

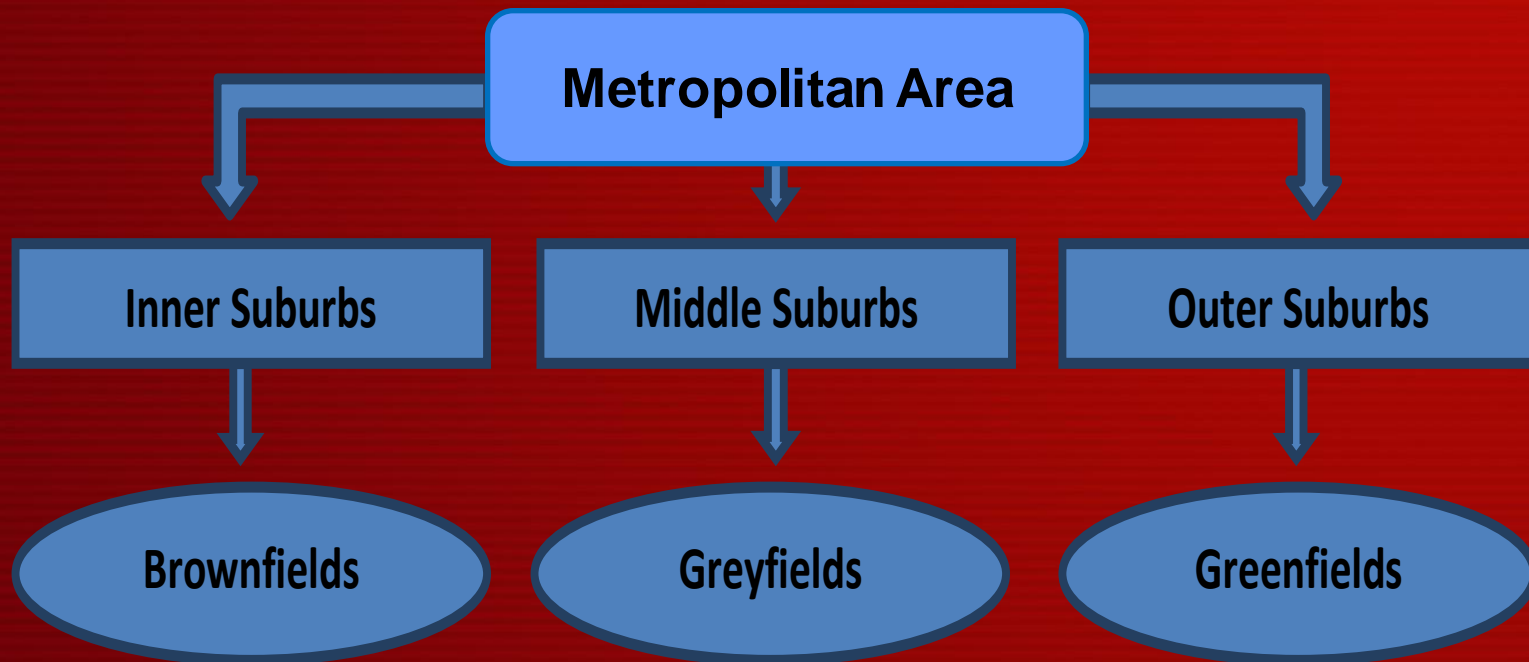
# **Green the greyfields: developing geospatial tools for 21<sup>st</sup> century planning**

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Dept of Geography and GeoHealth Laboratory

University of Canterbury

# What are 'greyfields'?



“**Greyfields**” are those ageing but **occupied** tracts of inner and middle ring suburbia that are physically, technologically and environmentally failing and which represent under-capitalised real estate assets”  
(Newton, 2010)

# Why research the greyfields?

	2006	2031
Total households	7.8m	11.8m
.....		
Lone person	1.86m	3.6m
.....		
Couple with children	2.58m	> 2.47m
.....		
Couple without children	2.13m	3.79m
.....		
Population	20.7m	28.8m

SOURCE: ABS, HOUSEHOLD PROJECTIONS, SERIES III

## Hidden costs...

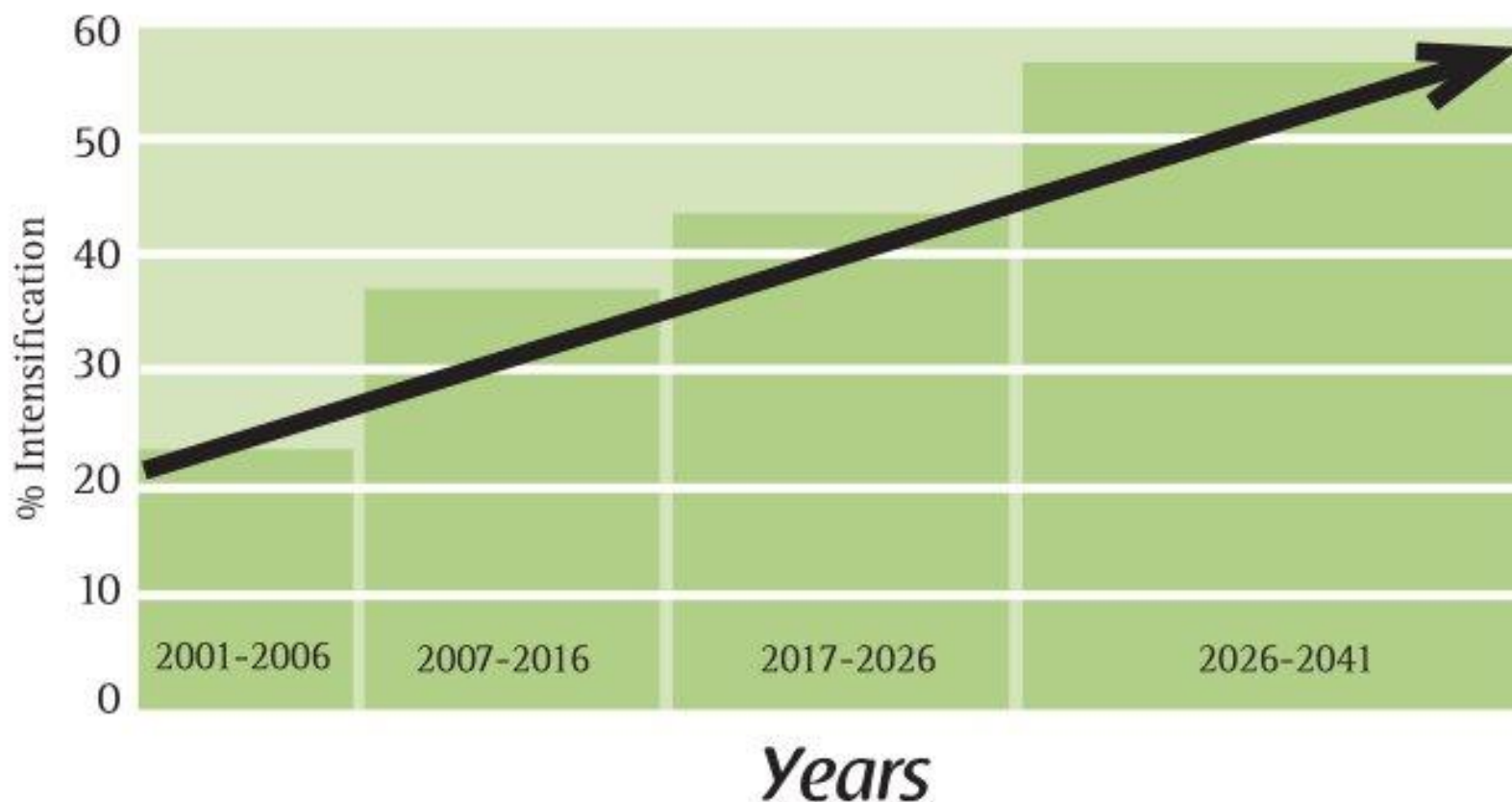
**1000** houses built on the fringe of Australian cities cost **\$300 million** more than **1000** houses built within existing growth boundaries.

# Infill Targets

City	Strategic planning document	Time-frame	Target dwellings (number)	Percentage from infill (%)
Sydney	City of Cities: A Plan for Sydney's Future	2005–2031	640,000	60 to 70
Melbourne	Melbourne 2030: A Planning Update – Melbourne @ 5 million	2009–2030	600,000	53
South-east Queensland	South East Queensland (SEQ) Regional Plan	2009–2031	754,000	50
Perth	Directions 2031 Spatial Framework for Perth and Peel	2009–2031	328,000	55
Adelaide	The 30-Year Plan for Greater Adelaide	2010–2040	258,000	Moving from 50 to 70

Source: **National Housing Supply Council, 2010**

Christchurch	Urban Development Strategy	2007-2041		45-60% (80% in 2006)
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**Figure 11:** Projected share of growth through intensification

Source: Greater Christchurch Urban Development Strategy and Action Plan 2007, p32



# Types of infill



Christchurch



# Types of infill



Slateford Green, Edinburgh



# Types of infill



Hammarby Sjöstad. Stockham



# Types of infill



Christie Walk, Adelaide



# What are the barriers to 'good' infill

- Rules and regulations
  - Parking requirements
  - Tried and tested
- Land area
  - You need bigger land parcels to do better development
- Need a tool to find the cost effective land parcels in the right areas

# Greening the Greyfields - Project stages

- **Module 1:** Why? – Urban Development Economics
- **Module 2:** Where? – Identify areas for housing regeneration
- **Module 3:** What? – Visualisation and Assessment
- **Module 4:** Who and How? – Community Engagement



# Module 2: Where?

## Identify areas for housing regeneration

Shared Urban Spatial Information Platform (SUSIP/Envision)

Australian research

Cooperative Research Centre for Spatial Information

- Curtin University (Perth) – Prof Peter Newman & Dr Roman Trubka
- Swinburne Universities (Melbourne) – Prof Peter Newton & Dr Stephen Glackin
- Victoria Department of Planning and Community Development (DPCD) & City of Manningham
- Western Australia Department of Planning (DoP) & City of Canning

# Approach

Toolset developed

Uses Open source software packages

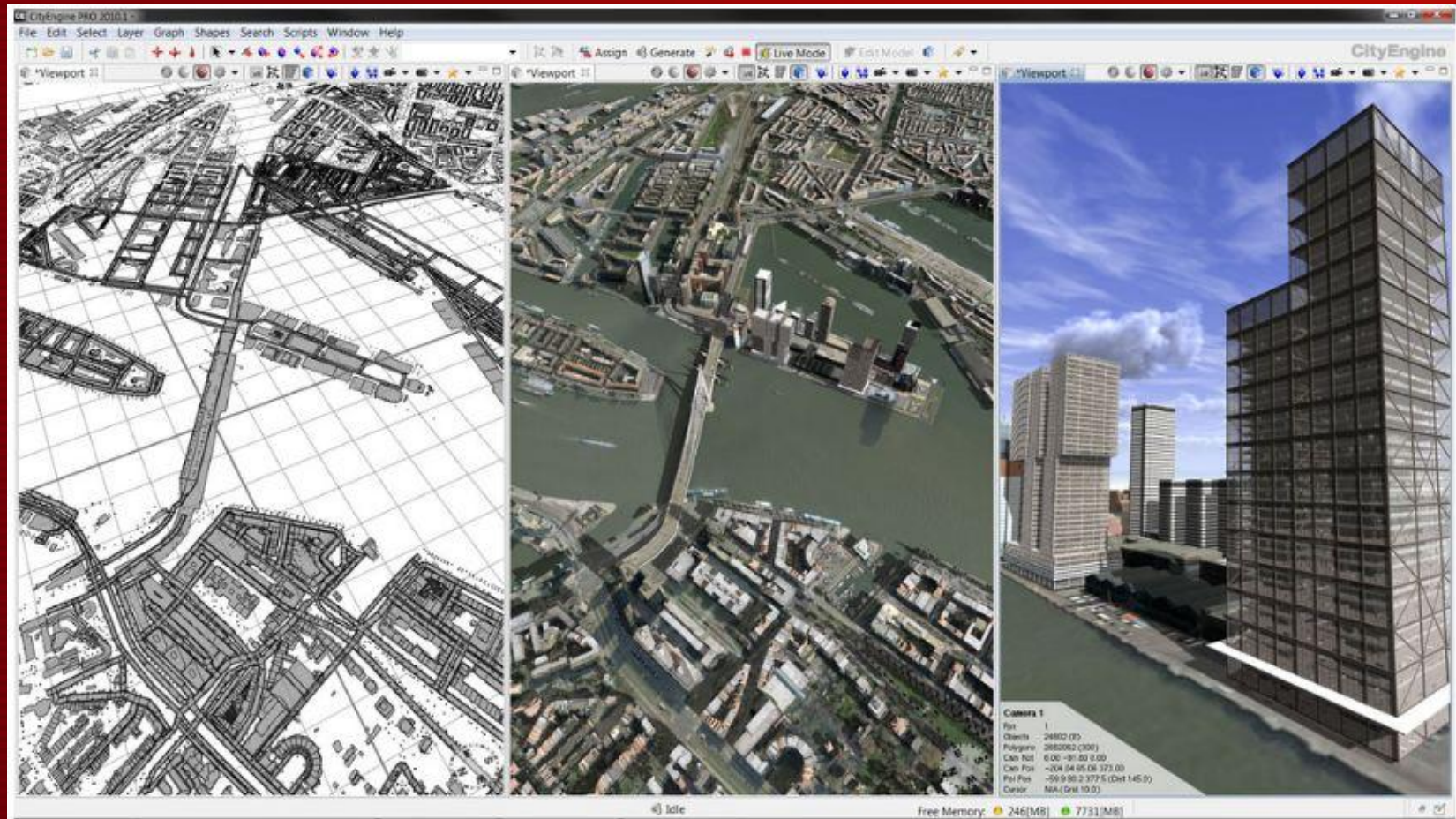
- Database management system (back end)
- Quantum GIS (front end)
- Plug-in in Quantum GIS using Python programming language
- Based on research
- Locally variable
  - Sensitive to changes in individual attributes

- Multi-criteria evaluation tool
  - Property, demographic and location attributes
- Market re-development tool
  - Which attributes contribute to property being re-developed e.g. age of dwelling, density, nearby demolitions, zoning
- Zoning capacity tool
  - Allows rezoning to higher densities
- Housing typology / design tool
  - Looks at type of housing that could be added

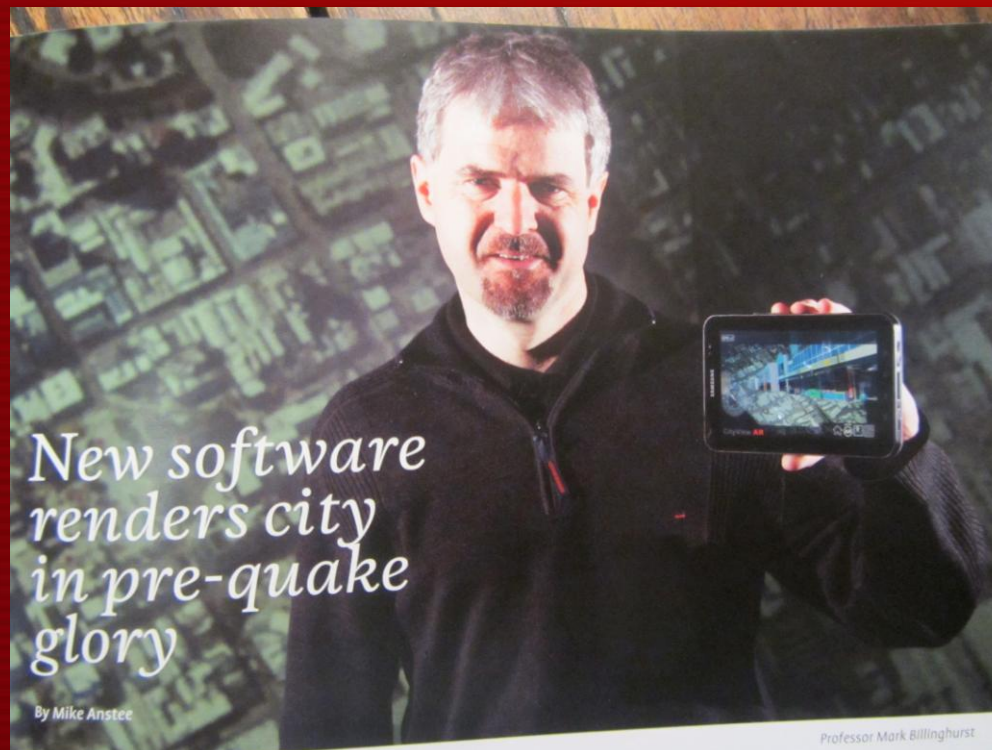




# Module 3: What? Visualisation and Assessment



# Linking Shared Urban Spatial Information Platform to City View AR





# Module 4: Who and How? Community Engagement

## Linking tools to people

- How do we use and how will it be received



**Thank you**





# Multi-criteria Evaluation (MCE) Tool

Introduction Strategic Probability of redevelopment Area and development Rezoning tool

Property Attributes

RPI	<input checked="" type="checkbox"/>		11	Zoning	<input type="checkbox"/>		10
Age of dwelling	<input checked="" type="checkbox"/>		14	Strata titled	<input type="checkbox"/>		10
Area	<input type="checkbox"/>		10	Vacant land	<input checked="" type="checkbox"/>		5
Frontage	<input type="checkbox"/>		10	LGA owned	<input type="checkbox"/>		10
Development efficiency	<input type="checkbox"/>		10	Extra land	<input type="checkbox"/>		10
Lot squareness	<input type="checkbox"/>		10	Sensitive area	<input type="checkbox"/>		10

Demographics

Age 20 - 29 quartile	<input type="checkbox"/>		10	SEIFA quartile	<input type="checkbox"/>		10
Age 30 - 54 quartile	<input type="checkbox"/>		10				
Age 55 - 74 quartile	<input checked="" type="checkbox"/>		10				
Age 75+ quartile	<input checked="" type="checkbox"/>		12				

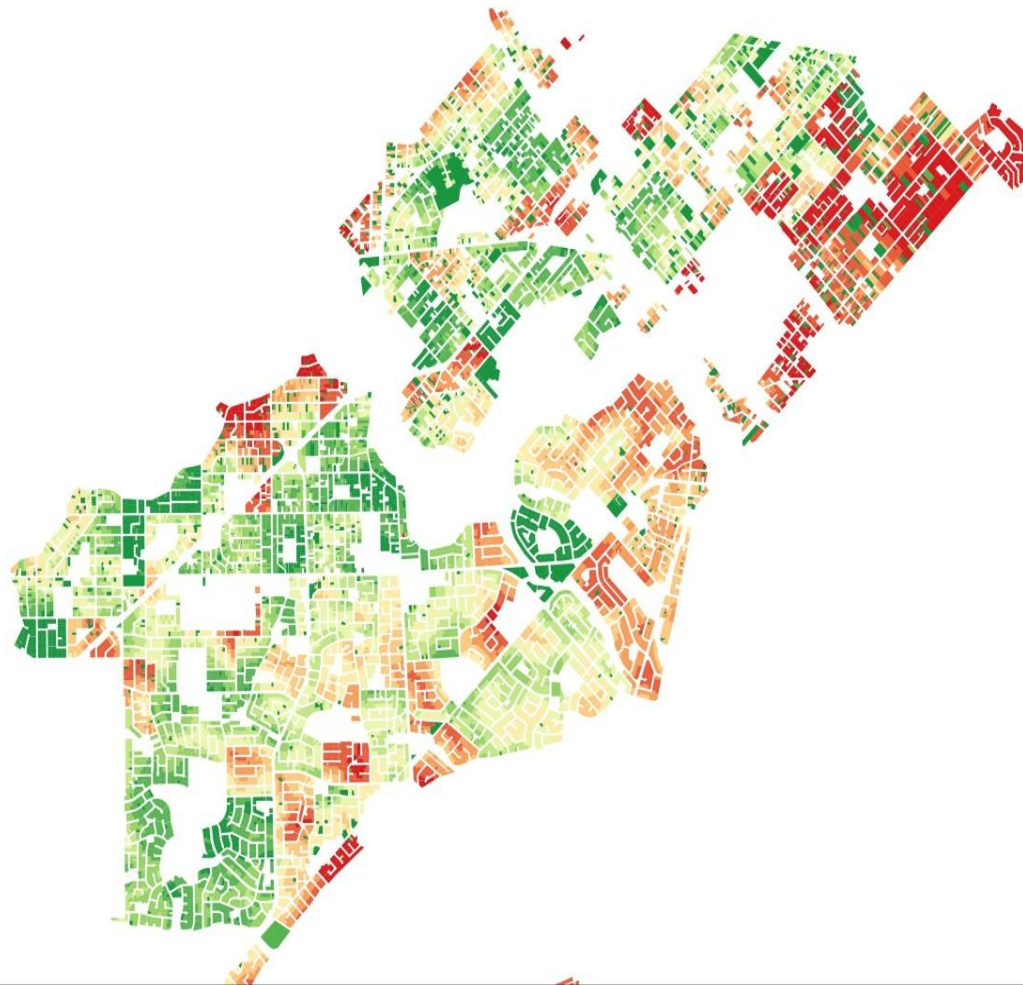
Location

Dist to primary centre	<input type="checkbox"/>		10	Dist to primary school	<input type="checkbox"/>		10
Dist to neighbourhood centre	<input checked="" type="checkbox"/>		14	Dist to secondary school	<input type="checkbox"/>		10
Dist to local centre	<input checked="" type="checkbox"/>		9	Dist to tertiary school	<input type="checkbox"/>		10
Dist to train station	<input type="checkbox"/>		10	Recent nearby demolitions	<input checked="" type="checkbox"/>		7
Dist to bus stop	<input checked="" type="checkbox"/>		8	Relative density	<input type="checkbox"/>		10
Dist to main road	<input type="checkbox"/>		10	Net increase	<input type="checkbox"/>		10
Dist to park	<input checked="" type="checkbox"/>		10	PTAL	<input type="checkbox"/>		10

Variables selected: 10 Total Points allocated: 100 [Reset Values](#)

Title for analysis layer:  [Run MCE](#)

# City of Canning – aged persons housing potential based on MCE



# Market / Redevelopment Tool

Introduction
Planning / MCE tool
**Market / Redevelopment Tool**
Zoning / Capacity Tool
Housing Typology / Design Tool

This section allows users to select which primary indicators they would like to query and to what level. It also allows users to make the query AND (ie refining a selection) or OR which adds more variables to the query.

Type of Query  
☒ And  
☐ Or

Show map

Your current query is:  
- Query result here -

Primary Indicators

RPI  $\geq$  ☐ 0.0  
Age of dwelling  $\geq$  ☐ 0  
Relative Density  $<$  ☐ 1.0  
Zoning (WA)  $>$  ☐ 0  
Recent nearby demolitions  $\geq$  ☐ 0  
Net increase  $\geq$  ☐ 0  
LGA owned ☐ Vacant land ☐

Remove

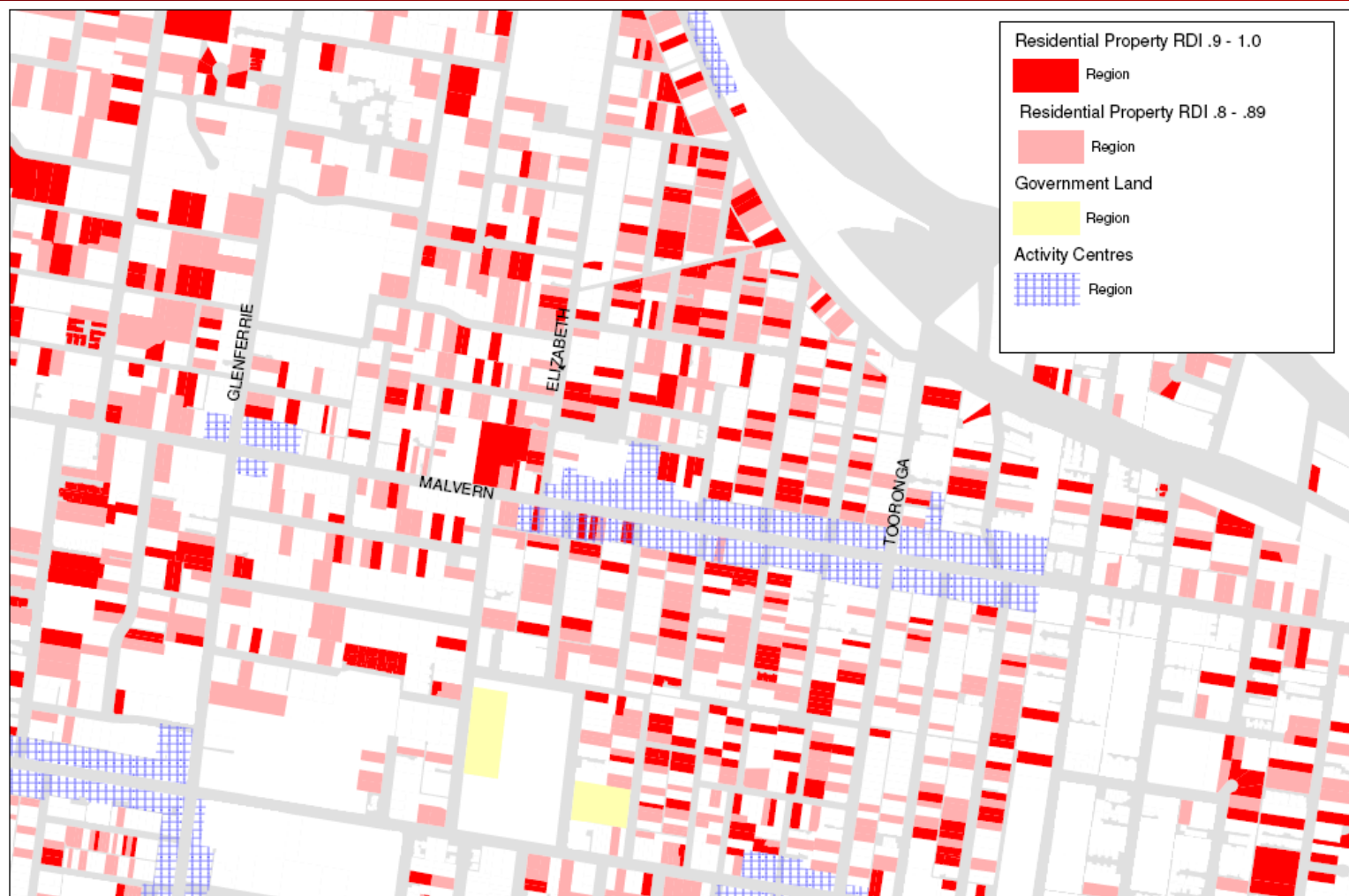
Area (sqm)  $<$  ☐ 0  
Frontage (m)  $<$  ☐ 0  
Extra land index  $<$  ☐ 1.0  
Development efficiency  $>$  ☐ 0.0  
Strata title ☐ Sensitive area ☐ Vacant ☐

Zoning (Vic)

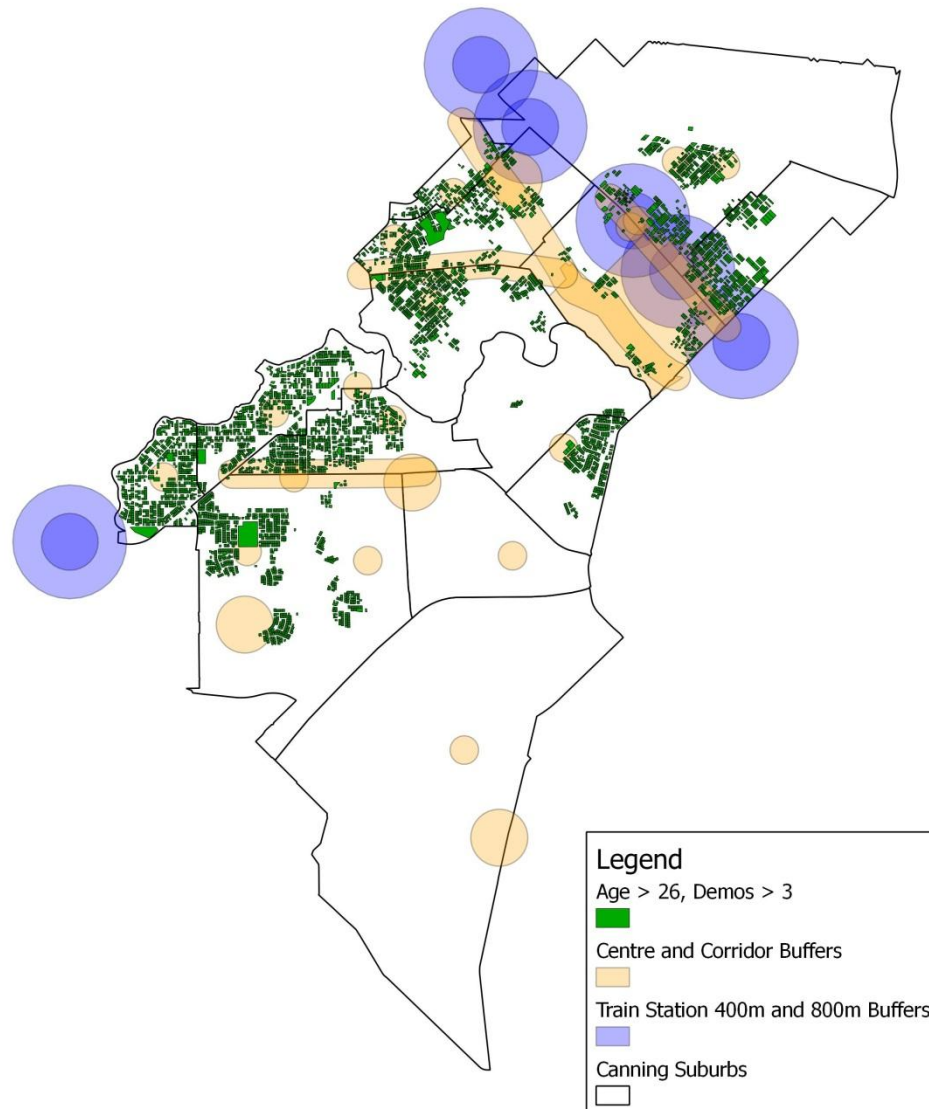
☐ Activity centre ☐ Business ☐ Industrial ☐ Rural conservation  
☐ Low density ☐ Residential ☐ Park/public ☐ Special use



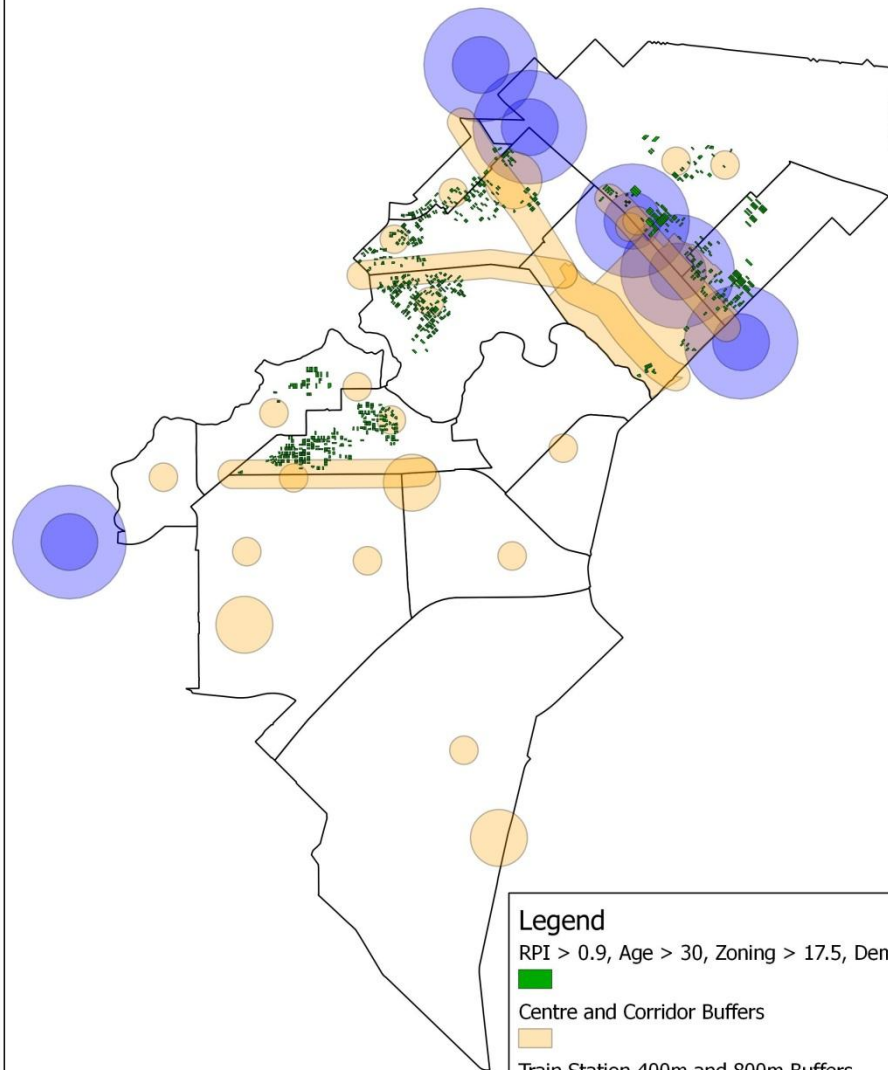
# REDEVELOPMENT POTENTIAL INDEX (RDI) 2006



City of Canning - Areas of Medium to Strong Redevelopment Potential



City of Canning - Areas of Strong Redevelopment Potential



Legend

RPI > 0.9, Age > 30, Zoning > 17.5, Demos > 5



Centre and Corridor Buffers



Train Station 400m and 800m Buffers



Canning Suburbs





# Rezoning Tool

Introduction

Planning / MCE tool

Market / Redevelopment Tool

Zoning / Capacity Tool

Housing Typology / Design Tool

Rezoning-capacity tool

Add rezoning layer

Calculate

Total area rezoned (ha): 7.26085

Total dwelling capacity: 415

Net capacity increase: 229

Total dwellings: 375

Net dwelling increase: 258

Delete all zones

Remove Layer

	gid	Name	Density	Dev't Efficiency	Area	Capacity	D
1	105		60	0.85	2.46491	147.894	125.7:
2	106		60	0.95	3.74931	224.959	213.7:
3	107		40	0.85	1.04663	41.8653	35.58:

Sub-station based capacity analysis

Calculate Remaining Capacity

Number of sub-station covered: 2

Current surplus capacity: 30142

Remaining surplus capacity after redevelopment: 29884

Collection district based capacity analysis

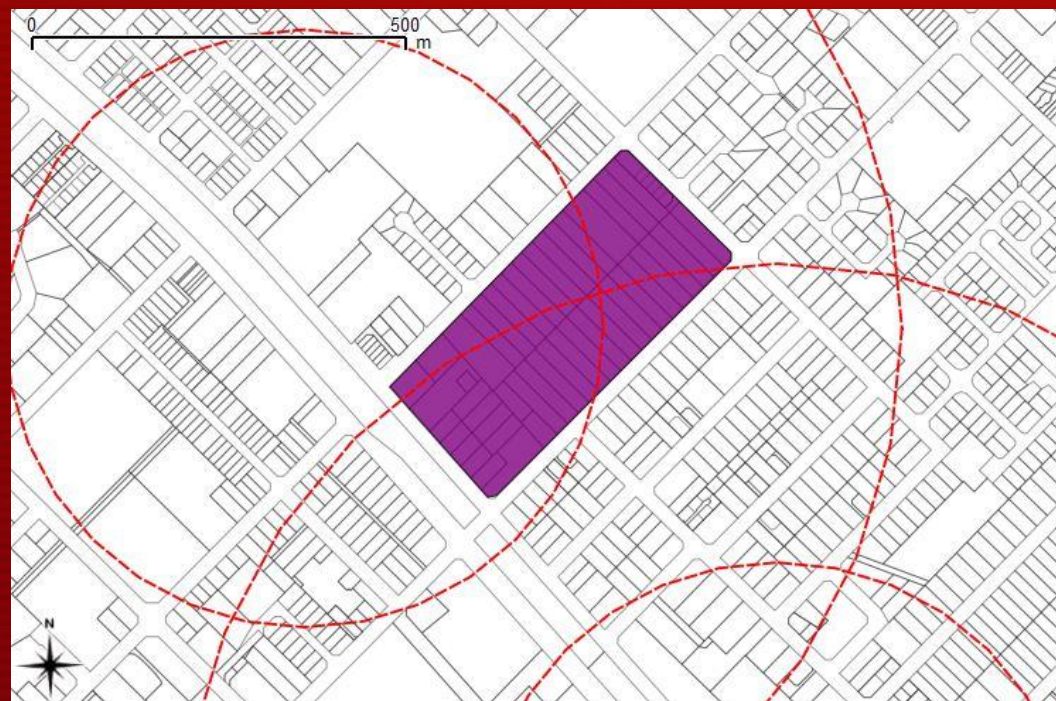
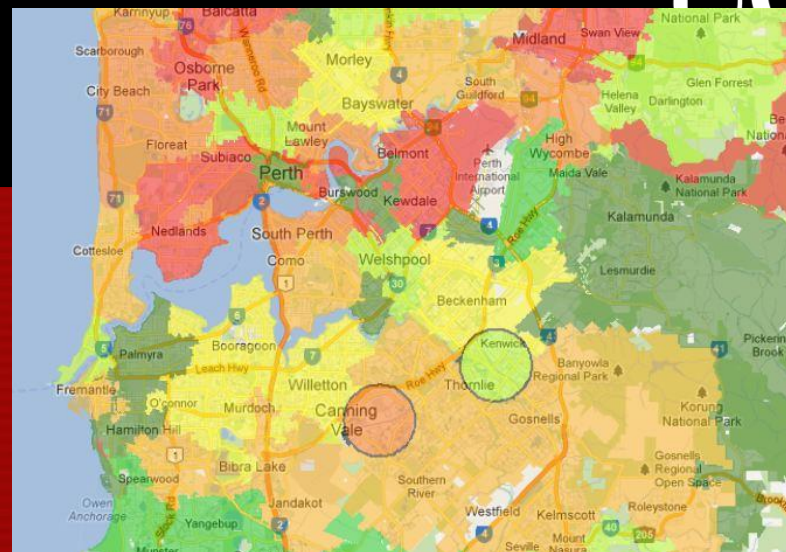
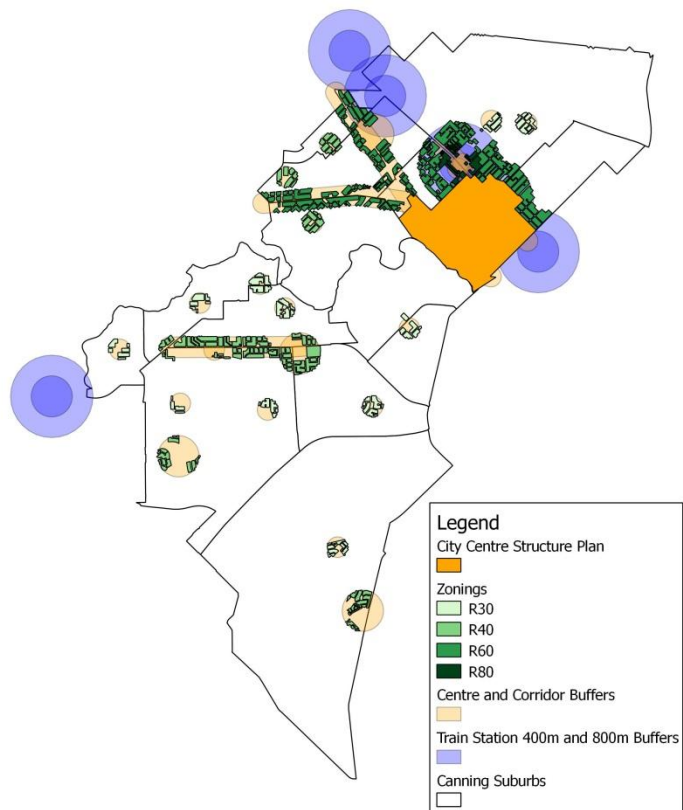
Calculate Remaining Capacity

Number of CDs covered: 3

Current surplus capacity: 1228

Remaining surplus capacity after redevelopment: 970

City of Canning - Canning Rezoned (D2031 and SPP 4.2)





# Housing Typology / Design Tool

Introduction
Planning / MCE tool
Market / Redevelopment Tool
Zoning / Capacity Tool
Housing Typology / Design Tool

Redevelopment area creation

Add 'Area Capture' Layer

Execute Lot Amalgamations

Property details of area captured

Number of original lots: 0
Number of destination lots: 0

Average size of original lots: 0
Average destination lot size: 0

Single lots
Count: 0

Double Lots
Side-by-side: 0
Back-to-back: 0

Triple Lots
Side-by-side: 0
L-formation: 0

Quadruple Lots
Count: 0

Quintuple Lots
Count: 0

Sextuple-plus Lots
Count: 0

Reset

Save to KML

Yield - BAU
0 to 0

Yield - Adv. Design
0 to 0

Total Yield - BAU
0 to 0

Total Yield - Adv
0 to 0

Potential design benefits

-BAU-

Yield
Building mass
Design flexibility
Open space quality
Pedestrian/bikes
Passive design
Sustainable systems
Public / community
Affordability
Commercial viability

-Advanced Design-

Yield
Building mass
Design flexibility
Open space quality
Pedestrian/bikes
Passive design
Sustainable systems
Public / community
Affordability
Commercial viability

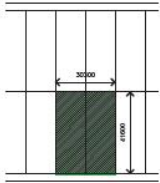
Density - BAU
0 to 0 dph

Density - Adv. Design
0 to 0 dph

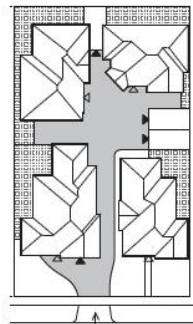
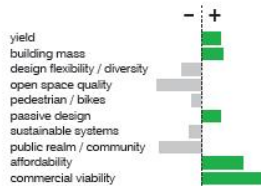


# Dwelling Typologies: Double (side by side) lots

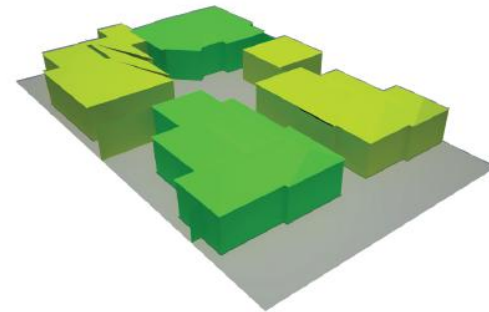
## Double Lot Redevelopment



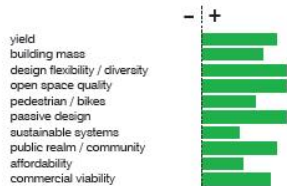
### Business as Usual



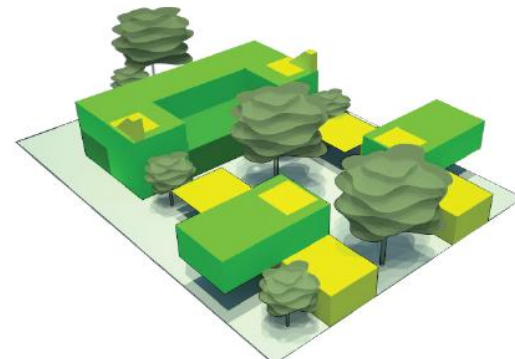
4 x detached units



### Design Alternative

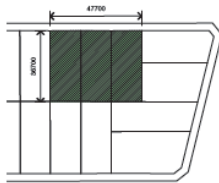


6 x dwellings (hybrid apartment & courtyard model)

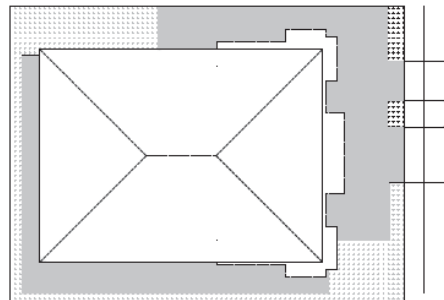
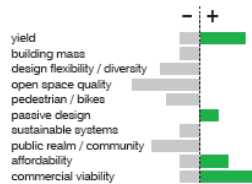


# Dwelling Typologies: Triple lot 'Lifted' (6 or more stories)

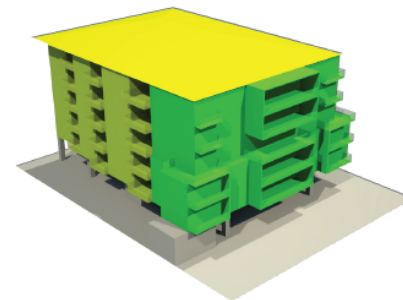
Triple Lot 'Lifted' (6 or more storeys)



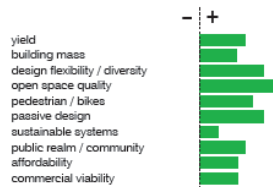
Business as Usual



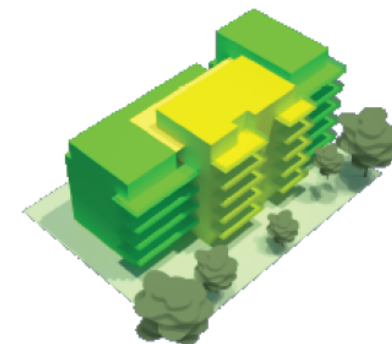
1, 2 & 3 bedroom apartments (basement parking)



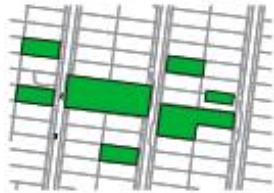
Design Alternative



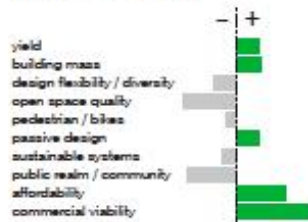
1, 2 & 3 bedroom apartments (basement parking)



## Precinct Redevelopment

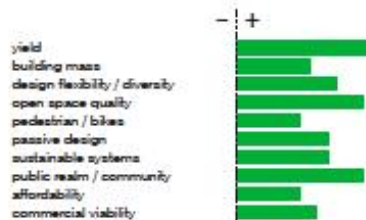


### Business as Usual



30 dwellings.  
All dual occupancy units.  
Parking garages adjacent each dwelling.

### Design Alternative



68 dwellings.  
Diversity of apartments, terrace and courtyard housing.  
Mix of uses, including local business & community uses.  
Common parking areas, improved pedestrian & bike lanes.  
Public open space and infrastructure upgrades.  
District-wide energy, waste, water & technology systems.