



Cost Benefit Analysis: Intensification Planning Instrument for Upper Hutt City's District Plan

Report for Upper Hutt City
Council

Monday 18 July, 2022



SENSE PARTNERS

DATA LOGIC ACTION



Context

Sense Partners has been engaged to conduct a cost-benefit analysis (CBA) of a proposed intensification planning instrument. The instrument responds to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA-EHS).

The focus of the Act is to enable additional housing in Aotearoa New Zealand 's main urban areas. Upper Hutt City is part of the Wellington urban area and is thus subject to the legislation that requires councils to respond to the new legislation.

The planning instrument brings both the MDRS and NPS-UD into the district plan.



Key points

The proposed Intensification Planning Instrument (IPI) enables density beyond the requirements of the Medium Density Residential Standards (MDRS)

- Proposed amendments enable a large amount of medium and high-density housing.
- These amendments include:
 - Splitting the residential zone into a general and a new high-density zone, that covers a wide area.
 - Significant allowances for much higher densities, including:
 - unlimited heights in the city centre zone,
 - Enabling heights up to 20m as a permitted activity, and up to 26m as a restricted discretionary activity in the High-density residential zone.
 - providing for greater building height, a higher recession plane, and increased site coverage within the high-density zone.
 - Enabling 6 residential units on a site as a permitted activity within the high-density zone.
- Taken as a suite of policy changes, these amendments enable significantly more housing than the MDRS alone enables.

Our analysis suggests large gains to both the MDRS and additional IPI amendments

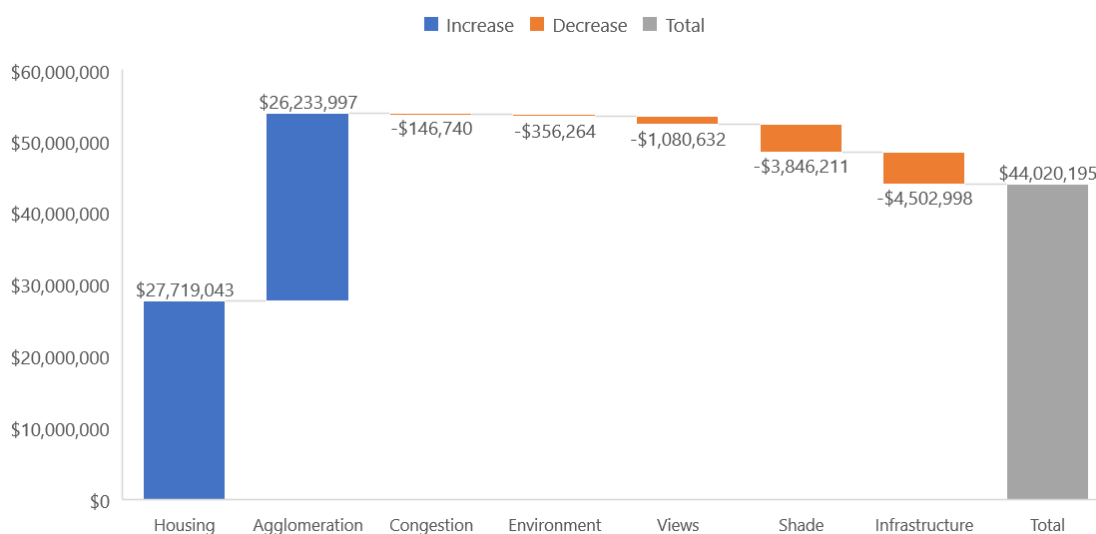
- We find large benefits from both the MDRS and the additional IPI amendments that create opportunities for more people to live and work within Upper Hutt.
- Benefits are chiefly
 - improved housing market dynamics that allow new buyers to transact at prices below their willingness to pay, creating a benefit
 - density creates strong agglomeration impacts –stronger local labour and goods markets that increase productivity of firms and workers.
- Costs include additional payments for infrastructure, shading and some loss of views and smaller costs on congestion and the environment (primarily air quality).
- Our base case suggests net benefits of \$116 million from the MDRS and an additional net benefit of \$44 million from other IPI amendments (see



- Figure 1).



Figure 1: Our analysis shows clear benefits from the additional IPI amendments



Source: Sense Partners

Our estimates are uncertain, so we test our base case against high and low alternatives

- We model net costs and benefits using a variety of methods and techniques that draw from best practice on urban economics, including recent work on the MDRS CBA.
- Our base case of 1,758 extra MDRS dwellings simply allocates earlier work that estimated 28,000 MDRS enabled dwellings in the Wellington region on a per capita basis. Relative property values would suggest allocating fewer properties to Upper Hutt. But other councils would appear to be adopting less permissive IPIs.
- Since the number of dwellings, the IPI enables is uncertain, we work with a 'low' scenario, where the MDRS provides 1,484 dwellings and the other IPI provisions 742 extra dwellings.
- A 'high' scenario, where there is no adjustment for relative prices between Wellington City and Upper Hutt, returns 2,226 MDRS dwellings and 2,003 dwellings enabled by the additional IPI amendments. We use upper bounds on dwellings forecasts as a guide but ultimately a full HBA assessment is required to best assess future dwellings after each council responds to the MDRS and the intensification requirements of the NPS-UD.

Enabling additional housing leads to improved housing market outcomes

- We model housing outcomes using the same elasticities in the MDRS CBA. In real terms, our base case suggests house prices fall \$108,903 from the impact of the MDRS. Additional IPI amendments that increase housing supply lower the real price of housing by an additional \$45,000.
- The fall in house prices improves outcomes since more transactions are now possible at prices lower than buyers' willingness to pay.
- Both the MDRS and the additional IPI amendments generate significant transfers of wealth to buyers from sellers whose housings assets have decreased in value. These



transfers might be expected to increase equity but are not included in standard cost-benefit analysis since the costs and benefits are offset.

Enabling high density throws shade on many properties – these costs are material

- In previous work,¹ we constructed a model that calculates the shade cast by typical density buildings enabled by the MDRS in the Wellington region.
- We make a modest adjustment for relative house prices but otherwise allocate these values to on a per capital basis (at least in our base case).
- Previous work shows Upper Hutt residents have a significant preference for sunshine that manifests in higher prices for homes with more sunshine hours.
- Our base case suggests the cost of lost sunshine is about \$5.5 million in the base case and about half that value for the IPI amendments (see Table 1).

We assess smaller costs for lost views, environmental impacts and congestion

- Increasing density can obstruct views decreasing the enjoyment from these locations.
- But the sales record for Upper Hutt shows relatively few wide-open views of water – views that are valued, attracting the largest price premium – so these costs are small.
- We take a conservative approach and use previous work to attribute some small environment costs from reductions in air quality.
- Congestion is hard to pin down but most likely adding additional residents to Upper Hutt – even for dwelling types most likely to use public transport – is likely to increase congestion for Upper Hutt residents.
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Most of the action is about residential zoning...but other IPI amendments are material

- Much of our assessment focusses on a quantitative assessment of the policies with the most significant costs and benefits – the Residential Zones Chapter.
- We augment our quantitative assessment of the key residential impacts with a qualitative assessment of the other key policies including the Commercial and Mixed-Use Zones Chapter.

¹ See the Cost-Benefit Analysis of proposed Medium Density Residential Standards, PWC and Sense Partners 2021



Table 1: Our analysis suggests material benefits from zoning changes

Medium Density Residential Standards			
CBA Element	Base	Low	High
Additional dwellings	1,758	1,484	2,226
Benefits			
Housing	\$95,725,737	\$68,211,318	\$153,476,022
Agglomeration	\$36,988,008	\$58,179,999	\$85,763,177
Total benefits	\$132,713,745	\$126,391,317	\$239,239,199
Costs			
Congestion	\$2,667,249	\$2,447,969	\$3,106,589
Environment	\$508,783	\$429,484	\$644,227
Views	\$1,543,259	\$521,091	\$1,543,259
Shade	\$5,492,801	\$5,111,312	\$6,390,946
Infrastructure	\$6,430,764	\$5,428,472	\$8,142,708
Total costs	\$16,642,856	\$13,938,329	\$19,827,729
Net benefits			
Net benefits	\$116,070,889	\$112,071,499	\$219,411,470
Benefit-Cost ratio	7.97	9.07	12.07
Additional Proposed Intensification Planning Instrument (IPI)			
CBA element	Base	Low	High
Additional dwellings	1,231	742	2,003
Benefits			
Housing	\$27,719,043	\$10,436,601	\$68,996,340
Agglomeration	\$26,233,997	\$8,000,410	\$77,587,050
Total benefits	\$53,953,040	\$18,437,011	\$146,583,389
Costs			
Congestion	\$146,740	\$109,570	\$265,070
Environment	\$356,264	\$214,742	\$579,688
Views	\$1,080,632	\$260,546	\$3,516,664
Shade	\$3,846,211	\$2,555,656	\$5,750,703
Infrastructure	\$4,502,998	\$2,714,236	\$7,326,974
Total costs	\$44,020,195	\$12,582,261	\$129,144,290
Net benefits			
Net benefits	\$44,020,195	\$12,582,261	\$129,144,290
Benefit-cost ratio	5.43	3.15	8.41
Joint policy impact: MDRS and IPI			
Total benefits	\$213,242,486	\$164,621,408	\$423,089,417
Total costs	\$26,575,701	\$19,793,079	\$37,266,829
Net benefits	\$186,666,785	\$144,828,328	\$385,822,588
Benefit-cost ratio	8.02	8.32	11.35

Source: Sense Partners



Commercial and mixed-use zones chapter includes on paper a large change – a move to a centres hierarchy

- The centres hierarchy is chiefly about giving effect to the Regional Policy Statement and retaining the role and function of the City Centre Zone, and to enable the IPI to more accurately give effect to the requirements of Policy 3(d) of the NPS-UD.
- The centres hierarchy is similar in form to other hierarchy models reported to be working well elsewhere (Wellington, for example). Planners in other local councils speak highly of the benefits of a centres hierarchy to manage, control, and promote retail activity.
- Economic frameworks probably underplay externalities from the location of large format retail and favour allowing some fungibility across locations. This may increase variety in consumer goods and services available in some locations for retail and is likely to be net beneficial.
- Retaining the existing enablement of residential at the rear and above commercial spaces increases the flexibility of capital in the local economy. This is particularly the case where the IPI proposes to increase the heights within centres from the status quo limits.

Retail can benefit from a range of activities rather than rules and policies alone

- Collaboration and community discussion to enable suitable development activity remains critical to vibrancy. This will reduce latent development potential.
- Vibrancy of outer centres are key. Draft controls on GFA are mostly consistent with efficient use of business land in town, local and neighbourhood centres.
- Some design controls can increase development costs and limit efficient land use.
- The evidence base on the benefits of design controls should help determine these draft controls.

Some IPI amendments raise costs for developers – that can be OK

- It is worth noting that some IPI amendments raise costs for developers. For example, recouping development charges is appropriate, but expect some impact on the timing and location of development.
- Requirements for hydraulic neutrality will also increase costs for developers. This may be a first best option rather than costly remediation of the water system.
- But the policy will work best when implemented on a collective basis across the region to mitigate developers moving to more least cost development locations. Our understanding is this is likely to be true in the near-term through a region-wide change to the Regional Policy Statement to give effect to national guidance on freshwater management.

Papakāinga provisions looks sensible, but cultural impacts beyond our remit

- We note the IPI amendments that apply to enabling of Papakāinga.



- Any cost-benefit assessment should appraise the broad social, economic, environmental and cultural impacts.
- But our assessment is limited to the social, economic and environment costs and benefits. We do not make any claim of expertise on cultural impacts.

Urban design considerations are sensible but are hard to quantify

- Within the residential chapter there is an emphasis on using urban design practice to mitigate poor outcomes.
- This anticipates the direction of travel – expect national direction on urban design principles.
- In general, too much reliance on urban design reduces certainty and flexibility for firms, developers and residents, potentially risking the transparency the proposed IPI provides. We do not have specific criticisms of the proposed design guides.
- The role of character appears to be in keeping with the reality that character – and amenity – changes over time.
- The approach to passive street surveillance appears sensible but benefits are hard to quantify.
- Simple delineation of the two precinct areas help keep the plan simple and transparent:
 - Precinct 1 – Indigenous Biodiversity Precinct
 - Precinct 2 – St Patrick's Estate Precinct, including part of the 45 hectares of empty land alongside the Hutt River, forming part of the flood plain.

Both the MDRS and other IPI amendments improve outcomes for the local community

- Enabling density brings significant benefits to New Zealand's urban areas – including Upper Hutt that our cost-benefits analysis makes clear.
- Increasing housing supply, makes for better housing outcomes and likely improves equity outcomes – benefits we quantify, but do not include in our cost-benefit analysis.
- The impact of density on productivity of local firms and workers is significant – better labour market outcomes, more variety in local suppliers and spillovers from firms clustering together raises incomes a little each year. This is material in the long run.
- Realised densities will be driven by policy choices not just within Upper Hutt, but across the Wellington region. Adding capacity helps but is not the single factor determining how many people will live within the city.



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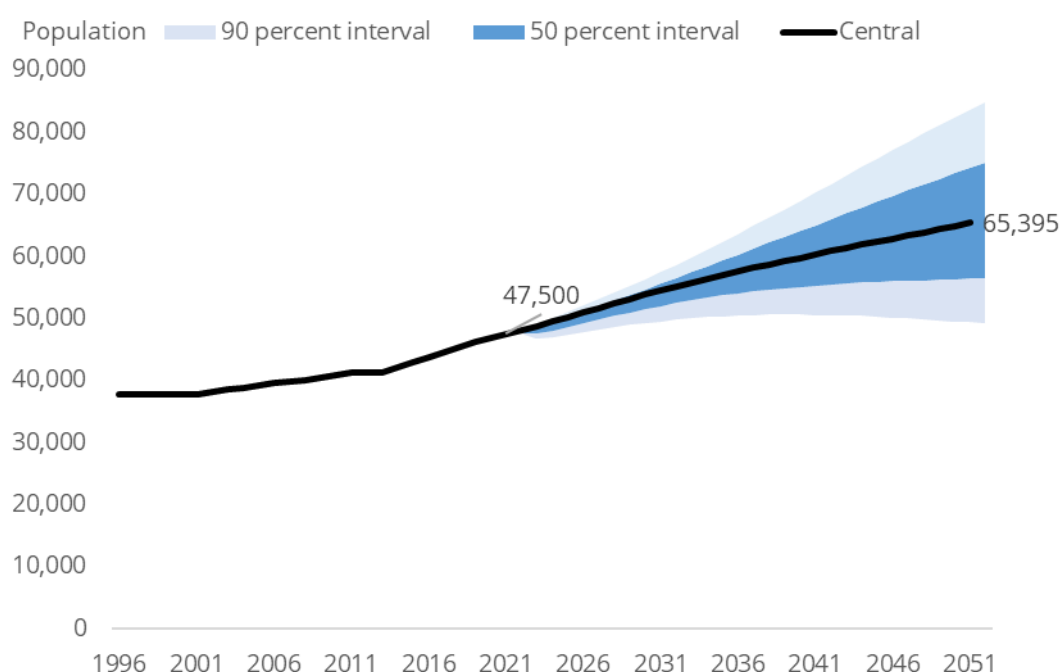
1. Overview

1.1. Demographic outlook

Demographics are central in determining the outlook for housing demand and in turn, how policy might be expected to respond.

Figure 2 shows the pace of growth is expected to slow a little, although the population average 1 percent growth over the forecast period to 2051.

Figure 2 Population growth is expected to moderate from the recent strong growth rates Population projections, year to 30 June.



Source: Sense Partners

These forecasts for future population are uncertain. Net migration to New Zealand and regional migration are key uncertainties. So, Sense Partners regularly provide confidence intervals around the forecasts. We show a 50- and 90-percent confidence interval in Figure 2.

Moreover, future population will depend on the district plan and how enabling local regulations are relative other councils across the region and across New Zealand more broadly.

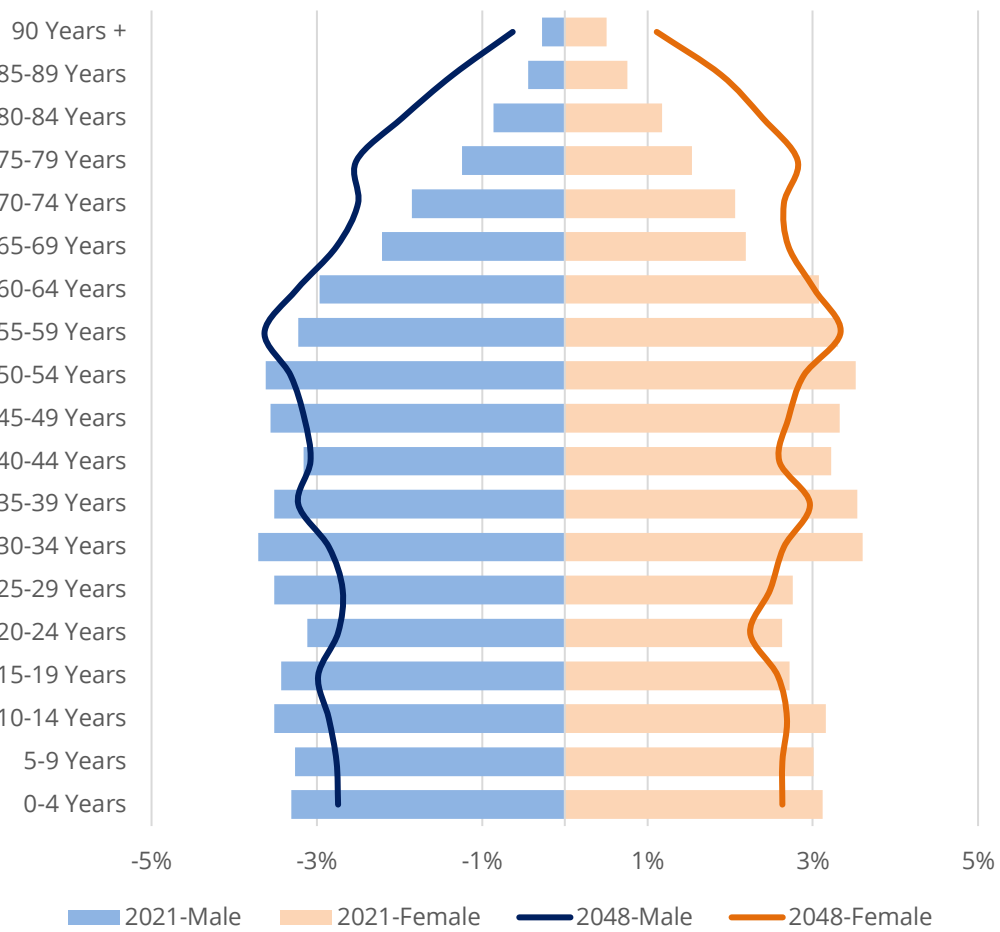
The right time to address these issues is through the regions' Housing and Business Assessment. For now, we note that it turns out that the additional capacity we consider in our base case, is approximately consistent with the top of the 50-percent confidence interval.



In addition, Upper Hutt is expected to age. The lines in Figure 3 show cohorts in older age groups are likely to be a much larger fraction of the population than today.

Typically, older cohorts require more dwellings per 1,000 people. So, expect this aging to add addition pressure to Upper Hutt's housing market.

Figure 3 Like elsewhere, Upper Hutt is expected to age, putting pressure on housing
Age profile, 2021 vs 2051



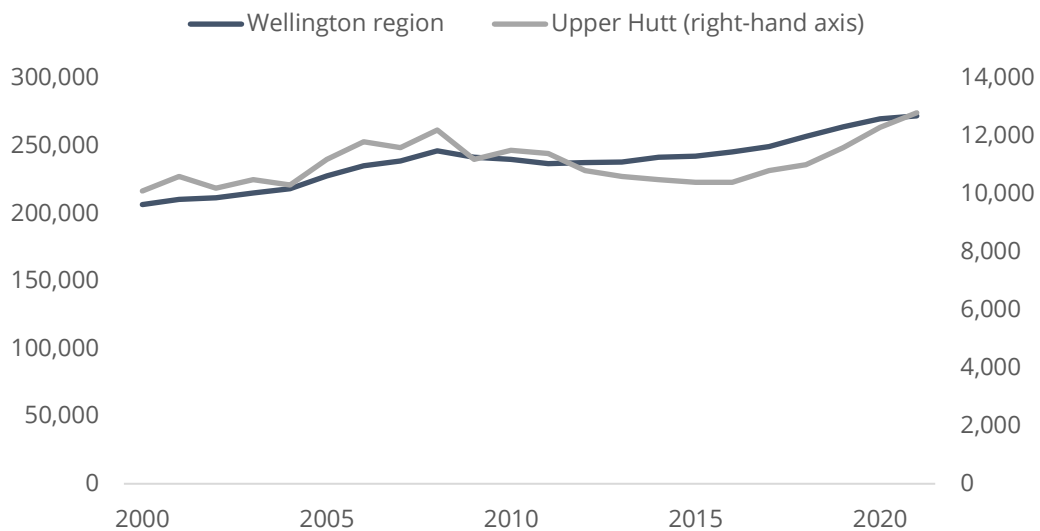
Source: Sense Partners



1.2. Economic outlook

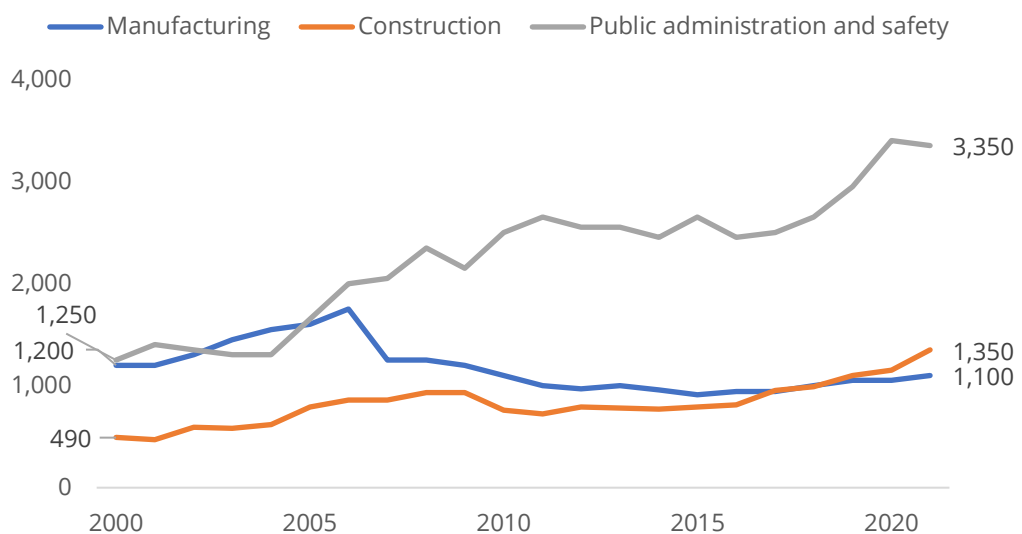
Trends and conditions in the local economy also determine the demand for housing. Upper Hutt's strong commuting connections to Wellington city are also important. Figure 4 shows that Upper Hutt job numbers have surpassed pre-GFC peaks and have grown more rapidly than the region in recent years. Construction and government jobs are boosting growth (see Figure 5). Right now, economic trends point to continued demand for housing in Upper Hutt.

Figure 4 The GFC hit Upper Hutt hard by the recovery is picking up steam
Job numbers, 2000-2021, Wellington region vs Upper Hutt



Source: Statistics New Zealand, Business demography data

Figure 5 Construction and government activity are picking up...in Upper Hutt
Job numbers, 2000-2021, Wellington region vs Upper Hutt



Source: Statistics New Zealand, Business demography data



1.3. Housing outlook

Like elsewhere, Upper Hutt's housing market is moderating from the previous level recorded at the end of 2021. Weak net migration and increasing interest rates have reduced demand prices for housing in the market. The median house price in Upper Hutt is \$800,000 – the same value as 12 months ago. Increasing mortgage repayments have offset price declines: housing remains unaffordable for most.

Land prices have increased rapidly across the Wellington region (see Figure 7). This suggests development restrictions, not construction costs (see Figure 8), have pushed prices higher.

Figure 6 Previous house prices increases have been pared back in recent months
Median house price, January 2012 to June 2022, Wellington region, Upper Hutt, New Zealand

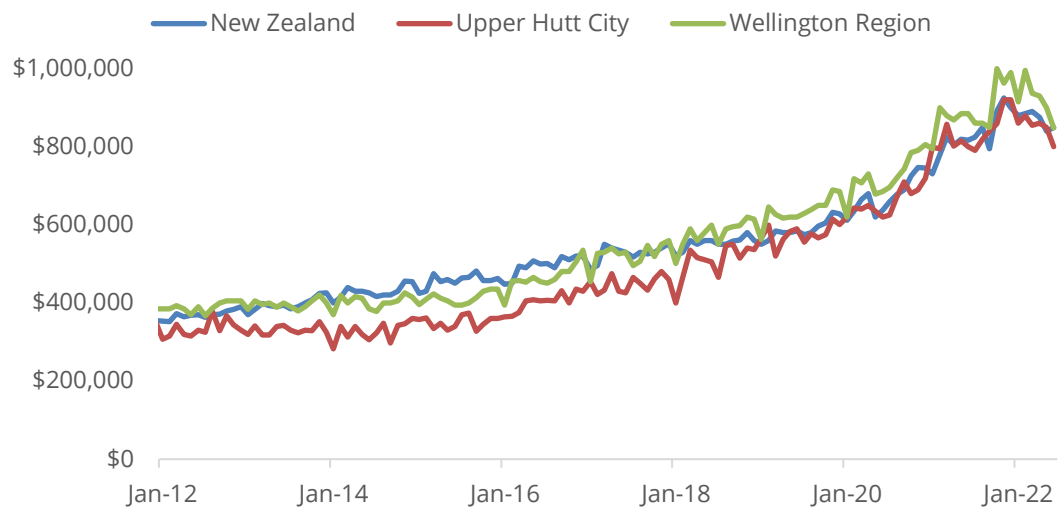
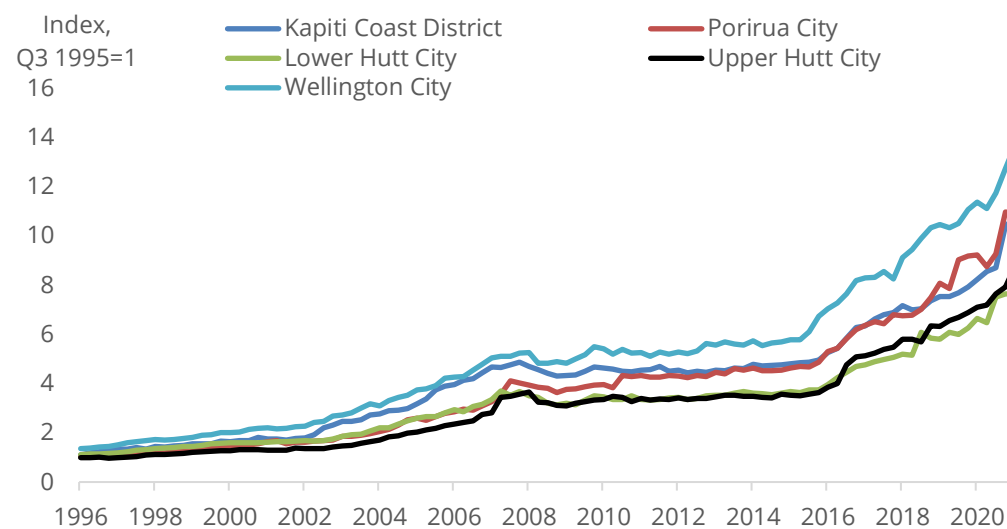


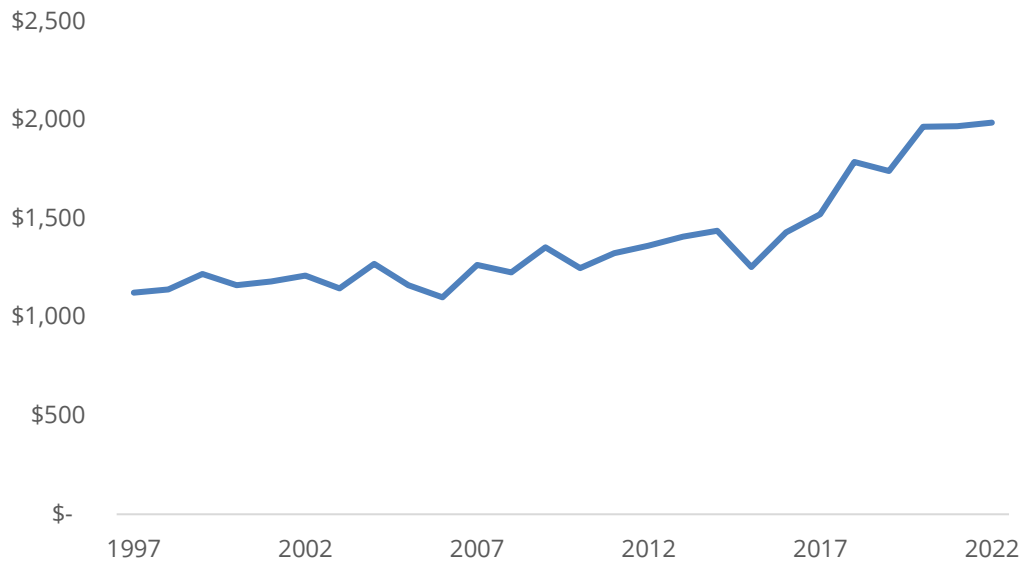
Figure 7 Land values rose rapidly across the region prior to COVID-19
Land value index, Q3-1995 = 1, data to Q1-2021



Source: Ministry of Housing and Urban Development



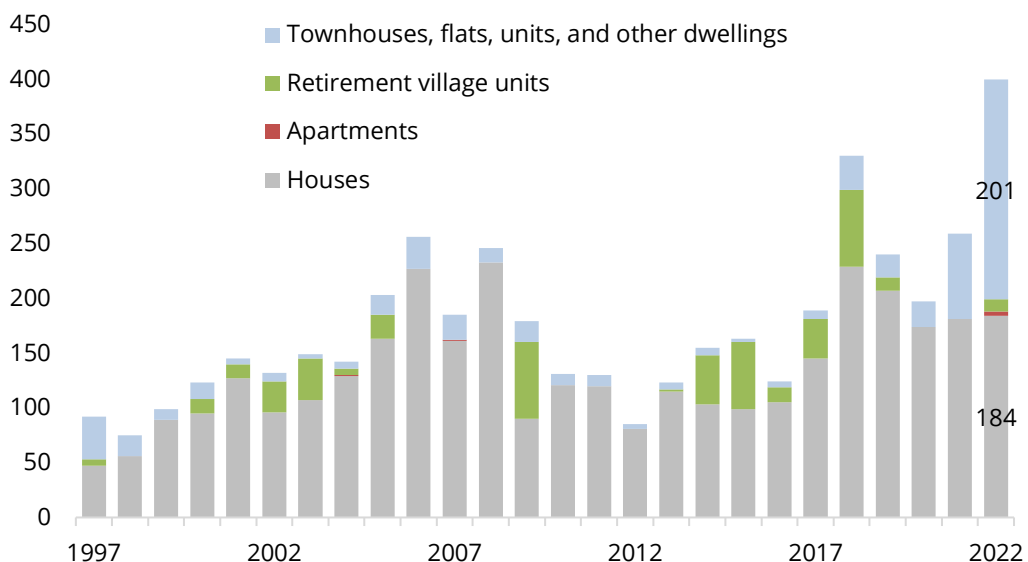
Figure 8 Prices in Upper Hutt are rising faster than construction costs
 Dwellings consented, value (\$/m²), real (2010), deflated with PPI - Construction



Source: Sense Partners estimate, Statistics New Zealand data

Development types are already shifting. In the year to May 2021, more townhouses, flats, units and other dwellings were consented than stand-alone housing. We expect some small increases in density would continue even in the absence of the MDRS and proposed IPI amendments

Figure 9 Consents are increasingly for build types that increase density
 Dwellings consented, by type, year to 31 May



Source: Statistics New Zealand



1.4. Implications

House prices have moderated a little from the high points reached at the height of the COVID crisis. Extremely low interest rates and fiscal stimulus boosted house prices to the highest price-to-income ratios in recorded data. Recent increases in interest rates to more normal levels have reversed these earlier increases.

But land use regulation needs to take a long-term view, to make the most of local opportunities to improve living standards for residents. It would be a mistake to plan based on the most recent housing market data. Instead, trends that show likely future scenarios are critically important.

Upper Hutt's population is predicted to grow at about one percent a year over the next 30 years but there are material uncertainties that surround that forecast. There is a 1-in 10 chance that little, or no growth occurs. Equally, the latest population forecasts suggest a 1-in-4 chance of needing to accommodate an additional 27,500 residents.

Additional certainty would make planning easy. So, it's unfortunate that key uncertainties – like migration – will continue to impact on population growth. Planning should think about the cost of plans when population growth is lower than expected and higher than the expected base case. As a general observation, these considerations may lead to land use regulations that are more enabling than land use regulations designed to respond to a central population growth forecast known with certainty.

Of course, since housing supply impacts on the cost of housing, land use regulations impact on the choices households make on where to live and firms make on where to operate.

Right now, there is significant uncertainty across the region on how councils' responses to the MDRS legislation and NPS-UD requirements will impact the distribution of population across the region. Our base case is consistent with a level of population growth that would lift the population from the central estimate almost to the 75 percent confidence interval.

This is not by design but serves as a useful cross check on our implied take-up rates of the extra housing supply enabled by the combination of the MDRS and the proposed IPI amendments. Other councils will have their own response. But our take is the proposed IPI amendments are likely to be more enabling than other councils across the region.

The precise location of growth is difficult to forecast. Usefully, consent data shows that developers have learned how to organise, construct, market and sell higher density dwellings than traditional stand-alone housing.

But growth will be uneven. Some suburbs should be expected to accommodate growth more easily than others. It may take time for preferred locations to be revealed.



2. Proposed IPI amendments

2.1. Framework for assessing rules and policies

Considering the IPI amendments as a suite of regulation helps understand impacts

Before determining the costs and benefits of the IPI amendments we first seek to summarise the costs and benefits into groups or classes of regulations that tend to have similar impacts.

We set to one side rules that while important, are unlikely to have material costs and benefits.

We distinguish five general classes of regulations to help:²

- (i) location controls,
- (ii) density regulation,
- (iii) design controls,
- (iv) controls on alterations to existing buildings, and
- (v) controls that manage environmental impacts.

Table 2 shows the general impacts of the class of rules we consider summarise both the MDRS and IPI amendments.

² See for example the theoretical treatment in McDonald and McMillen 2003 and the general explainer by Nunns and Rohani 2016.



Table 2: We have a well-developed understanding of the costs and benefits of different zoning changes

Key +ve (high) -ve (med) -ve (low) +ve (slight) nil -ve (slight) -ve (low) -ve (med) -ve (high)

Stylised representation of cost-benefit framework					
Indicative Cost / benefit	Controlling location	Density regulations	Control design	Control alteration	Manage environment
Income related costs and benefits					
More job opportunities	-ve (slight)	-ve (low)	-ve (slight)	nil	-ve (slight)
Higher agglomeration benefits	-ve (slight)	-ve (low)	-ve (slight)	nil	-ve (slight)
Increase incomes	-ve (slight)	-ve (low)	-ve (slight)	nil	-ve (slight)
Variety in consumption	-ve (slight)	-ve (slight)	nil	nil	+ve (slight)
Amenity related costs and benefits					
More open spaces	+ve (med)	+ve (low)	+ve (slight)	+ve (slight)	+ve (med)
Limit overshadowing	+ve (low)	+ve (med)	+ve (low)	+ve (low)	+ve (slight)
Lift social infrastructure	-ve (low)	-ve (low)	+ve (slight)	+ve (slight)	+ve (slight)
Housing costs					
Reduce house prices	-ve (med)	-ve (med)	-ve (low)	-ve (slight)	-ve (low)
Lower rents	-ve (med)	-ve (med)	-ve (low)	-ve (slight)	-ve (low)
Infrastructure costs	-ve (med)	-ve (med)	nil	nil	-ve (low)
Transportation Costs					
Reduce congestion	-ve (low)	-ve (low)	-ve (low)	-ve (low)	-ve (low)
Reduce pollution	-ve (slight)	-ve (slight)	-ve (slight)	-ve (slight)	-ve (slight)
Other costs					
Improve water quality	+ve (slight)	+ve (slight)	+ve (slight)	+ve (low)	+ve (med)
Reduce noise	+ve (low)	+ve (low)	+ve (low)	+ve (low)	+ve (low)

Source: Sense Partners



2.2. Summarising key IPI amendments

Enabling high density

The proposed IPI will enable a higher level of density than strict adherence to the MDRS would in the proposed High Density Residential Zone for the following reasons:

- (i) the height in relation to boundary standard has been increased from the 4m and 60° enabled by the MDRS to a maximum of 5m and 60°
- (ii) site coverage standard has been increased from the 50% enabled by the MDRS to 70%.
- (iii) up to six residential units per site are accommodating as a permitted activity, rather than the 3 residential units permitted by the MDRS,
- (iv) maximum permitted height has been increased from 11m under the MDRS to 20m.

This enables greater density by increasing the available envelope for development. This means that a mix of larger and more dwellings can be built on the same site. This increases achievable density, without needing to reduce the size of dwellings.

The proposed IPI sets a maximum of three dwellings on each site in line with the MDRS in the General Residential Zone. However, it proposes that four or more sites be included as a restricted discretionary activity. The larger build envelope will better enable developers to meet all other requirements, such as minimum outdoor space, while providing more than three dwellings.

Continued provision of residential activities in commercial areas

The proposed IPI retains the existing provision in the operative plan for residential activity in commercial areas, but this now enables greater heights. The key condition is that these must be on upper levels or at the rear of sites, to preserve the commercial frontage.

This continuation of the provision for mixed-use where residential activity can occur will allow for the formation of walkable neighbourhoods in commercial areas. Residents will be within a very short walk of many of their daily or more periodic needs. These may include access to grocery stores, entertainment venues, and certain types of employment, among other things.

The formation of a local customer base will benefit business by easing reliance on the more periodic workday commuters. Businesses may enjoy, for example, a solid customer base right throughout the week, as opposed to only weekday lunches.



Commercial location controls

The operative 'commercial zone' is particularly enabling but the heights have been increased. The current commercial zone has been split into four separate zones to better align with the NPS-UD. These zones, and their proposed permitted activity density controls, are:

- Neighbourhood zone – 11 m height limit, tenancies limited to 150m² floor area.
- Local centre zone – 26m height limit, tenancies limited to 250m². Supermarkets with a floor area below 1,500m² are a restricted discretionary activity.
- Town centre zone – 26m height limit, tenancies limited to 500m². Supermarkets with a floor area below 1,500m² are permitted activities.
- Mixed use zone – 26m height limit, tenancies limited to 500m². Allowance for light industrial activity.

As with residential, there is a broad increase in permitted heights. Currently, commercial zones outside the city centre are limited to 8m in height. This is increasing to 11m for the neighbourhood zone, and 26m for remaining new zones.

Front and side setbacks have also been eased. Front setbacks are currently 8m, with the proposal removing these altogether³. Side setbacks, where the site is bordering a residential area, have been eased from 3m to 1m.

The IPI amends the recession plane requirements for commercial zones where a site adjoins a residential zone or open space zone. This requires compliance with the relevant recession plane requirements of the adjoining residential or open space zone.

As with the changes to residential, the setbacks and recession planes are exempted for roadside boundaries and where shared walls are proposed.

Greater reliance on urban design controls

Urban design controls offer the discretion to restrict development to help preserve important amenity values such as safe and attractive streets, adequate open space and shared public spaces. These features clearly have benefits.

But too much reliance on urban design control could, on the margin, offset some of the economic benefit of the proposed IPI through the introduction of other restrictions on density and development.

³ IPI states "Yard: Minimum depth". We interpret this as removing front setbacks.



For example, requiring developments to reduce visual bulk by adding variety to the roofline can reduce the floorspace that may be yielded within the build envelope.

Judicious use of urban design guides can provide broad economic and social value at little cost.

But at times, the use of design controls can generate trade-offs. Design controls can promote visual attractive streets and public spaces. But sometimes this is at the expense of enabling additional dwellings.

This trade-off is a general point about the use of urban design guides. The trick is to maintain balance between their use and the flexibility and transparency of the other IPI amendments.

We do not see particular issues with the draft urban design guide that is likely to apply when spatial controls are breached. It makes clear the intent to support development:

“The guide does not prescribe development requirements but instead supports and complements the design outcomes sought for residential development in the Upper Hutt District Plan (e.g., form and appearance, amenity).”⁴

Permissive regulations that in principle enable substantive increase in housing supply

Table 3 summarises our first high-level assessment of the IPI amendments. As a suite, together the MDRS and the additional IPI amendments have the potential to enable large amounts of new housing supply – above and beyond the housing supply enabled by the MDRS alone.

Both the MDRS and set of additional IPI amendments should be considered as a package. We present costs and benefits for this package of proposed amendments to the district plan. We present these core results in Figure 1 and Table 1.

It is difficult to be precise about the relative influence of the MDRS and the IPI amendments. Development that complies with the MDRS can be carried out within both the General Residential Zone and the High-Density Residential Zone –as a permitted activity. It's just that the additional standards enabled in the High-Density Residential Zone increases the permitted height, number of residential units, the height envelope and site coverage over-and-above the MDRS. Figure 10 shows the high density residential applies to a large fraction of the downtown area.

⁴ See page 2, draft Upper Hutt urban design guide here:
<https://www.upperhuttcity.com/files/assets/public/districtplan/pc50/final-draft-upper-hutt-medium-high-density-urban-design-guide.pdf>



Our assessment is the IPI amendments that enable greater heights and densities in the HRZ compared to the MDRS are not likely to result in a greater amount of housing than the MDRS on its own.

On the surface, this can seem counterintuitive given the additional IPI amendments enables a greater number of dwellings than the MDRS alone. However, several factors are relevant:

- Apartments are not yet a well-known quantity with many local buyers. Only recently have apartments started to grab a fraction of new build typologies that have omitted apartments for several decades.
- Banks are also yet to show that they are equally comfortable lending against apartments relative to other housing typologies such as stand-alone dwellings or townhouses.
- Other councils will enable additional supply. We expect a competitive market for high density living across the region. Not everyone will choose Upper Hutt over alternatives.
- The enabled supply will not have a linear relationship with realised demand for several reasons I now lay out in the report. Some of the reasoning relates to the relative commercial feasibility of townhouses and other low density build types (essentially 3 story) relative to apartments.
- MBIE's simply commercial model (used for the NPS-UDS) makes clear apartments can be a preferred topology when land prices are high and construction costs are relatively low. We fed trends in land prices for Upper Hutt and construction costs for Wellington (we do not have good data on construction costs for Upper Hutt) into the MBIE model. It shows that eventually apartments are commercially preferred to other typologies but not for many years.

So, on balance we are reluctant to ascribe more demand to be realised under the IPI amendments relative to the MDRS, despite a significant uptick in available supply from the IPI amendments. We suggest a base case where the IPI amendments deliver about 70 percent more dwellings than the dwellings supplied under the MDRS.

Given the uncertainty, testing a low and high scenario is appropriate.

Nor does the assumption of more dwellings being built under the MDRS make the IPI amendments a poor set of policies. Both policies should be evaluated by their costs and benefits.



Table 3: The proposed zoning changes are characterised by 5 zoning rules that as a suite of changes enables significant uplift in housing supply

Zone	Outline	Regulation classes	Additional capacity	Impact	Magnitude
Residential					
General residential	Aligns with MDRS – these are both MDRS requirements under Schedule 3A of the RMA.	Controlling location Density regulations		<u>Positive</u> These changes will increase the buildable envelope on sites (+25% on 20x50m site). Incentivise perimeter block housing pattern. Increases in number of dwellings allowed.	High
High density residential	Aligns with MDRS and NPS-UD. Since High density residential zones are a relevant residential zone under the RMA for the mandatory application of the MDRS. The HRZ enables development that complies with the MDRS but increases some of the standards to encourage higher densities compared to the GRZ.	Controlling location Density regulations	Six residential units per site. 70% site coverage. Increased height envelope. Increased height up to 20m.	<u>Positive</u>	
Commercial					



Zone	Outline	Regulation classes	Additional capacity	Impact	Magnitude
Neighbourhood centre	Small scale (150m ² tenancies)	Controlling location Density regulations	Allows for residential activity above ground floor or to the rear of the site. 11m height implies 3 storeys, including 2 storeys of residential.	This allows additional residential units to be built, creating a walkable, mixed-use area. More houses, lower transport cost, lower emissions.	2/3 of Gen Res impact per site
Local centre	Medium scale (250m ² tenancies) Supermarkets (<1500m ²) are restricted discretionary.	Controlling location Density regulations	Allows for residential activity above ground floor or to the rear of the site. 26m height implies 6 storeys, including 5 storeys of residential. Possibly mitigated by recession plane.	This allows additional residential units to be built, creating a walkable, mixed-use area. More houses, lower transport cost, lower emissions.	<1.6 times GenRes impact per site



Zone	Outline	Regulation classes	Additional capacity	Impact	Magnitude
Town centre	Large scale (500m ² tenancies) Supermarkets (<1500m ²) are permitted.	Controlling location Density regulations	Allows for residential activity above ground floor or to the rear of the site. 26m height implies 6 storeys, including 5 storeys of residential. Possibly mitigated by recession plane.	This allows additional residential units to be built, creating a walkable, mixed-use area. More houses, lower transport cost, lower emissions.	<1.6 times GenRes impact per site
Mixed use	Large scale (500m ² tenancies) Allowance for light industrial.	Controlling location Density regulations	Allows for residential activity above ground floor or to rear of the site. 26m height implies 6 storeys, including 5 storeys of residential.	This allows additional residential units to be built, creating a walkable, mixed-use area. More houses, lower transport cost, lower emissions.	<1.6 times GenRes impact per site



Zone	Outline	Regulation classes	Additional capacity	Impact	Magnitude
City centre	Large scale (500m ² tenancies) Supermarkets (<1500m ²) are permitted.	Controlling location Density regulations	Possibly mitigated by recession plane. Allows for residential activity above ground floor or to the rear of the site. Unlimited height, mitigated by recession plane.	This allows additional residential units to be built, creating a walkable, mixed-use area. More houses, lower transport cost, lower emissions.	
Precincts					
Precinct 1: Indigenous Biodiversity Precinct	Applies to areas of significant indigenous vegetation and significant habitats of indigenous fauna	Manage environment	None.	Affected areas are likely to be on hilly terrain, where native vegetation has been retained. Development on this terrain is likely to tend toward lower densities due to site constraints. Development is likely to concentrate on flat, cleared ground and brownfields.	Nil



Zone	Outline	Regulation classes	Additional capacity	Impact	Magnitude
Precinct 2 – St Patrick’s Estate	Part of 45ha of floodplain along the Hutt River	Manage environment	Development must be resilient to the impacts of flooding.	<p>These restrictions are unlikely to deter any development as the development itself is unlikely, and the provisions do not reduce any of the Medium Density Residential Standards.</p> <p>There are no specific rules, only policies.</p> <p>The land would need to be made suitable for residential development in light of the significant natural hazards that affect the site.</p> <p>The site is currently being filled in accordance with resource consents to be flood free to approximately the 1 in 400-year flood extent. Flood hazard modelling will be updated once this work is completed.</p>	Nil

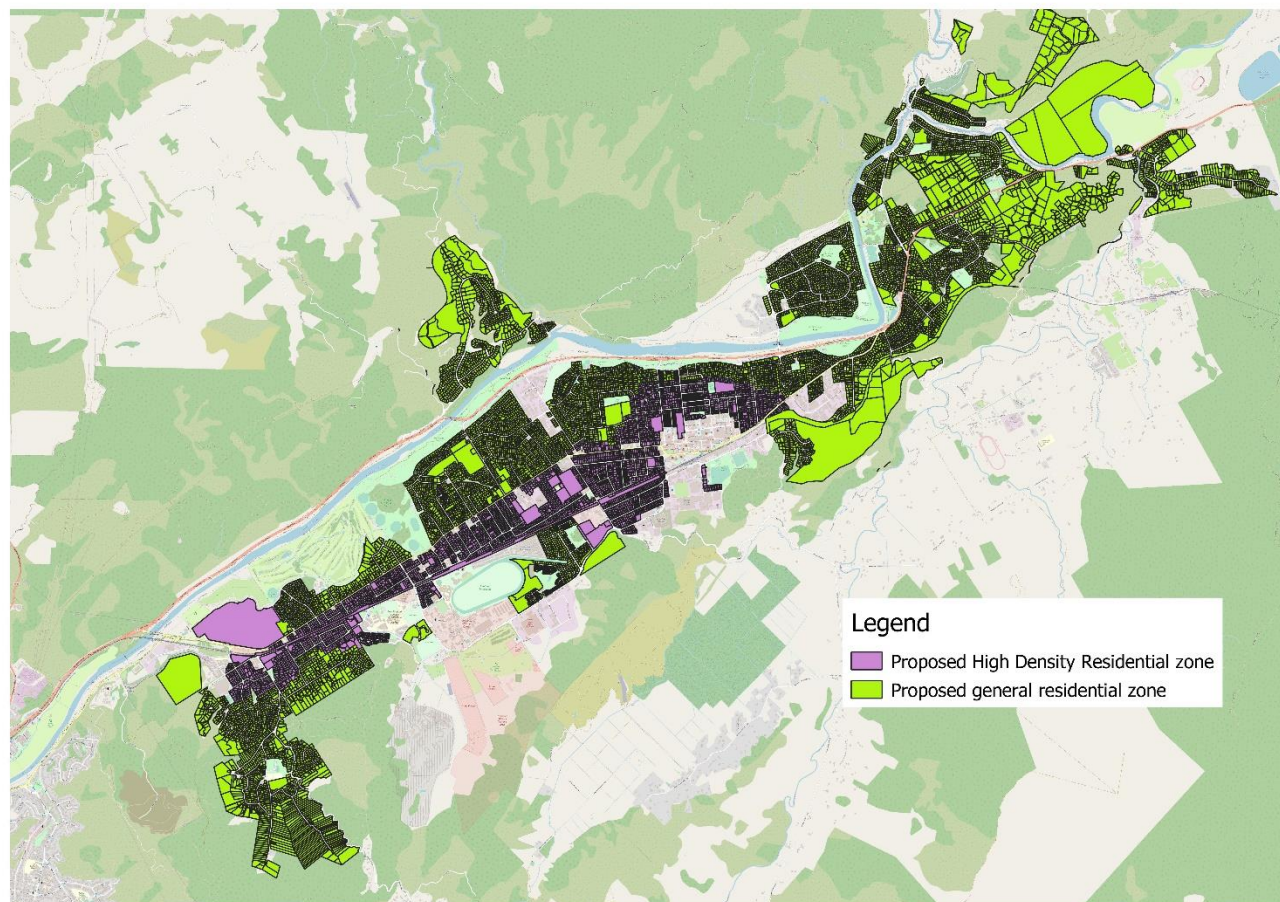


Zone	Outline	Regulation classes	Additional capacity	Impact	Magnitude
				<p>Policy direction will retain the status quo requirements for:</p> <ul style="list-style-type: none">• public access to Silverstream Station and the Hutt River; and• Landscaping along Fergusson Drive. <p>As a result, the costs of the policy are likely to be low.</p>	

Source: Sense Partners analysis of Upper Hutt City Council proposed IPI.



Figure 10 The proposed IPI amendments enable significant increases in density across Upper Hutt
Proposed high density residential zone and proposed general residential zone



Source: Upper Hutt City Council



3. Our assessment approach

3.1. Framework

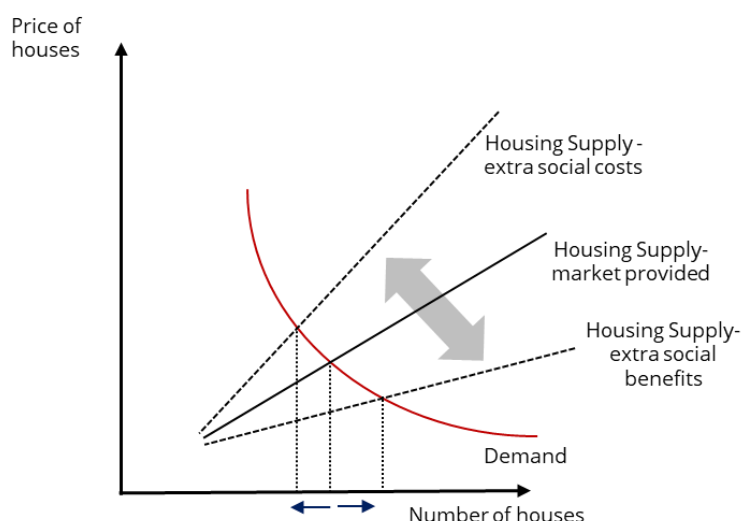
Our general approach

We want to evaluate the costs and benefits of the suite of IPI amendments including the incorporation of the MDRS. We seek not just the returns to private individuals that might transact in the housing market, but costs and benefits that might accrue to society more broadly.

Both the MDRS and set of additional IPI amendments should be considered as a package. We present costs and benefits for this package of proposed amendments to the district plan.

It is well known that increases in supply lower prices. We need to capture these impacts. But increases in supply could be associated with extra benefits – or costs – to society (see Figure 11).

Figure 11 Our cost-benefit analysis needs to address wider societal costs and benefits



Our reference point for the CBA is Upper Hutt residents. Implicitly, we include both renters and ratepayers. Where practical, we try and draw out implications for other groups, such as households in the Wellington region, but our focus is Upper Hutt.⁵

CBA needs to span many elements

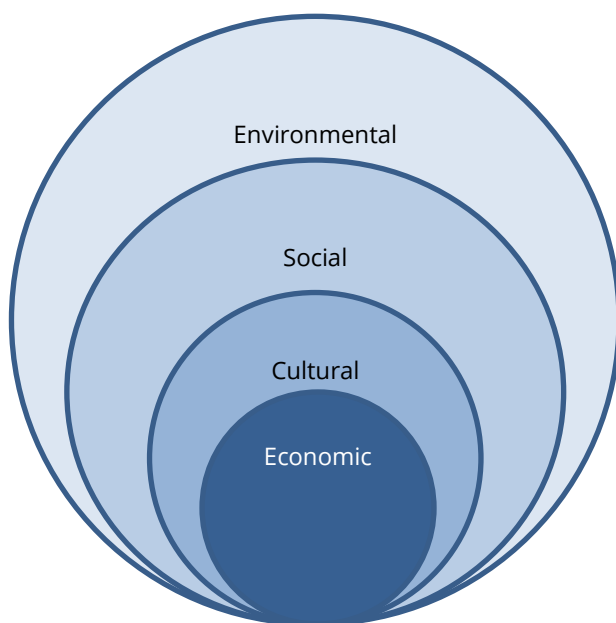
⁵ Whose costs and benefits are relevant within a cost-benefit study is referred to as the issue of standing and is critically important (see Doramas 2021, and Majerova and Abdrazakova 2021).



Our CBA is complex. The suite of MDRS and proposed IPI amendments have the potential for substantial changes to where households choose to live and play and where firms choose to operate.

These effects can be large and span many factors. We choose to organise our thinking around 4 key factors: (i) economic factors, (ii) cultural factors, (iii) social factors and (iv) environmental factors we set out in Figure 12.

Figure 12: Our CBA should span four key factors



Source: Sense Partners

Some social and environment factors can be revealed through the observed willingness-to-pay for locations that provide different amenities.

But consistent with much of the urban cost-benefit literature, we can draw on a wide range of studies in the literature, our own hedonic pricing model for Upper Hutt,⁶ and previous work on the MDRS to tease out the different impacts across each factor.⁷

But some factors are harder. If changes in the environment are likely to be substantive, then non-use values may be needed to measure impacts. We lean on the literature and other studies to help quantify the size of local effects.

⁶ Hedonic pricing models use large datasets on house sales to draw out the preferences over amenity households reveal with their housing choices.

⁷ See MRCagney, BECA & Covec. 2016.



These effects include the variety of consumption and services that denser areas and consumer markets provide.⁸ Although we know much about the generally positive benefits of density on firm-level productivity,⁹ we know much less about the impacts of density on consumption.

3.2. Measuring impacts

Our 4-step approach

Assessing the impact of the proposed policy changes – including separating the impact of the MDRS from the other IPI amendments is challenging.

To address the policy objectives, which include ensuring well-functioning urban environments and promoting competitive land markets, the policies seek to enable medium- and high-density housing, which is not long established as a commercially feasible housing typology within Upper Hutt.

Enabling a particular build type is different to the commercial feasibility of a specific type of residential building. Both the MDRS and other IPI amendments add significant capacity to Upper Hutt.

But not all the enabled capacity will necessarily be realised. To make progress on the costs and benefits of the proposed policy we proceed with the following three step procedure:

- Step 1: Assess uptake rate for enabled capacity including the change in the number of dwellings and people across the city
- Step 2: Where possible, quantify likely costs and benefits
- Step 3: Where a quantify assessment is not possible, conduct a qualitative assessment.
- Step 4: Sum costs and benefits and present on a like-for-like basis

Complex urban environments need a broad set of metrics

We will integrate existing supply-side assessments by using development feasibility models. This assessment is critical to show the interactions between supply and demand that determine the quantity of housing that will likely be provided and the likely cost of housing under existing regulations. Development can occur outside of plan enabled capacity and not all commercially feasible development is likely to occur.

Our approach to evaluating economic factors uses spatial equilibrium to assess relative costs and benefits. In equilibrium, the population of Upper Hutt is constant relative to other areas. This can only occur when the pull and push factors are balanced. So, at a high-level, population flows provide a strong indication of the relative attractiveness of a given location.

⁸ See Schiff 2015, Couture 2016 and Ahnfeldt 2019.

⁹ See Maré and Graham 2013 and Donovan et al. 2022.



We lean on theory, international and domestic evidence to estimate impacts

Since the scope of the cost-benefit analysis is broad and likely to require several metrics that are not easily quantified, our approach to CBA is to use a broad approach that draws on many data sources to obtain the relevant parameters and estimates.

We use:

- (i) simple economic theory to characterise the likely impacts and sign (where known) of impacts
- (ii) qualitative information from the international economic literature to assess magnitudes
- (iii) existing quantitative estimates for New Zealand.
- (iv) where possible existing estimates for Upper Hutt
- (v) an empirical hedonic pricing model for Upper Hutt.

Although theory might be silent on quantities, often theory has sharp implications on the direction (costs or benefits) of different regulations, at least at a local level. So, we draw on theory to make a first assessment of the costs and benefits of the suite of regulations we identify.

Next, we scan the international literature for quantitative estimates of relevant parameters. Since these parameters are likely to be location-specific, in general we skew these estimates based on their applicability to Upper Hutt.

For many factors, there exist some estimates for New Zealand, but the urban economics literature is not as rich as elsewhere. Often these estimates (for example, the impact of building heights and urban limits) are estimated for Auckland but not elsewhere.

At times we can use local estimates (for example, the infrastructure costs associated with greenfield development) but for many important amenity values, local estimates are missing. So, we draw on results from a hedonic pricing model that deconstructs house prices into characteristics that include amenity values derive from living in that location.

Hedonic price models have a long history in urban economics and have been applied to reveal the underlying price of a wide variety of characteristics including:¹⁰

- heritage (see Ahlfeldt 2017 and Lazrak et al. 2014)
- open space (Geoghegan 2002, Brander and Koetse 2011, and Daams et al. 2016)
- parks (Crompton 2001 and Allpress et al. 2016)
- views (Samarasinghe and Sharp 2008)
- sunshine (see Geoghegan et al. 2018).

¹⁰ See Roback 1982 and Rosen 1974 for the theory that underpins these models.



Step 1: Assessing the uptake rate

To realise our analysis, we use the cost benefit assessment conducted by PWC and Sense Partners for the Ministry of the Environment. That assessment leveraged the Auckland Unitary Plan (AUP) as a natural experiment that allows calibration of the extent of construction taken up after the AUP enabled additional housing supply.

This modelling was based on the quality score, roughly speaking, the ratio of unimproved land to capital, adjusted for location. Sized with high quality scores have high unimproved land values and/or low capital values in good locations. These properties are likely candidates for development since the land value is high, indicating a desirable property that is underutilised with a low capital value.

MDRS uptake rate

We use the existing estimate for the impact of the MDRS on the Wellington region as a starting point to calibrate the potential impacts of the MDRS on Upper Hutt. The first column – labelled “Wellington case” shows the estimate from the MDRS for the Wellington region that produces an additional 28,000 dwellings.

We then allocate that supply to Upper Hutt on a per capita basis with caveats. First, the median house price in Upper Hutt is about 79.0% of the median house price in Wellington. This partly reflects location preferences that make development uptake more likely in Wellington City than in Upper Hutt. So at least in our base case, we reduce the uptake for Upper Hutt based on relative differences in house prices. This scenario suggests 1,758 additional dwellings.

Given uncertainties on the uptake rate, we supplement our base case with a high scenario that assumes no price adjustment and allocates MDRS dwellings to Upper Hutt on a per capita basis. This might seem optimistic but also has the interpretation of other councils – chiefly Wellington City – enabling less supply than the MDRS imply, separate to what Upper Hutt may enable.¹¹ This suggests 2,226 additional dwellings.

We also complement the base case with a low scenario that assumes MDRS development is only two-thirds of the per capita allocation of the MDRS development. This scenario is consistent with much lower uptake for Upper Hutt given the quality score is a little high in Wellington City than Upper Hutt.

¹¹ For Upper Hutt, the General Residential Zone applies the MDRS without the application of any new qualifying matters. Existing qualifying matters are retained.



Other IPI amendments uptake rate

Our assessment of the proposed IPI amendments in section 2 suggests a material increase in supply enabled dwellings but less housing is expected to be delivered using the additional IPI amendments compared to the MDRS alone.

There is considerable uncertainty in the relative uptake rate, so we complement a base case that the uptake rate of IPI amendments is 70 percent the base rate of the MDRS that suggests 1,231 extra dwellings over the next thirty years from the IPI amendments alone.

We augment this case with a low-uptake scenarios where IPI amendments are 50 percent of the low case (742 extra dwellings). We also show a high case with IPI amendments accounting for 90 percent extra development relative to the high MDRS scenario or 2,003 extra dwellings.

Table 4 shows the key results including the number of new residents brought to Upper Hutt under each scenario, Recall, our base is equivalent to increasing the number of residents to the 75th percentile in Figure 2. More people might move to Upper Hutt, but other councils are required to implement the MDRS. This may draw people to other regions, and we assume the number of New Zealanders is broadly fixed.¹²

Table 4: Calibrating MDRS and IPI enabled supply based on the MDRS CBA, next 30 years

	Wellington case	Base	Low	High
Medium Density Residential Standards				
Initial dwellings	237,000	18,839	18,839	18,839
Extra MDRS dwellings	28,000	1,758	1,484	2,226
New total dwellings	265,000	20,597	20,323	21,065
Increase (%)	11.9%	9.3%	7.9%	11.9%
Intensification Planning Instrument				
IPI percent of MDRS supply		70%	50%	90%
Extra IPI dwellings		1,231	742	2,003
New total dwellings		21,828	21,065	23,068
Increase (% , over MDRS)		6.0%	3.7%	9.5%
New Totals				
Total extra dwellings		2,989	2,226	4,229
Increase (%)		15.9%	11.8%	22.4%
Total new residents		7,473	5,565	10,573

Source: Sense Partners, PWC and Sense Partners 2021

¹² Richer treatments could include the impact of house price differential but this is beyond the scope of this report.



Step 2: Quantifying costs and benefits

We use the broad framework from the Medium Residential Density Standards Cost -Benefit Analysis to identify the most pertinent costs and benefits to quantify. They include:

- Housing
- Agglomeration Benefits
- Congestion and environmental impacts
- Impacts of shade
- Impacts on views
- Infrastructure benefits

Most impacts closely relate to density that we proxy with the number of people or number of dwellings within the city. Our approach closely follows a number of recent cost benefit assessments of urban policies.¹³ Our quantitative approach spans the key impacts of the MDRS IPI amendments on density and housing.

Step 3 Qualitative assessment

But some of the policies do not neatly fit readily into standard impact models. These chiefly include the centres hierarchy and the Papakāinga provisions.

We provide a qualitative assessment of the impact of these policies and include the expected direction of impact – is the policy net positive, and likely scale of impact.

¹³ See for example MRCagney, BECA & Covec. 2016, PWC 2020, and PWC and Sense Partners 2021



3.3. Measuring housing impacts

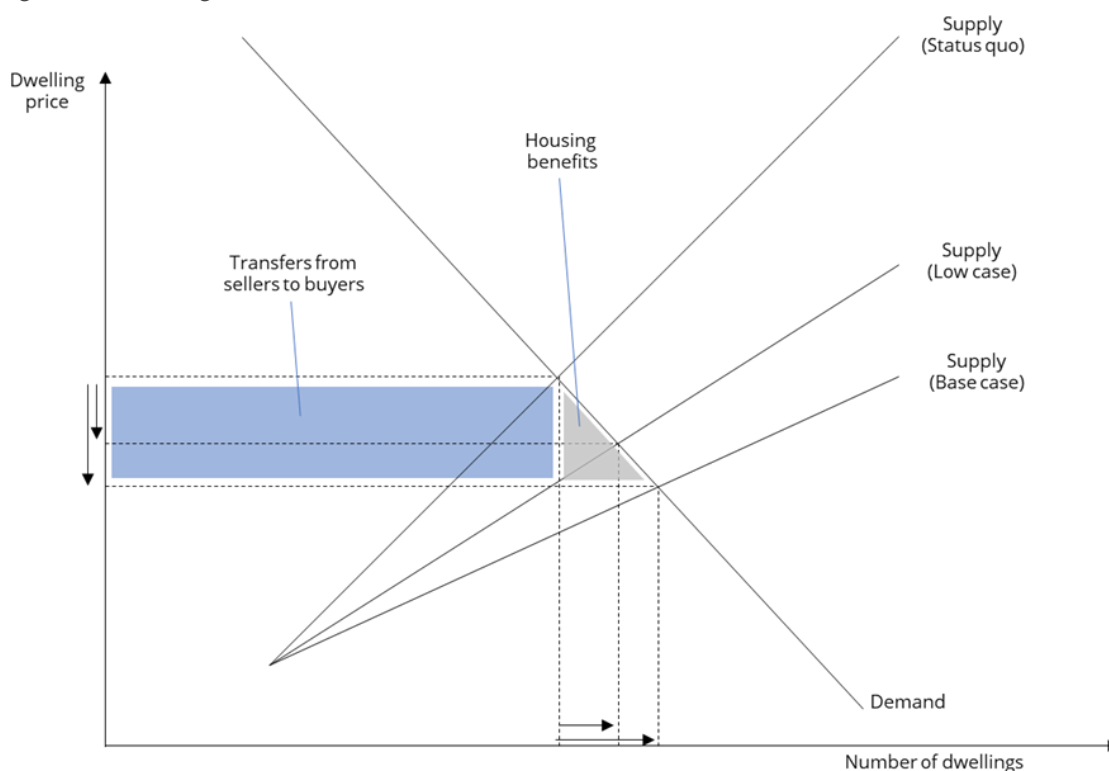
We adopt a static analysis to quantify impacts on the housing market. This method was used for the earlier study on the nation-wide impacts of the MDRS.

Increasing the supply of housing will lower prices. But most house sales are transfers from sellers to buyers. The impacts of lower prices of these transactions are net zero – good for buyers but not for sellers.¹⁴

But economic benefits do arise from the increase in the volume of transactions made possible by the increase in the stock of housing in the city. For these additional transactions, the difference between the willingness to pay and the price level are economic benefits.

Figure 13 shows both the economic benefits (grey area) and the transfers (blue area) that we seek to calculate. We use the estimates of the price elasticity of demand for Wellington to calculate these impacts.¹⁵

Figure 13: Housing benefits accrue from new transactions, not transfers



Source: Sense Partners

¹⁴ Decisionmakers may still wish to think about equity issues. We calculate the size of these transfers but then follow standard CBA procedures and set these issues to one side.

¹⁵ We use the estimate of -1.332 used in the MDRS CBA (see PWC and Sense Partners 2021).



3.4. Infrastructure costs

Urban development typically requires the expansion of infrastructure. This includes roads, public transport, three-waters, electricity, telecommunications, and community infrastructure (parks, pools, and playgrounds). We focus on those elements likely to result in a cost to ratepayers, namely transport, three-waters, and community infrastructure. In this area, street amenity from pocket parks and general green area is likely to be high and should be included in costs.

Infrastructure costs can be lumpy. This is because upgrades to expand network capacity occur only periodically. When they do, they must expand to allow for growth over a suitable period. The total cost of the upgrade cannot be allocated just to the new residents who triggered the upgrade. Doing so would give a free ride to future residents who do not tip network capacity into upgrade territory. The cost of lumpy infrastructure must be smoothed over time and fairly allocated amongst residents new and old.

This does mean that developer contributions (DC) only cover a portion of the total cost of expanding infrastructure network capacity. Some researchers estimate that as little as 73% of infrastructure costs of urban intensification in Auckland are covered by DCs.¹⁶ So omitted developer contributions could count as a cost.

We follow the MDRS CBA approach and consider additional infrastructure costs not covered by development contributions. This requires thinking through the infrastructure costs associated with building more dwellings at high urban intensities rather than the typologies that would exist in the absence of the zoning change. We assume that if the zoning change did not enable additional apartment dwellings, then a mix of brownfield and greenfield dwellings would be needed.

The new dwellings come with infrastructure costs we assess using the estimates of unrecovered developments costs of infrastructure from the MDRS CBA. These are costs.

We then consider the infrastructure costs for the greenfields development that would occur in the absence of the rezoning. These costs are no longer incurred and are rezoning benefits.

3.5. Agglomeration

Agglomeration in production

Agglomeration benefits occur where people and firms are in closer proximity to each other. This reduction in economic distance, (that is, the transport cost between firms and/or households, is called economic distance). yields benefits beyond immediate reductions in the cost of travel. These benefits include:

¹⁶ See MRCagney et al. 2016



- **Deeper labour markets.** More potential workers within an economic commute means a larger pool to recruit from. This improves the chances of an ideal match between employer and employee, benefiting both.
- **Greater knowledge transfer.** Proximity of firms allows easier transfer of knowledge between workers and firms. This includes spontaneous collaboration between firms.
- **Economies of scale and network.** Being closer to more suppliers and customers means firms have more choice in who they buy from and sell to.

We calculate agglomeration benefits using the standard equation:

$$\Delta Productivity = \left(\frac{New\ city\ size}{Old\ city\ size} \right)^{elasticity}$$

This is a simple, one step process when applied to population forecasts in 2048. The key variable is the elasticity. There is a high level of uncertainty on the scale of agglomeration benefits, as it is usually highly contextual.

Rather than use MDRS CBA estimates provided Maré and Graham (2009),¹⁷ we use new, recent estimates provided in Donovan et al. (2022) that are close to the 0.04 we use for Upper Hutt.

We follow the approach in the MDRS and omit hard-to-measure agglomeration benefits in consumption that occur when residents can access a variety of goods and services made possible by dense urban locations.¹⁸

On balance these benefits are hard to quantify but should be considered as modest upsides to our benefits estimates that are smaller in magnitude than the productivity estimates.¹⁹

Agglomeration in consumption

But cities are not just labour markets. Individual preferences matter and can create amenity value that attracts people to cities. When people have different preferences for a range of goods and services, such as going out for dinner and listening to live music, these goods and services are more easily accessed within cities.

But we can also think about a hierarchy of preferences – preferences for not just listening to live music but listening to heavy metal and listening to subgenres of heavy metal like doom metal or sludge metal.

Cities support variety in the consumption of goods and services, allowing residents to access a deeper diversity of preferences across goods and services.

Agglomeration in consumption is difficult to measure. Travelling to gain access to niche goods and consumption is the alternative to cities. Driving times has been used to assess the utility

¹⁷ Maré, David C. & Graham, Daniel J., 2013. "Agglomeration elasticities and firm heterogeneity", *Journal of Urban Economics*, Elsevier, vol. 75(C), pages 44-56.

¹⁸ See Ahlfeldt and Pietrostefani 2019 for example.

¹⁹ See Donovan et al. 2022.



of the variety of consumption options provided by cities but there are no New Zealand studies of agglomeration in consumption and we do not quantify these effects, but note they are likely to add some small upside benefits to the MDRS.

3.6. Congestion and environmental impacts

Congestion

To estimate the benefits of the proposed zoning policy we rely on the costs of congestion costs estimated for the Wellington region in the MDRS CBA. This work estimated an annual cost of congestion of \$267 million dollars (2021 NZ dollars) based on costs for a range of cities in Australia and New Zealand. This implies a per capita cost of \$541.78 across the Wellington region.

Since commuting costs are non-linear and increase exponentially with population, we add the extra residents in the Wellington region implied by additional housing supply, recalculate the per capita commuting costs (a little higher than \$541.78) and then apply these costs to residents in Upper Hutt on a per capita basis.

On one hand, these estimates could understate commuting costs. Many Upper Hutt residents take a substantial commute to Wellington every day. On the other hand, the housing type locates more people near the train station helping to facilitate public transport use.

Our calculation of commuting costs also raises the question of where people will move to Upper Hutt from. If people move to Upper Hutt from commute intensive locations, the impacts of on congestion could be negative across the region. However, our focus is on estimating net benefits – or net costs – to Upper Hutt residents. So we stick with our method to estimate congestion costs.

Environmental impacts

To assess the environmental impacts, we use the values discussed at length in analysis provided by MR Cagney on the costs and benefits of urban development.²⁰ We use values updated for inflation from the MDRS CBA we show in Table 5.

²⁰ See MRCagney et al. 2016



Table 5: Environment costs of urban development associated with different urban form

Costs	Brownfield	Greenfield
Loss of per-urban land		\$201.61
Air quality ²¹	\$289.41	\$242.80
Freshwater quality		\$135.49
Coastal water quality		\$149.25
Total	\$289.41	\$729.15

Source: MR Cagney et al. 1996, PWC and Sense Partners 2021

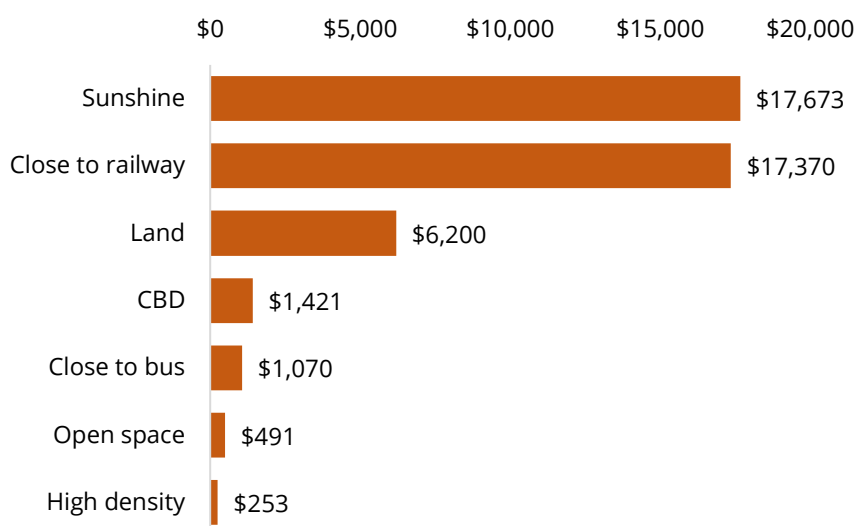
3.7. Throwing shade

We know Upper Hutt residents appreciate sunshine

Earlier work shows sunshine hours have a marked impact on the value of a property. For our preferred hedonic dwelling model, a 1 percent increase in daily sunshine hours (adjusted for clouds) generates a 3 percent increase in the value of a dwelling without these additional hours. So, we know access to sunshine is highly valued (see Figure 14).

Figure 14: Sunshine is very important to Upper Hutt residents

Key amenity drivers of average house price value



Source: Sense Partners

²¹ Differences in air quality might be expected to change over time with take-up of electric vehicles.



Urban development creates issues of sunlight and shade. As cities intensify and buildings go higher, they inevitably displace how the sunlight naturally falls upon their neighbours.

In practice, these urban development negative 'externalities' have been addressed through inflexible land use regulations that specify allowable building parameters. But until recently we knew very little about the costs and benefits of these policies.

Any evaluation of these policies requires knowing three elements:

1. Locations of new developments
2. The value of sunshine to existing residents
3. The impact on development from a given land use regulation

Modelling approach

We use the modelling of the housing supply impact assessment to identify locations of new developments. And recent research provides estimates of the value of sunshine for Wellington using hedonic pricing methods.²² We use these values as an approximation to the value of sunshine (in terms of a fraction of the total value of a property).

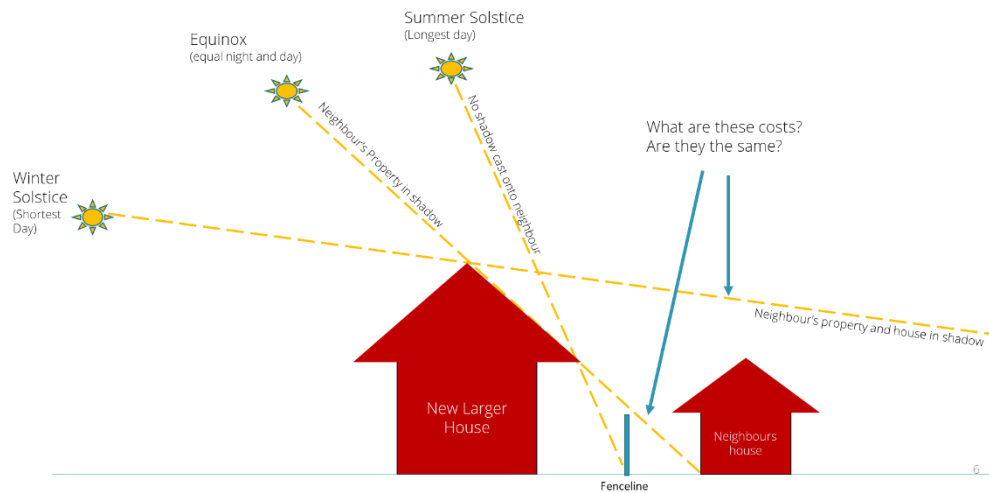
But there is little direction on 3. So for the MDRS CBA, we built, 'Icarus', a model that first estimates the impact of a given development on sunshine available to nearby properties and then uses estimates of the value of sunshine to assess the costs of loss of sunshine from land use regulations.

Icarus is the first urban development sunshine externality costing model that can support large-scale urban development planning initiatives in New Zealand urban centres. Using geospatial information on building location and height, Icarus tracks the sun at set times of the year and estimates the value of the shade cast by a new development onto its neighbours. Figure 15 provides a stylised example of how Icarus tracks shade from a new development over the year.

²² Fleming et al. 2017 who suggest empirical based methods might support market-based alternative to restrictions which could lead to welfare-improving urban development outcomes.



Figure 15: Icarus tracks the impacts of shade from new urban development
Stylised representation

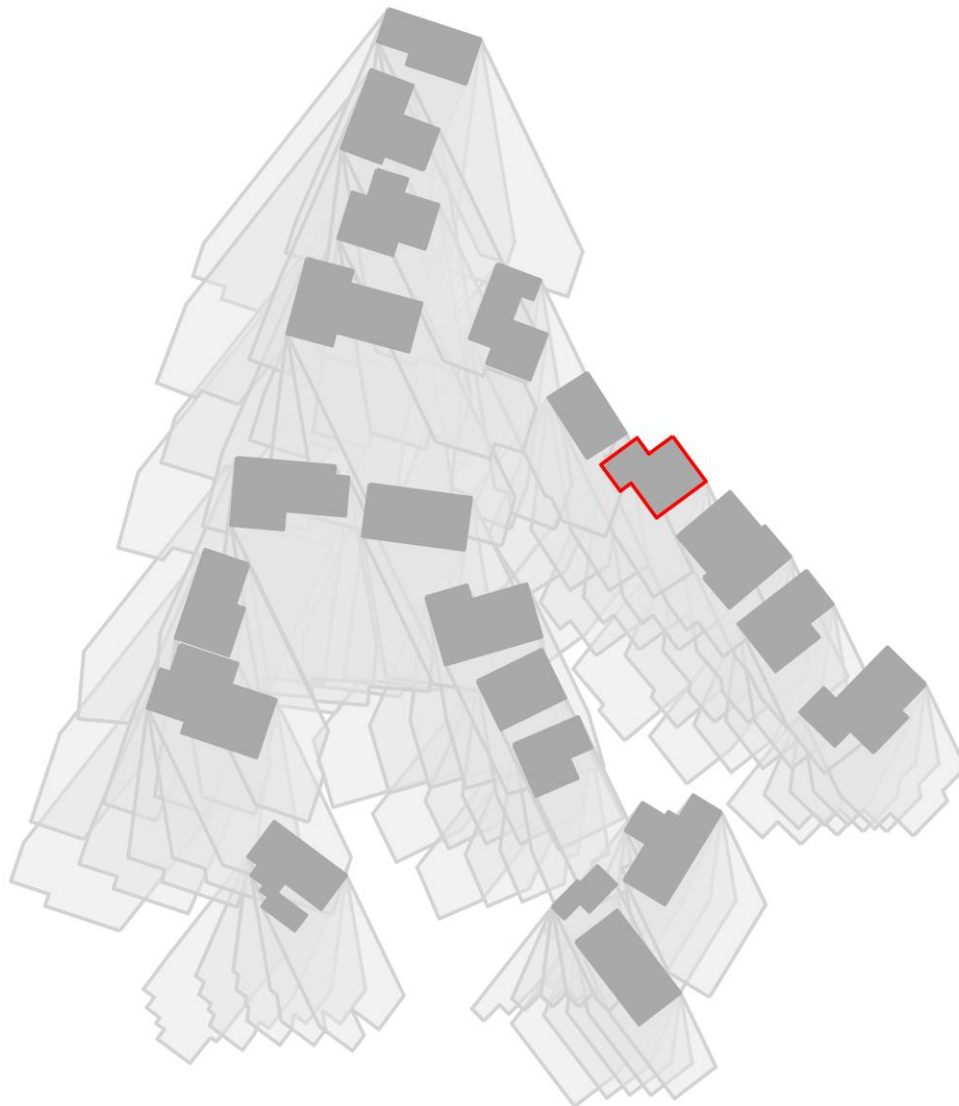


Source: PWC and Sense Partners, MDRS CBA 2021

This exercise produces a shade pattern for each proposed development. Figure 16 shows an example based on an existing property in Lower Hutt.



Figure 16: Example of shading from Icarus model, existing property, Kelson, Lower Hutt



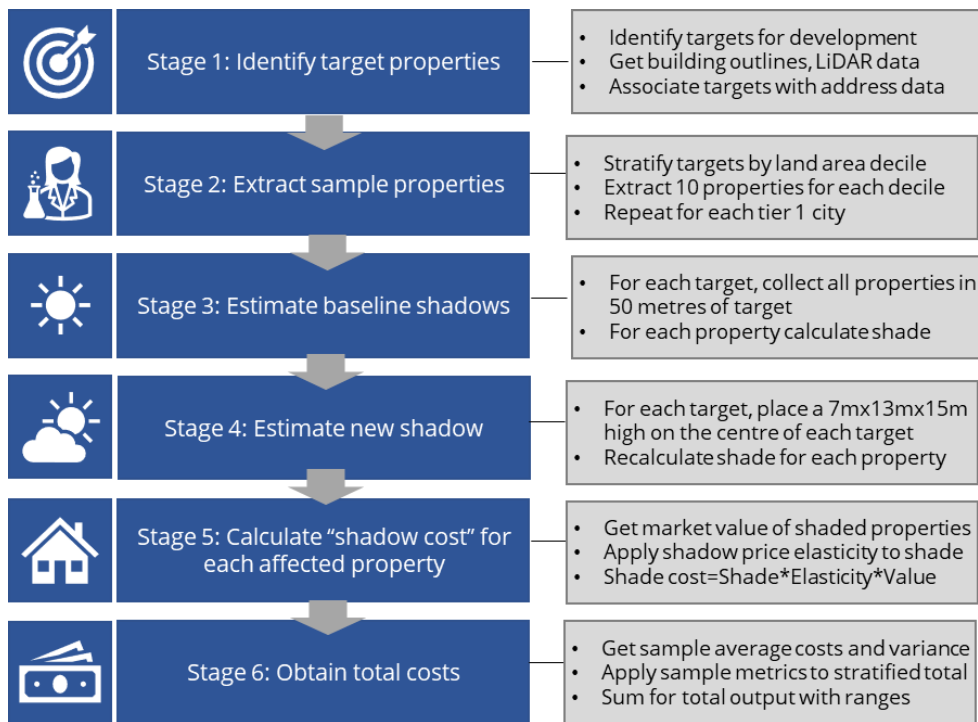
Source: PWC and Sense Partners, MDRS CBA 2021

Icarus is data intensive. For a single new development, we need to calculate the impact of the new property on all surrounding properties.

To simplify the analysis, we restricted our analysis to properties within 50 metres of any identified new development. We also restricted ourselves to a stratified sample of 100 targeted developments for each tier 1 city. Figure 17 steps through each of stage of the process to estimate total cost of shading from the MDRS. This provides a useful precursor to assessing the costs of shading from the greater heights and densities being proposed in the High-Density zone.



Figure 17: We used a six-stage process to estimate the costs of shading from the MDRS



Source: PWC and Sense Partners, MDRS CBA 2021

We evaluated impacts, rating up our estimates for a stratified sample of 100 properties for each urban area – including the Wellington region, we show in Table 6.

Table 6: Previous detailed work on shading identified non-trivial costs
 Present value of estimated cost of lost sunshine

Major urban area	Lower bound (90% C.I.)	Central estimate	Upper bound (90% C.I.)
Auckland	\$212.1m	\$316.1m	\$420.0m
Christchurch	\$39.6m	\$59.0m	\$80.3m
Hamilton	\$22.5m	\$32.6m	\$78.4m
Tauranga	\$41.1m	\$60.7m	\$80.3m
Wellington	\$28.5m	\$45.5m	\$62.4m
Total	\$343.9m	\$513.9m	\$683.9m

Source: PWC-and Sense Partners 2021

3.8. Views

Finally, we seek to capture the impact for the MDRS and IPI amendments on views that provide amenity.



The loss of views is not generally considered to be a resource management issue under the RMA unless there are specific cultural views (such as views from marae to culturally significant landscapes) or outstanding natural landscape views identified and specifically provided for.

But we know from the literature that views can be highly valued. Typically, this literature uses hedonic price methods to quantify the value by comparing house prices with similar features with the exception that one house contains a view.

For example, on researcher shows that Auckland properties with wide open water views can command up to a 59 percent premium over houses with no view.

Table 7: Existing literature suggests wide views of water command price premiums
Percentage increase in house price

View type	Narrow view	Medium view	Wide view
At coast	0%	33%	59%
1,000 metres from coast	0%	13%	18%
2,000 metres from coast	0%	11%	14%
Other views	4%	5%	6%

Source: Bourassa et al. 2004

On the surface, this suggests that views could be a very important externality of cost of enabling housing supply.²³ However, even for Auckland, there are few properties with the wide views of water that command much higher prices. And for Upper Hutt, Table 8 shows that there are extremely few houses that have wide views of water. Most views in Upper Hutt's urban areas are of the surrounding hills.

Table 8: Few Upper Hutt properties have wide views of water that command high prices
View characteristics of a large sample (10,000 plus) of Upper Hutt properties

View type	Scope of view				Total
	Narrow	Some	Moderate	Wide	
None	8,725				8725
Open	2	637	905	388	1932
Water		1	14	12	27
Total	8,727	638	919	400	10,684

Source: Upper Hutt CBA report

Table 7 was used to help calculate the impact of enabling housing supply on views in the MDRS CBA. We use Table 8 to down weight these numbers for the Wellington region we then apply to Upper Hutt on a per capita basis. We summarise much of the literature we draw from in Table 9, showing estimates we have from international, New Zealand and local sources.

²³ See also Filippova 2009 on the evidence for a premium for views in New Zealand.



Table 9: The economics literature provides a large array of evidence-based to support evidence-based policy recommendations
View characteristics of a large sample (10,000 plus) of Upper Hutt properties

Status Quo cost-benefit assessment	Description	Impact	Evidence		
Indicative cost/ benefit			International	New Zealand	Local
Income related					
Job/income opportunity	Population growth means more jobs	More job opportunities within Upper Hutt and Wellington City	"People follow jobs." - Soeter and Keeris (2008), so it is reasonable to roughly equate population growth with job growth	Ten percent increase in population associated with attractive conditions for business but this is correlation not causation (Grimes et al 2019)	Expect 2,116 extra local jobs over the next 30 years
Agglomeration benefits	Agglomeration effects occur when workers increase productivity by sharing knowledge	As Upper Hutt grows, density increases productivity and real wages grow a little	Estimates vary significantly by place and industry (see Melo et al 2009)	Maré and Graham (2013) suggest estimates of 0.063 for Wellington, 0.048, for Canterbury and Auckland 0.056	Maré and Graham (2013) estimate 0.069 for Upper Hutt, equating to a \$1,878 total wage benefit over the 20 years to 2047
Variety in consumption	Location with dense populations have more options for goods and services consumption	Residents are better off with a broader set of options (not just one takeaway, but more choice)	Hard to measure (see Coutoure 2016) but 40% of gains from density could be shorter trips and 60% greater variety	No New Zealand based studies	Too hard to measure but starting point suggests additional density supports a wider range of options e.g., Brewtown
Amenity related					
Open space	Residents enjoy access to open spaces including parks and other areas	Research repeatedly finds positive impact of open space revealed in house prices	Geoghegan (2002) finds open space is 3 times more valuable to residents than developable open space in Maryland, US. Brander and Koetse (2011) find a significant positive relationship between value of urban open space and density	Allpress et al. (2016) estimate Auckland apartments 500 metres away from the nearest park are 13.7 per cent less valuable than apartments immediately next to the park	Upper Hutt estimates suggest moving a \$500,000 dwelling from the average distance to a park to next to the park increases value by \$3,467



Status Quo cost-benefit assessment	Description	Impact	Evidence		
			International	New Zealand	Local
Indicative cost/ benefit					
Sunshine	Dwellings enjoy more sunshine hours per day	Anecdotally & intuitively expect sunshine to have a positive impact due to warming and heating	Few existing estimates	Preston et al. 2018 show New Zealanders move to sunnier cities. An extra hour of sunlight/day brings a 2% increase house prices (Fleming et al 2018)	Upper Hutt has similar sunshine hours impacts. Increasing sunshine hours from average to the top 5% of houses lifts value by 2.4 %.
Social infrastructure	Population density means literal distance between friends can be reduced. Variety of social activities can be greater.	Dense populations can hold more connections between family and friends including social capital and trust	Few empirical estimates	Statistics New Zealand's show Aucklanders report better connections to family than elsewhere (General Social Survey)	Unavailable
Housing costs					
House prices	Specific projects can impact on housing supply and hence house prices	Test local development impacts using methods in McDonald (2001) ²⁴	Cross country regression put New Zealand's response at 0.7 (see Caldera and Johansson 2011)	Grimes and Aitken (2006) suggest house prices raise supply by between 0.5 and 1.1 %	Unavailable
Rents	Lack of housing supply can drive up rents	Impacts can be large and drive inequality across communities	Estimates vary by region	High – Grimes et al. (2013) estimate rents rise 5.94% for a 5% Manukau population increase.	Unavailable

²⁴ McDonald (2001) tests the value of allocating industrial land to housing as the market values of houses on the land minus the capital cost of additional houses, the rental rate of housing and minus local government taxes or rates relative to the value householders derive from provision of local services.



Status Quo cost-benefit assessment	Description	Impact	Evidence		
			International	New Zealand	Local
Indicative cost/ benefit					
Transportation Costs					
Congestion	Without additional infrastructure more people generate congestion	Can be significant: time cost of commuting can be high			
Pollution				NZTA manual estimates suggest an additional tonne of CO2 pollution costs \$4.13 in 2016	Unavailable
Other costs					
Freshwater impact and noise	Without new infrastructure, higher population adds congestion	Can be significant, commuting costs include time cost of travel			



4. Results

4.1. Our quantitative assessment

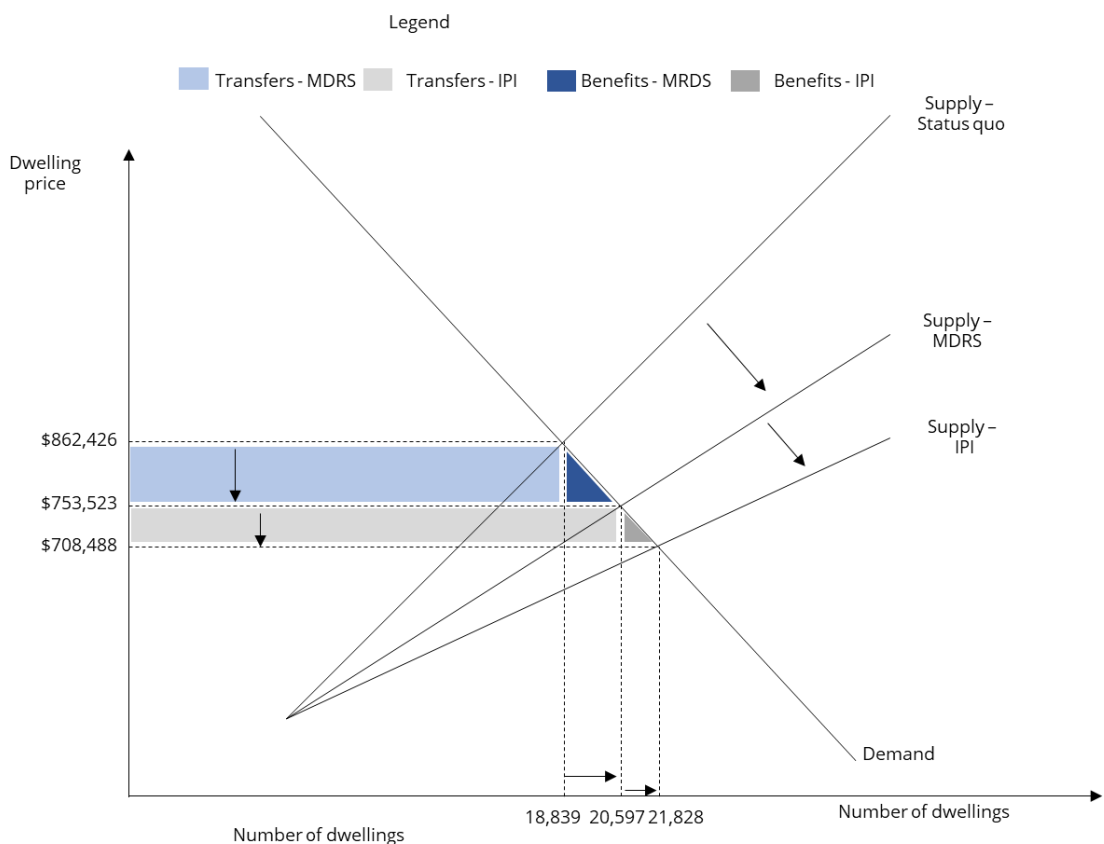
Housing

Figure 18 shows the impact of both the MDRS policies (in blue) and IPI amendments (in grey). Each set of policies enables additional housing supply that shifts supply of housing to the right on the diagram. This shift decreases dwelling prices (see the vertical axis), enabling more transactions at these lower prices shifting up the number of dwellings (see the horizontal axis).

At these additional transactions, the dwelling price paid is below the demand curve that shows the willingness to pay of buyers. The slope of the curve is an estimate for the Wellington region from the MDRS CBA. These triangles are of direct benefit to buyers and capture the housing market impacts of each policy.

The rectangles capture shifts of wealth from sellers to buyers that occur at the new prices. Since these values are transfers from one group to another that net zero, they are not included in our CBA despite the likelihood these transactions improve equity in housing.

Figure 18: MDRS and IPI amendments both enable extra supply that pushes prices lower
Static analysis, elasticities from the MDRS CBA



Source: Sense Partners



Table 10 captures these impacts for the base case and both scenarios.

The housing market benefits are substantive - \$95.7 million for the MDRS in the base case and \$27.7 million for the IPI amendments. Since transfers apply to every transaction – not just additional transactions – the transfers are very large – almost \$3 billion in the base case.

Table 10: Both the MDRS and IPI amendments enable much improved housing outcomes
 Estimates of housing benefits, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Starting point – current conditions			
Dwellings		18,839	
Price		\$862,426	
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
House price impact	2,989	2,226	4,229
MDRS (%)	-12.63%	-10.66%	-15.99%
MDRS (\$, level)	-\$108,903	-\$91,929	-\$137,894
MDRS (\$, change)	\$753,523	\$770,497	\$724,532
IPI (%)	-5.98%	-3.65%	-9.51%
IPI (\$, level)	-\$45,035	-\$28,131	-\$68,893
IPI ((\$, change)	\$708,488	\$742,366	\$655,639
Transfers			
MDRS	\$2,051,623,617	\$1,731,850,431	\$2,597,785,066
Additional IPI amendments	\$927,585,895	\$571,706,313	\$1,451,231,045
Total	\$2,979,209,512	\$2,303,556,744	\$4,049,016,111
Benefits			
MDRS	\$95,725,737	\$68,211,318	\$153,476,022
Additional IPI amendments	\$27,719,043	\$10,436,601	\$68,996,340
Total	\$123,444,780	\$78,647,919	\$222,472,362

Source: Sense Partners



Agglomeration

In addition to housing benefits, agglomeration impacts form the two linchpins of the benefits of enabling housing supply.

Rather than add up impacts on jobs and incomes, agglomeration impacts add up improvements to productivity that come from increasing density. We use relatively conservative parameter choices from the literature (0.02 for our base case but 0.01 for the low case and 0.037 for the high case).

Since the productivity impacts accrue to not just the new residents, but in principle to all workers in Upper Hutt, small per capita impacts (of between \$80 to \$186 dollars per year for the MDRS) cumulate to a large impact across the region.

Moreover, the impacts on productivity are for all-time, not just for one year. To make a like-for-like comparison across other costs and benefits we calculate the present value of the future stream of productivity benefits using a discount rate of 5 percent (in real terms) across the next 100 years.

Table 11 capture these impacts that show large gains to local productivity from increasing density. Our base case suggests an improvement of \$83 million, with the low case indicating benefits of nearly \$45 million and the high case benefits of about \$163 million. Benefits are somewhat smaller for the IPI amendments relative to the MDRS policies.

Table 11: Agglomeration benefits from density boost productivity of the local economy
 Estimates of agglomeration benefits, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
Per capita agglomeration benefits Annual			
MDRS	\$126.41	\$80.36	\$186.34
Additional IPI amendments	\$57.00	\$17.38	\$168.57
Total	\$183.41	\$97.75	\$354.91
Total agglomeration benefits (Present value)			
MDRS	\$58,179,999	\$36,988,008	\$85,763,177
Additional IPI amendments	\$26,233,997	\$8,000,410	\$77,587,050
Total	\$84,413,997	\$44,988,418	\$163,350,227

Source: Sense Partners



Views

Turning towards costs, recall our methods pare back per capita estimates available from the MDRS CBA since homes within Upper Hutt have limited access to either wide or water views that most typically carry a price premium.

Table 12 shows that these costs are much smaller in magnitude than the housing or the agglomeration benefits. The table shows a range of impacts from \$521,091 to \$3,908,185 for the MDRS and between \$260,546 and \$3,516,664 for the IPI impacts.

Table 12: Our estimates suggest limited impacts of enabling medium density on views
 Estimates of impacts on views, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
Key starting point assumptions			
MDRS impact on view in Wellington	\$4,446.11	\$4,446.11	\$4,446.11
Discount by price ratio	0.79	0.79	0.79
Discount for fewer properties with views	25%	10%	50%
Total impacts on views (Present value)			
MDRS	\$1,543,259	\$521,091	\$3,908,185
Additional IPI amendments	\$1,080,632	\$260,546	\$3,516,664
Total	\$2,623,891	\$781,637	\$7,424,848

Source: Sense Partners

Sunshine

Loss of sunshine shows larger costs than loss of views. The first section of Table 13 shows the impacts of lost sunshine for the Wellington urban area, calculated in the MDRS CBA.²⁵ The per capita estimates are a little *lower* for the low case relative to the high case. This is because properties most likely to be developed tend to be closer to the city centre and have higher costs of shading other sites than locations a little further out. Previous work showed the marginal dwelling that is developed has lower shade costs than the first sites to be developed.

²⁵ See PWC and Sense Partners 2021.



Table 13 also shows the shade per dwelling that are adjusted lower the relative price ratio between Upper Hutt and Wellington City.

Costs turn out to be higher than for the case of views - between \$5,111,312 and \$6,390,946 for the MDRS suite of policies and \$2,555,656 and \$5,750,703 for the IPI amendments.

Table 13: Impacts on lost sunshine are a material cost from the proposed policies
 Estimates of impacts on lost sunshine, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Wellington MDRS impacts			
MDRS Dwellings	11,501	6,535	17,165
Total impact on shade	\$45,500,000	\$28,500,000	\$62,400,000
Impact per dwelling	\$4,361	\$3,956	\$3,635
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
Key starting point assumptions			
Use Wellington rates...	\$3,956	\$4,361	\$3,635
...Discount by price ratio	0.79	0.79	0.79
Implies shade per dwelling	\$3,124	\$3,444	\$2,871
Total impacts on views (Present value)			
MDRS	\$5,492,801	\$5,111,312	\$6,390,946
Additional IPI amendments	\$3,846,211	\$2,555,656	\$5,750,703
Total	\$9,339,012	\$7,666,968	\$12,141,650

Source: Sense Partners

Congestion

Table 14 shows the costs of congestion we calculate. Since the impacts are highly non-linear, differences between the MDRS and IPI amendments can appear large.

Total costs from congestion are relatively small – between \$2,813,989 and \$3,371,659 in present value terms.



Table 14: Offsetting impacts make congestion impacts low but hard to quantify
 Estimates of impacts on congestion, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
Key starting point assumptions			
Original	\$25,008,381	\$25,008,381	\$25,008,381
MDRS	\$27,675,630	\$27,456,350	\$28,114,970
Additional IPI amendments	\$27,822,370	\$27,565,920	\$28,380,040
Total impacts on views (Present value)			
MDRS	\$2,667,249	\$2,447,969	\$3,106,589
Additional IPI amendments	\$146,740	\$109,570	\$265,070
Total	\$2,813,989	\$2,557,539	\$3,371,659

Source: Sense Partners

Environmental impacts

Table 15: Small environmental costs are costs of growth that might be offset elsewhere
 Estimates of environmental impacts on, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
Costs			
MDRS	\$508,783	\$429,484	\$644,227
Additional IPI amendments	\$356,264	\$214,742	\$579,688
Total	\$865,046	\$644,227	\$1,223,915

Source: Sense Partners



Infrastructure impacts

At least in principle, infrastructure costs are fully recoverable. But experience suggests development contributions are seldom set at rates that recover all infrastructure costs. We follow other work and calculate costs that might not be recovered at a rate of \$3,658 per dwelling for medium density infill development.

Table 16 shows relatively small infrastructure costs from infrastructure based on our assumptions.

Table 16: Infrastructure costs depend on development contributions to recover costs
Estimates of environmental impacts on, MDRS and IPI amendments, base, low, and high case

	Base	Low	High
Extra dwellings			
MDRS	1,758	1,484	2,226
Additional IPI amendments	1,231	742	2,003
Costs			
MDRS	\$6,430,764	\$5,428,472	\$8,142,708
Additional IPI amendments	\$4,502,998	\$2,714,236	\$7,326,974
Total	\$10,933,7626	\$8,142,708	\$15,469,682

Source: Sense Partners

Summary

We summarise our quantitative cost-benefit analysis in Table 17. Each scenario shows large net benefits ranging from about \$112 million to \$219 million for the MDRS. Net benefits for the IPI amendments range from about \$12 million to \$129 million.

In every case benefit-cost ratio are high – both for each suite of policies and for the joint MDRS and IPI amendment results.

The size of the housing and agglomeration benefits are substantial and drive the lion's share of the overall results.



Table 17: Summing costs and benefits shows large net benefits from the zoning changes

Medium Density Residential Standards			
CBA Element	Base	Low	High
Additional dwellings	1,758	2,226	1,484
Benefits			
Housing	\$95,725,737	\$68,211,318	\$153,476,022
Agglomeration	\$36,988,008	\$58,179,999	\$85,763,177
Total benefits	\$132,713,745	\$126,391,317	\$239,239,199
Costs			
Congestion	\$2,667,249	\$2,447,969	\$3,106,589
Environment	\$508,783	\$429,484	\$644,227
Views	\$1,543,259	\$521,091	\$1,543,259
Shade	\$5,492,801	\$5,111,312	\$6,390,946
Infrastructure	\$6,430,764	\$5,428,472	\$8,142,708
Total costs	\$16,642,856	\$13,938,329	\$19,827,729
Net benefits			
Net benefits	\$116,070,889	\$112,071,499	\$219,411,470
Benefit-Cost ratio	7.97	9.07	12.07
Additional Proposed Intensification Planning Instrument Provisions			
CBA element	Base	Low	High
Additional dwellings	1,231	742	2,003
Benefits			
Housing	\$27,719,043	\$10,436,601	\$68,996,340
Agglomeration	\$26,233,997	\$8,000,410	\$77,587,050
Total benefits	\$53,953,040	\$18,437,011	\$146,583,389
Costs			
Congestion	\$146,740	\$109,570	\$265,070
Environment	\$356,264	\$214,742	\$579,688
Views	\$1,080,632	\$260,546	\$3,516,664
Shade	\$3,846,211	\$2,555,656	\$5,750,703
Infrastructure	\$4,502,998	\$2,714,236	\$7,326,974
Total costs	\$9,932,845	\$5,854,750	\$17,439,099
Net benefits			
Net benefits	\$44,020,195	\$12,582,261	\$129,144,290
Benefit-cost ratio	5.43	3.15	8.41
Joint policy impact: MDRS and Additional IPI			
Total benefits	\$213,242,486	\$164,621,408	\$423,089,417
Total costs	\$26,575,701	\$19,793,079	\$37,266,829
Net benefits	\$186,666,785	\$144,828,328	\$385,822,588
Benefit-cost ratio	8.02	8.32	11.35

Source: Sense Partners



4.2. Our qualitative evaluation

Papakāinga provisions

The authority for the Council to include papakāinga in the IPI is provided by section 80E(1)(b)(ii) of the RMA and the Intensification Streamlined Planning Process (ISPP) specifically allows for papakāinga:²⁶

“TAs may use the ISPP to amend or include provisions relating to financial contributions, papakāinga and related provisions that support or are consequential on the MDRS or NPS-UD intensification policies.”

We understand that draft provisions for papakāinga housing are likely to be relatively permissive assessed against the general residential zone.

In our view, based on available information, the proposed provisions do not carry substantive economic costs. But any cost-benefit assessment needs to span cultural impacts but we are not able to make such an evaluation based on any established economic method.

Centres hierarchy

The proposed IPI amendments introduce a centres hierarchy where each centre is placed in a cascading hierarchy of development, with the intention of managing, controlling and promoting retail activity. This change is primarily about giving effect to the Regional Policy Statement through retaining the role and function of the City Centre Zone, and to enable the IPI to appropriately give effect to the requirements of Policy 3(d) of the NPS-UD.

The policies intend that development should be of a scale and intensity in keeping with the place of the centre within the hierarchy with respect to the role and function each centre provides. So expect larger developments to take place at the top of the hierarchy and smaller developments at lower levels of the hierarchy.

The centres hierarchy is similar in form to other hierarchy models reported to be working well elsewhere (Wellington, for example). Planners in other local councils speak highly of the benefits of a centres hierarchy to manage, control, and promote retail activity.

Economic frameworks favour allowing some fungibility across locations. This helps firms and developers respond to market demand and household preferences about where and how they would like to shop. More favourable locations are allowed to grow and develop as residential development shifts, preferences change so the proposed removal of the City Centre Zone retail gross floor areas limit of 500m², and the removal of the large format retail gross floor area limit of 1500m² are positive changes.

It's possible an economic lens underplays externalities from the location of large format retail. Restricting large format retail in favour of smaller outlets could generate an externality that increases the variety in consumer goods and services available in some locations. This would

²⁶ See Ministry for the Environment 2022.



be net beneficial to consumers. But the mechanism to achieve these outcomes is far from clear.

Retaining the ability to provide residential at the rear and above commercial spaces is welcome and increases the flexibility of capital in the local economy to meet both commercial and residential needs. This is particularly the case where greater heights are proposed than the status quo provide for. On the margin, this should be expected to better use existing capital and increase future development.

Our assessment is these changes will meet their purpose of giving effect to the role of the city centre within the Regional Policy Statement. The economic impacts are likely to be small and variable.

Urban design considerations

Within the residential chapter there is an emphasis on using urban design practice to mitigate poor outcomes. This is limited to where resource consent is required for breaching one or more permitted standards.

This anticipates the direction of travel – we expect future national direction on urban design principles.

But too much reliance on urban design reduces certainty and flexibility for firms, developers and local residents, risking the transparency the proposed IPI provides.

The approach to passive street surveillance appears sensible but benefits are hard to quantify.



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