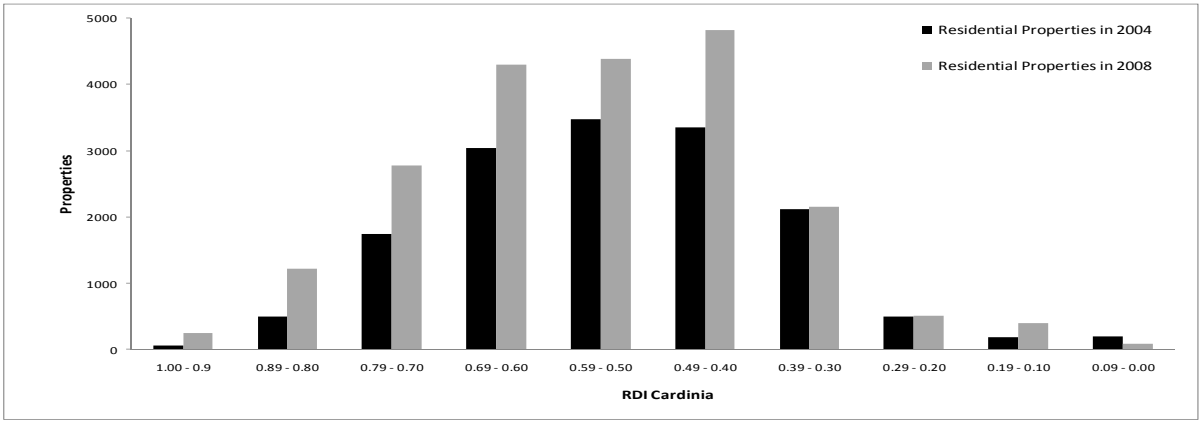
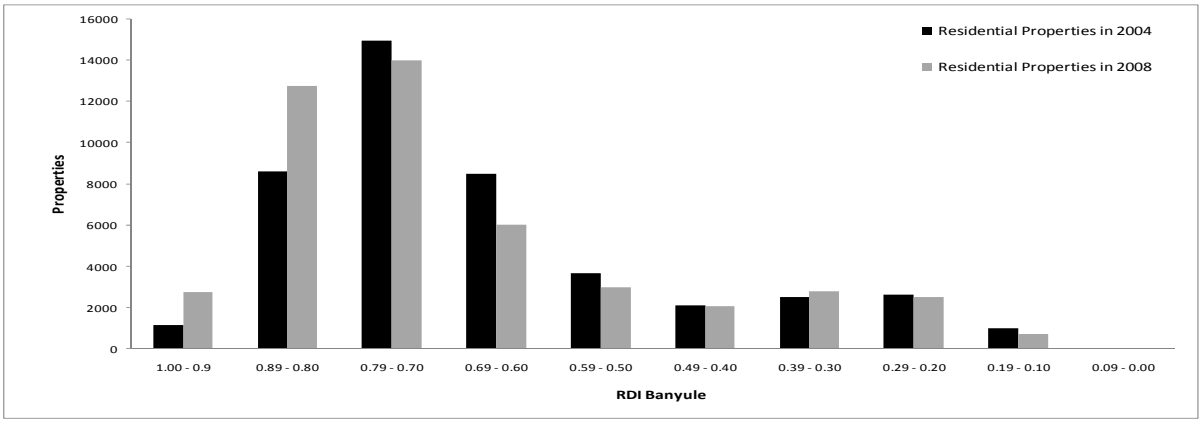
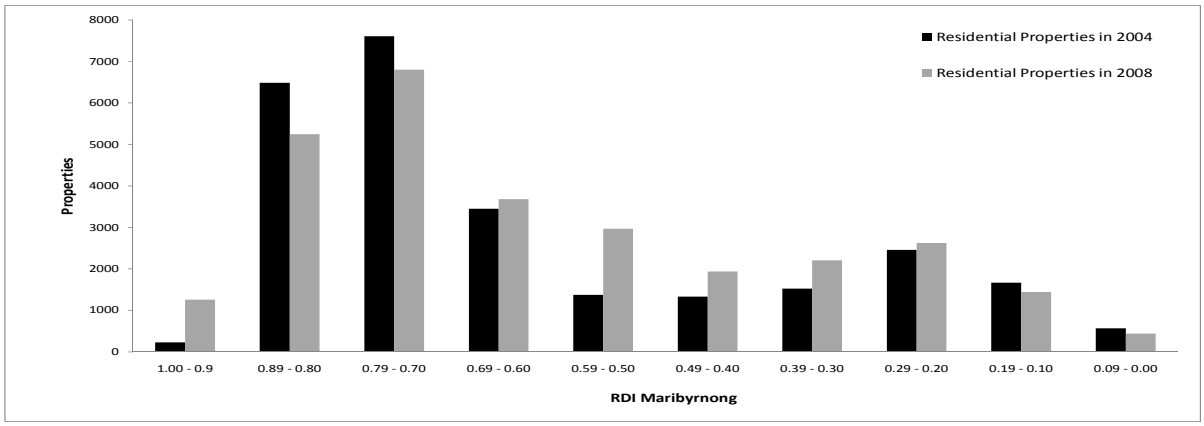
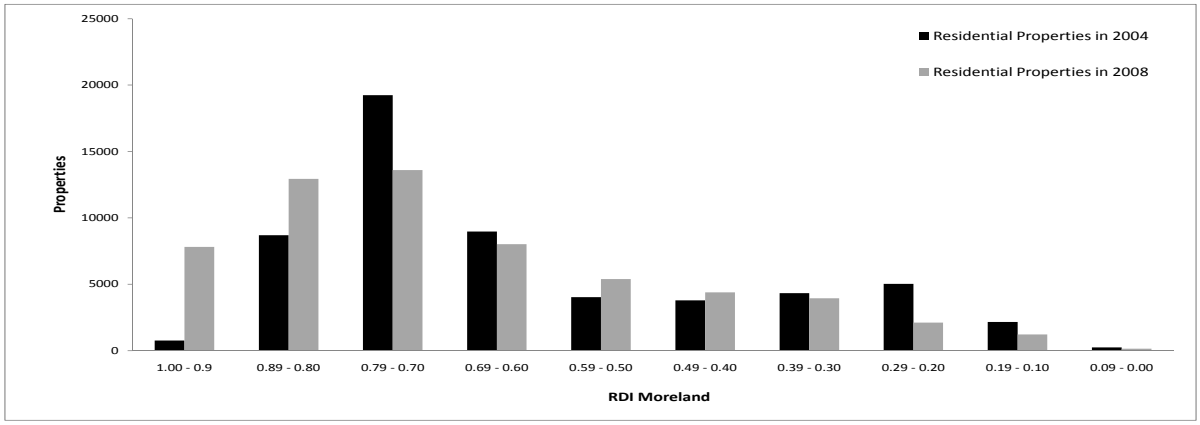
RDI Casey

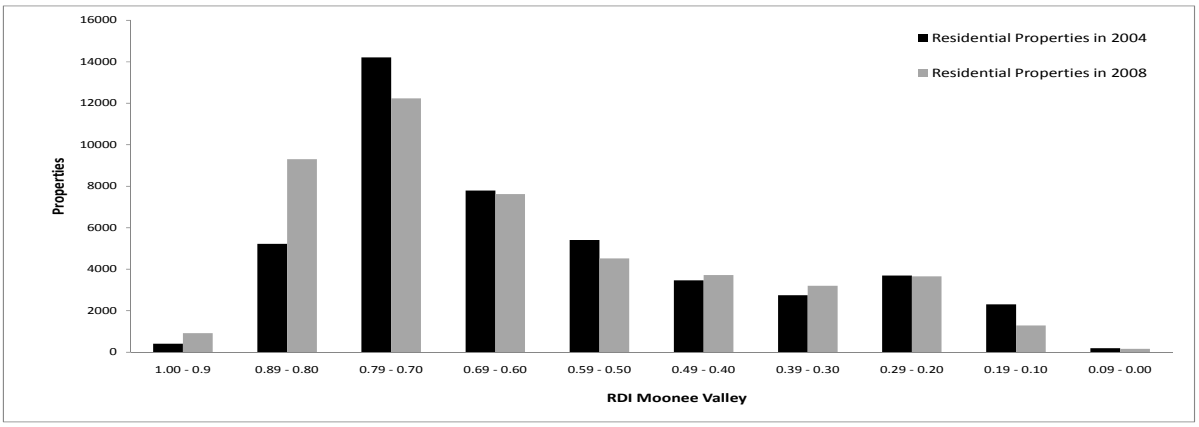
Ageing stage of area housing life cycle







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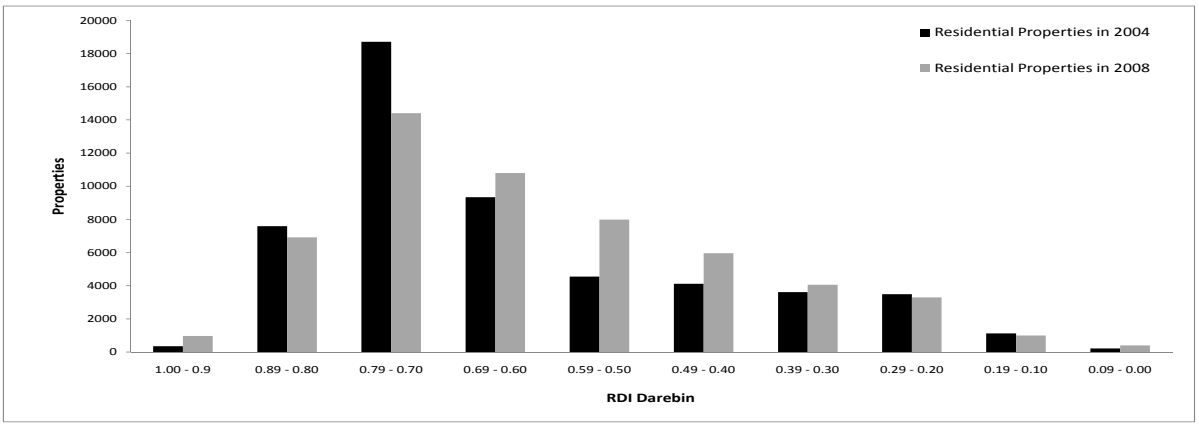
RDI Moonee Valley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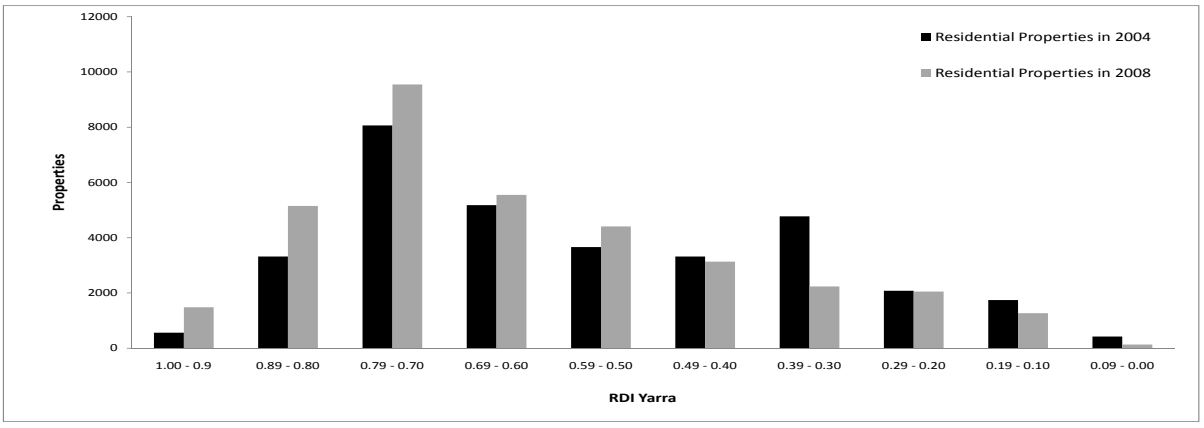
RDI Darebin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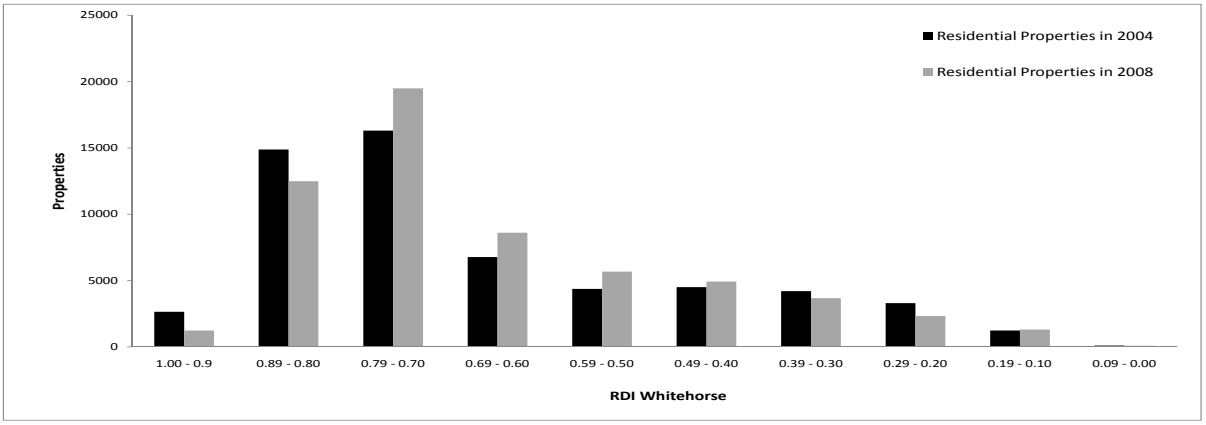
RDI Yarra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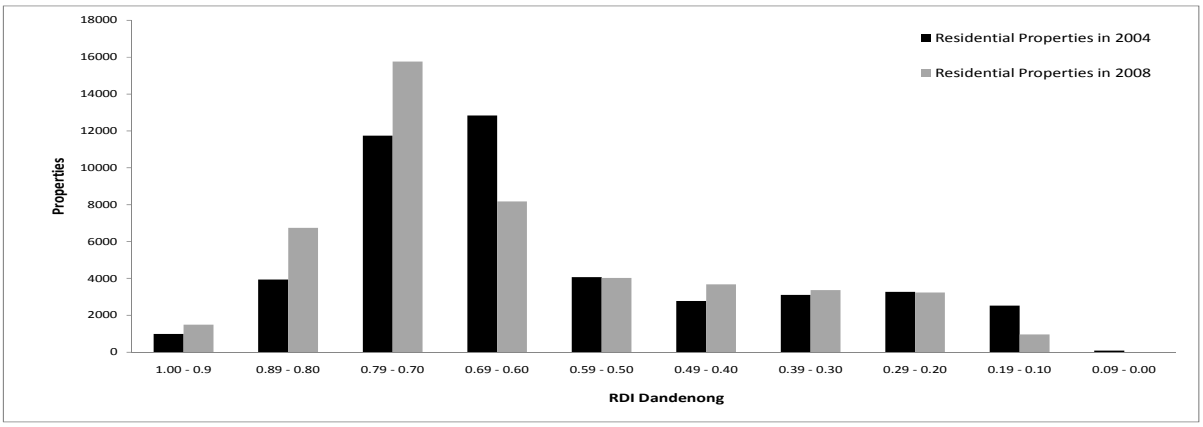
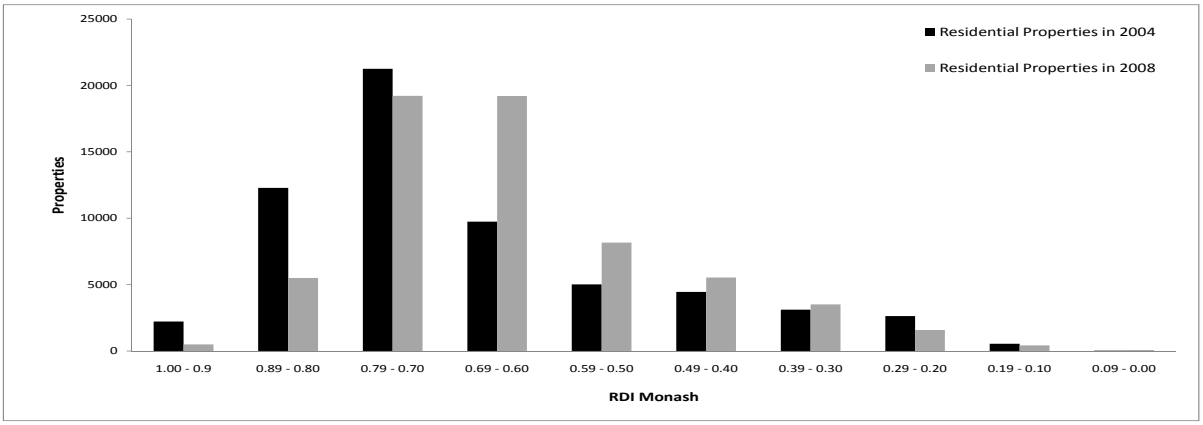
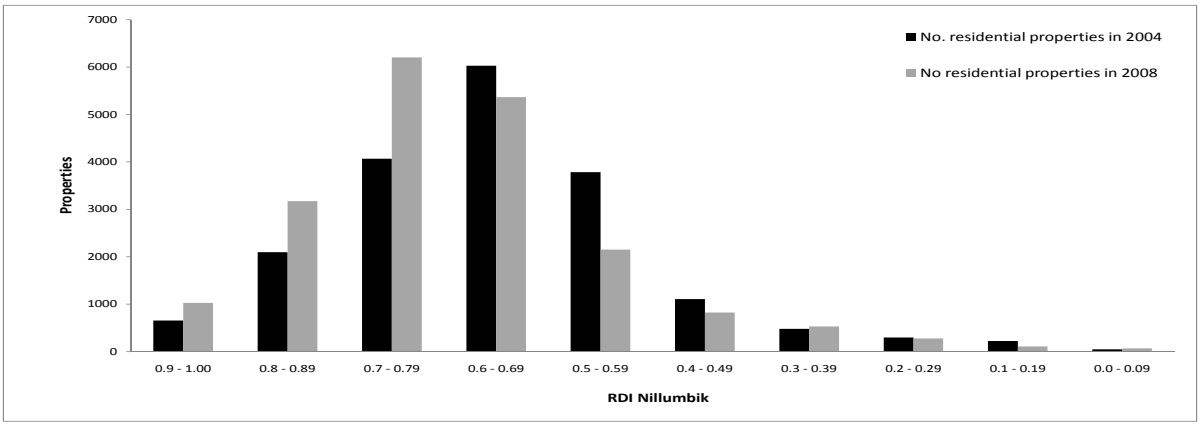
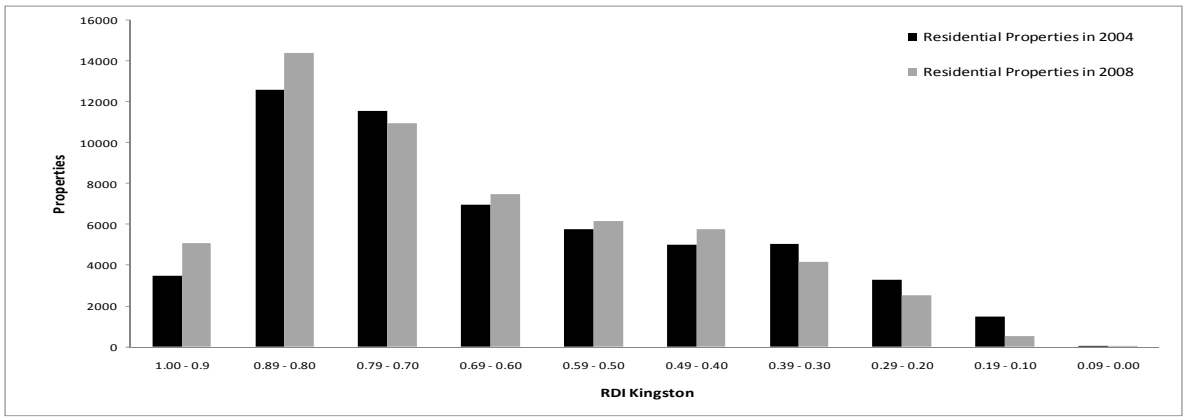
0.09 - 0.00
RDI Whitehorse

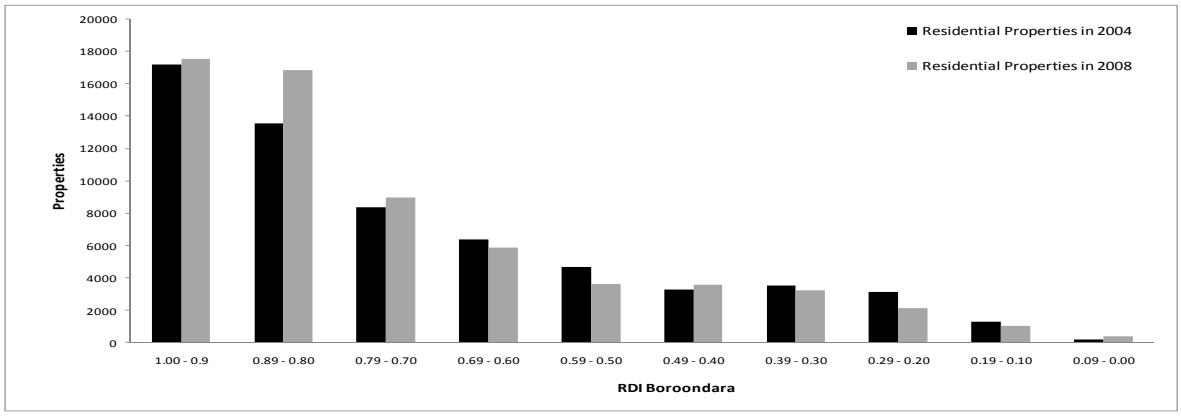

Residential Properties in 2004
Residential Properties in 2008
Properties
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1.00 - 0.9
0.89 - 0.80
0.79 - 0.70
0.69 - 0.60
0.59 - 0.50
0.49 - 0.40
0.39 - 0.30
0.29 - 0.20
0.19 - 0.10
0.09 - 0.00
RDI Dandenong

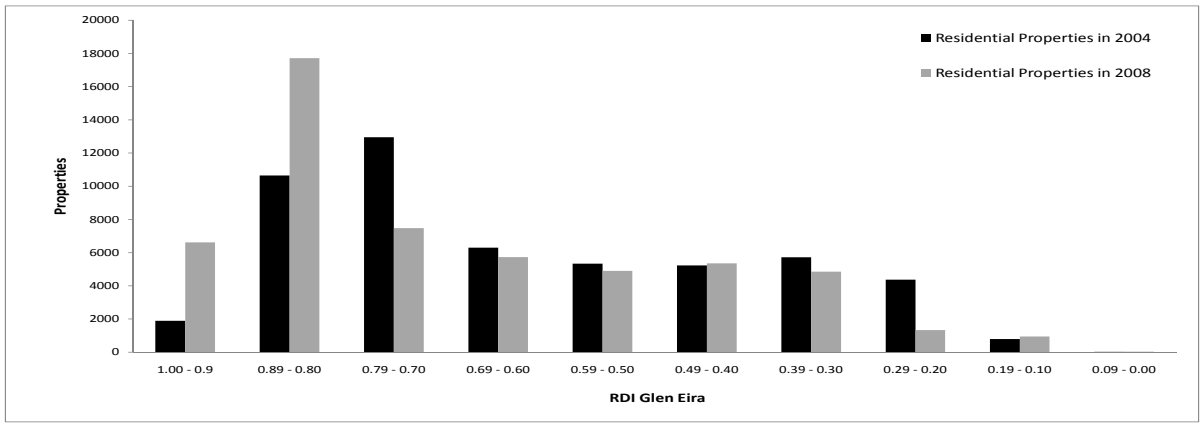

Residential Properties in 2004
Residential Properties in 2008
Properties
25000
20000
15000
10000
5000
0
1.00 - 0.9
0.89 - 0.80
0.79 - 0.70
0.69 - 0.60
0.59 - 0.50
0.49 - 0.40
0.39 - 0.30
0.29 - 0.20
0.19 - 0.10
0.09 - 0.00
RDI Monash

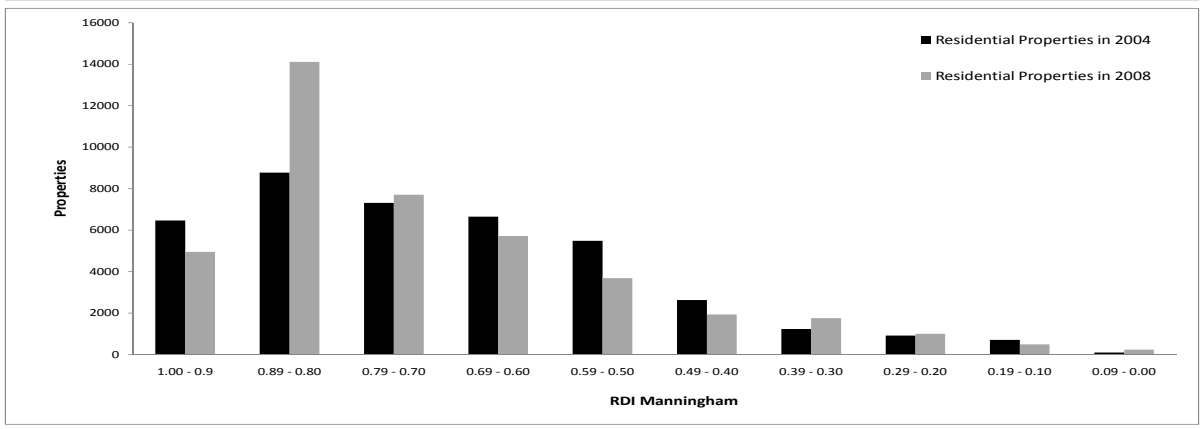

No. residential properties in 2004
No residential properties in 2008
Properties
7000
6000
5000
4000
3000
2000
1000
0
0.9 - 1.00
0.8 - 0.89
0.7 - 0.79
0.6 - 0.69
0.5 - 0.59
0.4 - 0.49
0.3 - 0.39
0.2 - 0.29
0.1 - 0.19
0.0 - 0.09
RDI Nillumbik

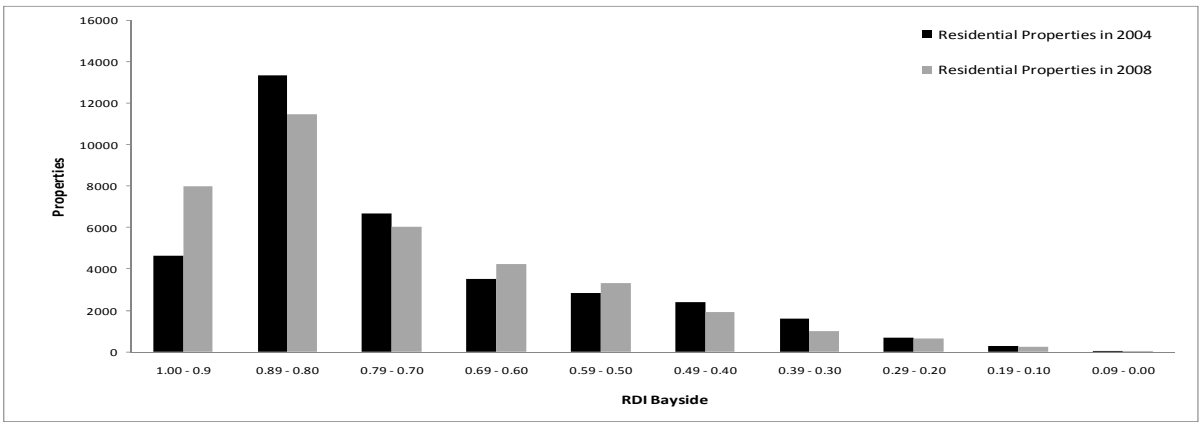
Advanced ageing stage in area housing life cycle



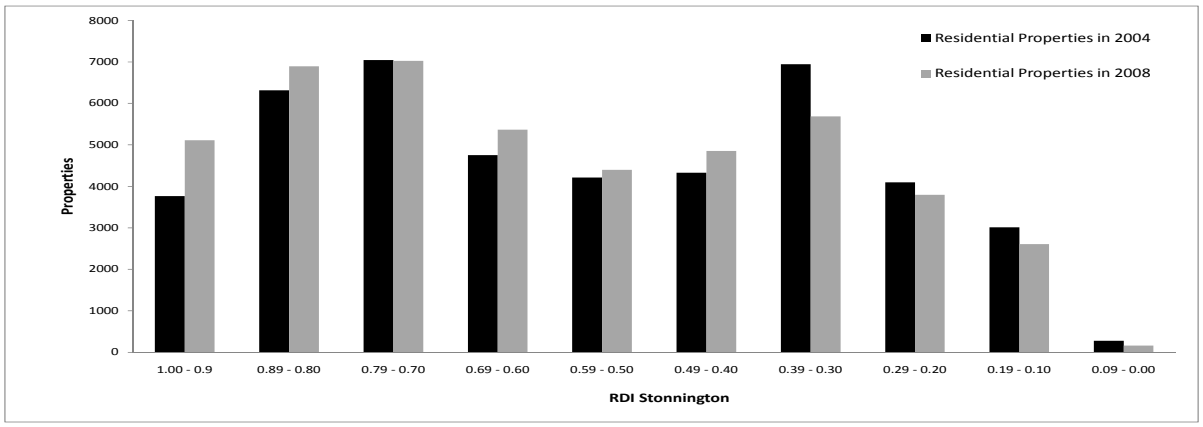


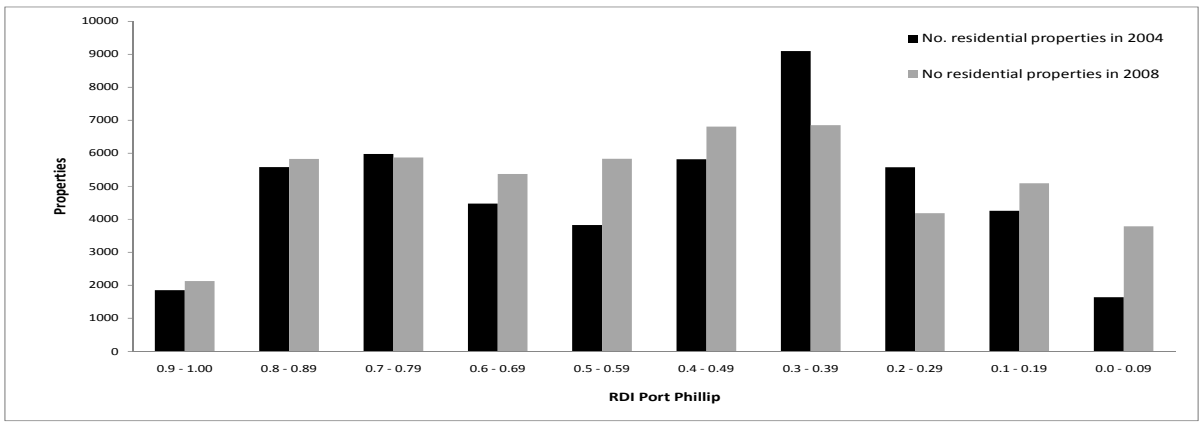


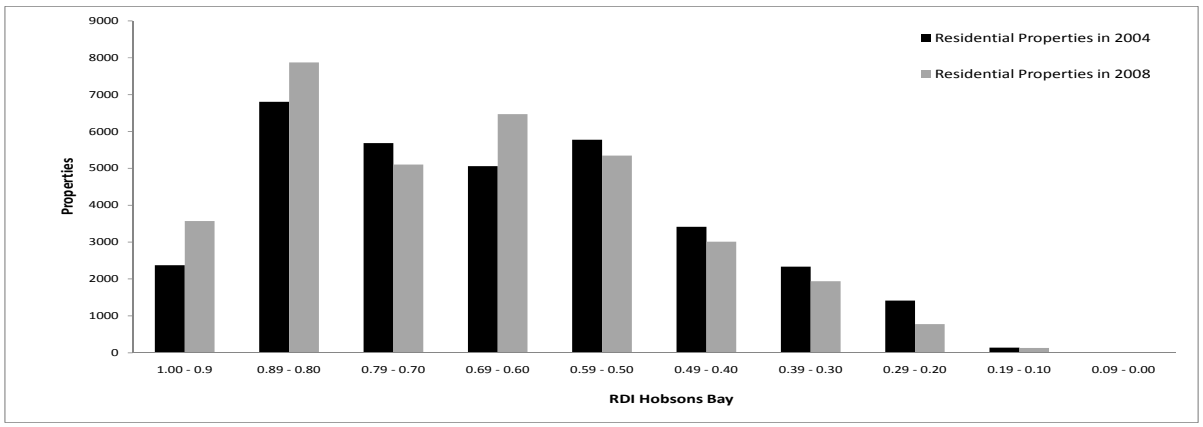




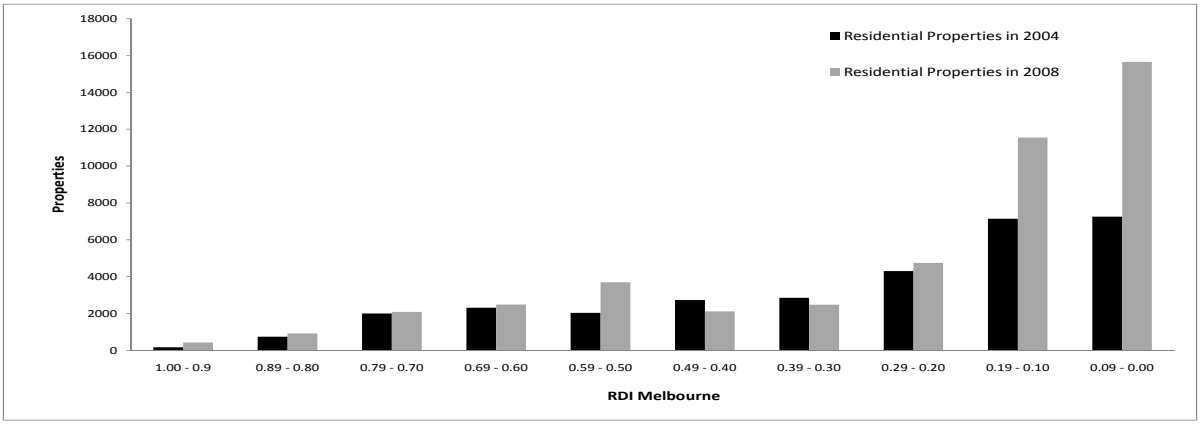
Regenerating stage of area housing life cycle







Intensive development stage of area housing life cycle

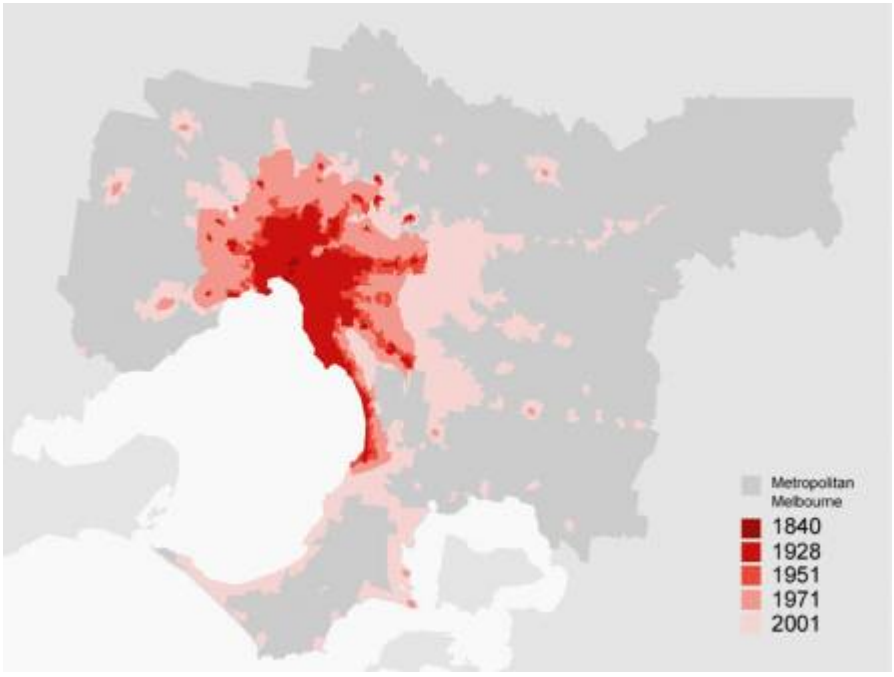


APPENDIX E: MELBOURNE'S MIDDLE SUBURBS

For our purposes, we are defining Melbourne's middle suburbs as the bulk of the housing built from the 1940s through to the early 1980s, including areas of inter-war stock located close to public transport (Figure A1). Laid out originally as residential dormitories, the middle suburbs now constitute a contiguous built region between 10 kilometres and 30 kilometres from the CBD. Unlike the inner suburbs, where a measure of urban regeneration is already well underway, the middle suburbs have tended to retain this dormitory layout, with many buildings and infrastructures likely to be showing signs of physical and technological obsolescence. The urban character and demography varies substantially across the region, with disparities in housing affordability and diversity. Compared to the outer suburbs, this belt of suburbia is service, transport, amenity and employment rich.

What follows is a sketch of the middle suburbs of Melbourne, based on a range of aggregated metrics and 'mapped' on the basis of distance from the CBD.

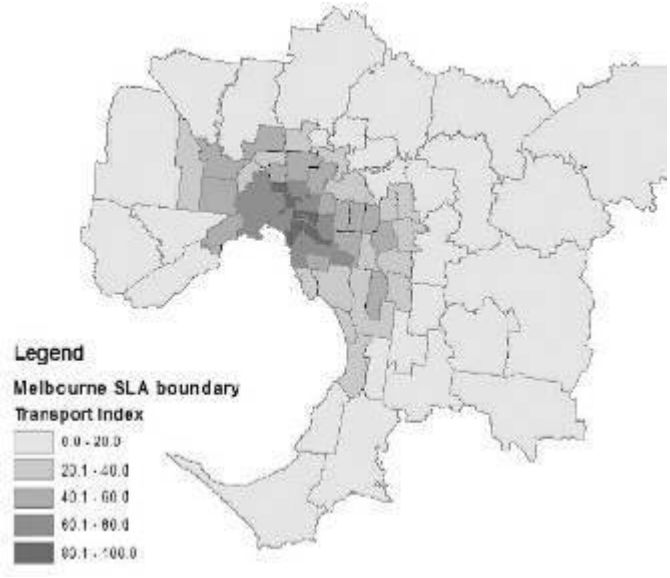
Figure A1: Growth of Melbourne, 1840–2001



Source: Department of Planning and Community Development (2010)

Public transport access tends to be good for many of the middle suburbs, but declines dramatically in the outer and fringe suburbs (Table A1, Figure A2). Increasing residential density in precincts with good public transport access should avoid automatic loading of the local road network which is already congested at peak times, but would remain one of the issues to examine for less well serviced districts.

Figure A2: Public transport richness index, Melbourne, 2008



Percentage of Statistical Local Area that is within 400 metres of any form of public transport (train, tram, bus)

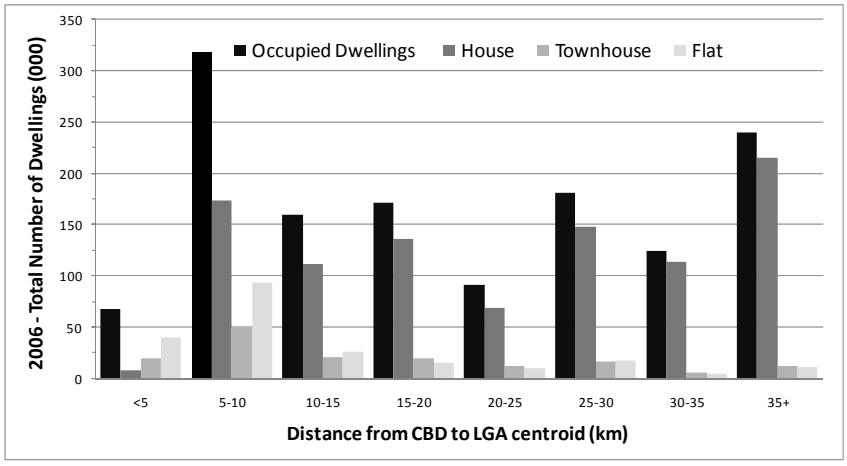
Table A1: Trips per day per person by area, Melbourne

	Core	*Inner*	*Middle*	*Outer/fringe*
Car	2.12	2.52	2.86	3.92
Transit	0.66	0.46	0.29	0.04
Walk/bike	2.62	1.61	1.08	0.81

Source: Trubka et al. (2008)

The volume of housing stock (number of dwellings) in the middle ring suburbs relative to inner and outer is somewhat smaller, revealing a potential for increasing capacity (Figure A3).

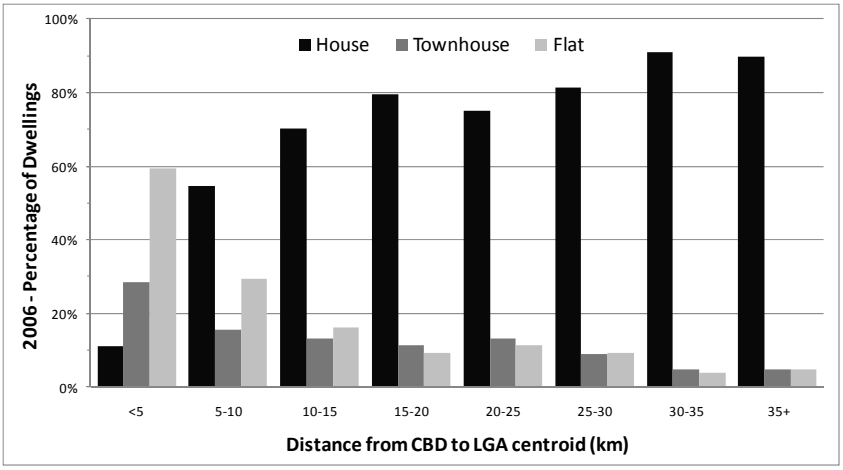
Figure A3: Distribution of dwellings, Melbourne, 2006



By Distance from CBD, Source: ABS Census (2006)

Compared to the inner city, there is relatively little variety in the types of dwelling on offer in the middle and outer suburbs (Figure A4).

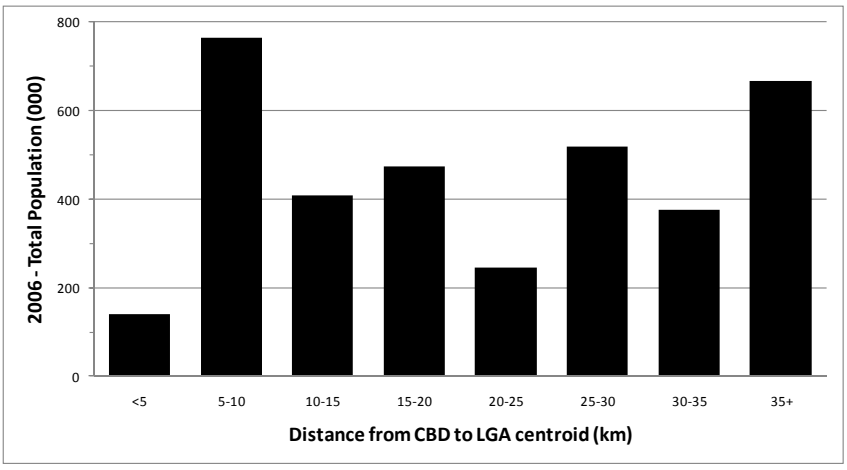
Figure A4: Percentage of dwellings, Melbourne, 2006



By Distance from CBD, Source: ABS Census (2006)

The number of people living in the middle suburbs is significantly less than in the inner and outer suburbs (Figure A5).

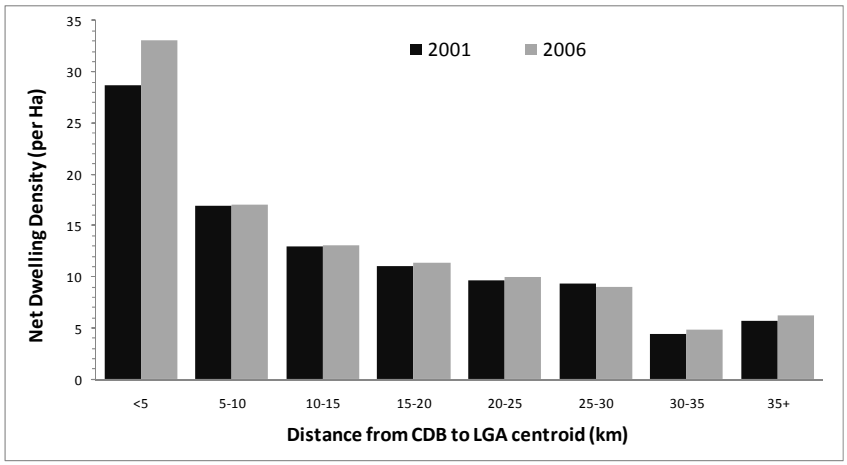
Figure A5: Distribution of population, Melbourne, 2006



By Distance from CBD, Source: ABS Census (2006)

The net dwelling density (Figure A6) of the middle ring suburbs is low – appreciably lower than the 15 dph target for density in the new master-planned precincts in the Growth Area Authority's fringe suburbs.

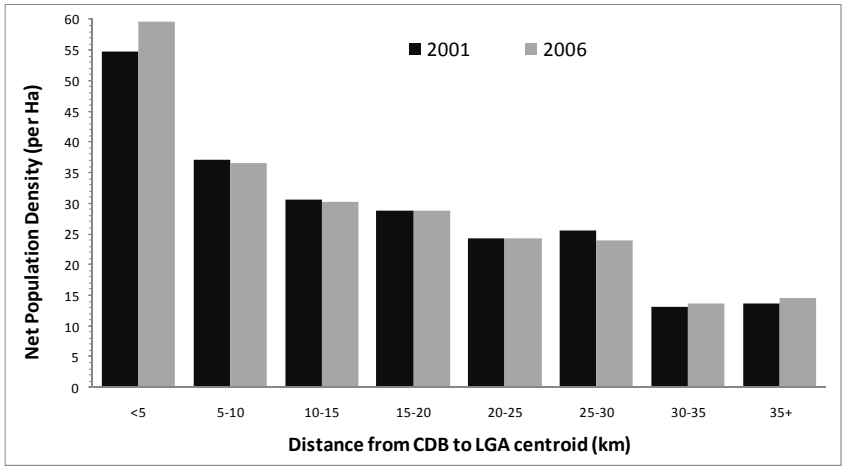
Figure A6: Dwelling density, Melbourne, 2006



By Distance from CBD, Source: ABS Census (2006)

The net population density of the middle suburbs is in the 20-30 persons per hectare range (Figure A7).

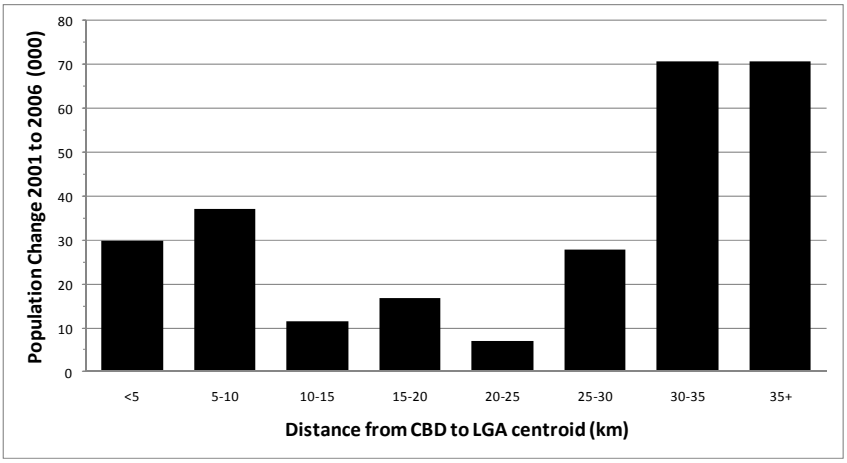
Figure A7: Population density, Melbourne, 2006



By Distance from CBD, Source: ABS Census (2006)

The middle ring suburbs have the lowest levels of population growth 2001-06 (Figure A8), the outer greenfield suburbs being the principal demographic absorbers.

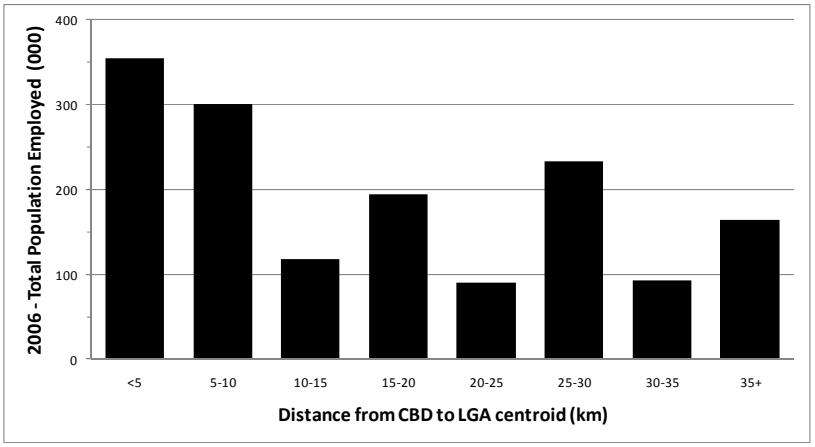
Figure A8: Change in population, Melbourne, 2001–06



By Distance from CBD, Source: ABS Census (2006)

The central city and inner suburbs have the highest concentration of jobs (Figure A9). Middle ring suburbs are well placed geographically to access jobs located in both inner and outer rings.

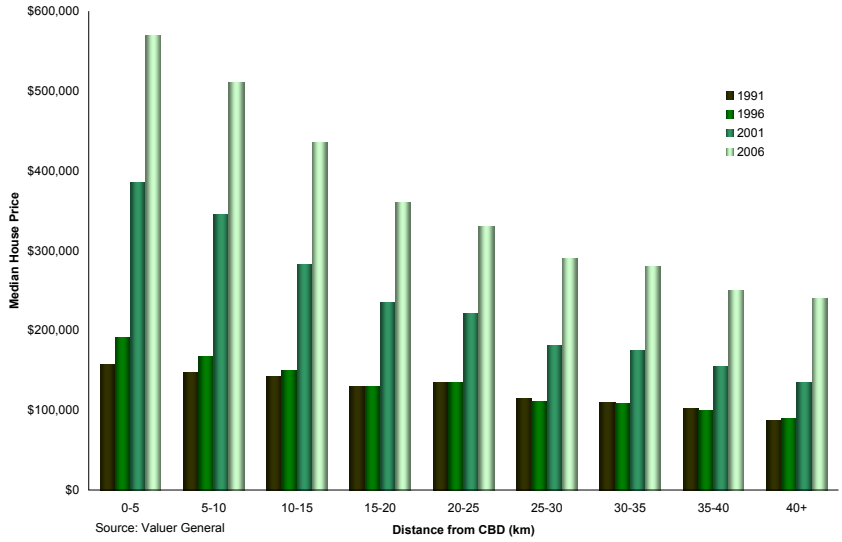
Figure A9: Distribution of jobs, Melbourne, 2006



By Distance from CBD, Source: ABS Census (2006)

Using house price as a hedonic guide to the locality's value, residential amenity is highest in the inner suburbs and diminishes with distance from the CBD. The disparity between inner, middle and outer prices has exploded over the past 15 years (Figure A10).

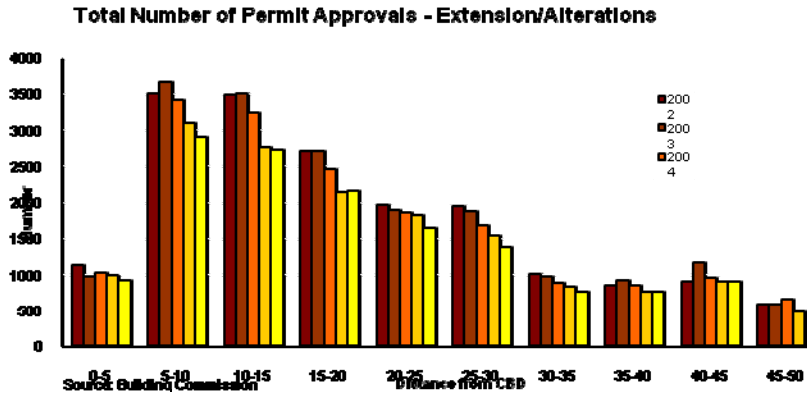
Figure A10: House prices, Melbourne, 1991–2006



By Distance from CBD, Source: Valuer-General, Victoria

Extensions and alterations to existing stock have been concentrated primarily in the inner and middle ring suburbs (5-20 kilometres band) (Figure A11).

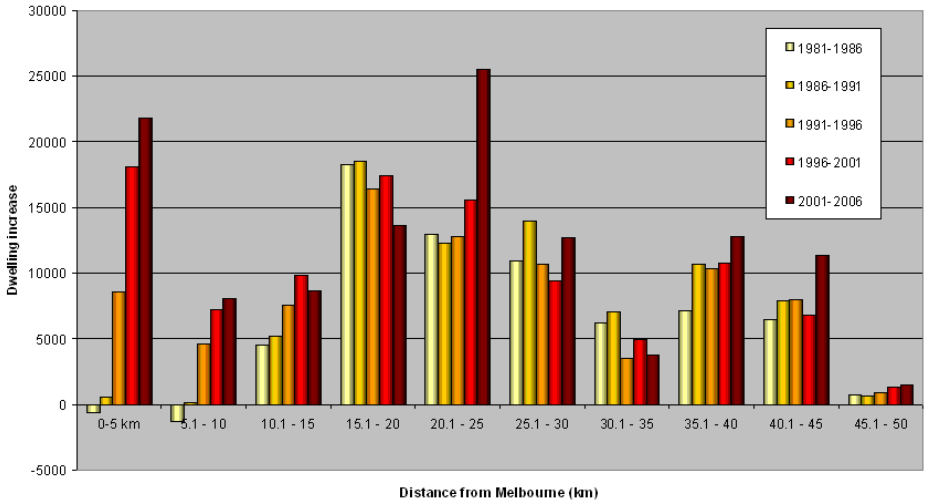
Figure A11: Number of approvals for extensions and alterations, Melbourne, 2002–06



By Distance from CBD, Source: Valuer-General, Victoria

New dwelling construction in the 5–15 kilometres ring beyond the inner city has remained modest over a 20 year period, albeit from a period in the early 1980s where there was actual net loss of housing stock (Figure A12).

Figure A12: Change in stock of dwellings, Melbourne, 1981–2006



By Distance from CBD, Source: ABS Census (1991-2006)

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