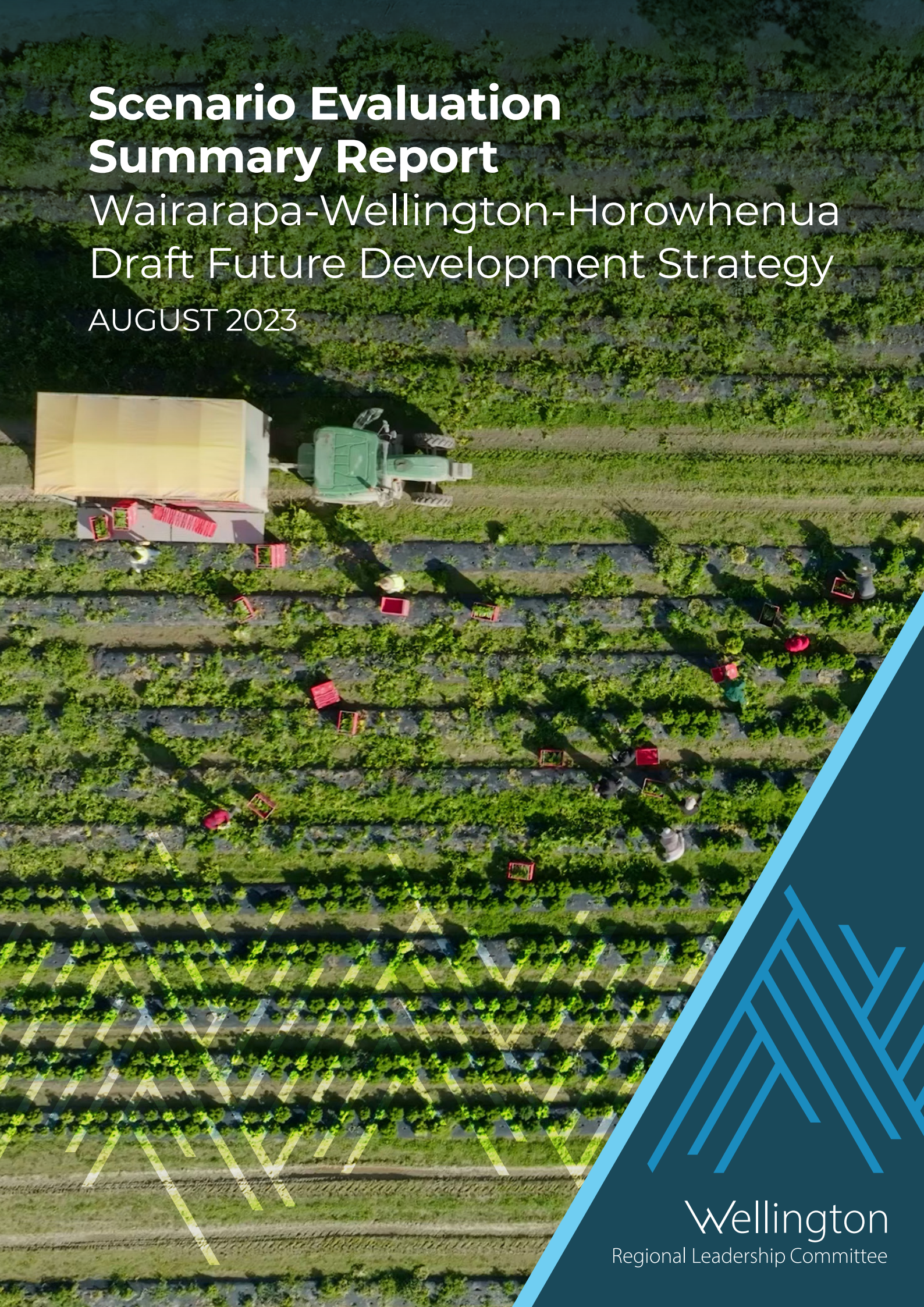
Scenario Evaluation Summary Report

Wairarapa-Wellington-Horowhenua Draft Future Development Strategy

AUGUST 2023



Wellington
Regional Leadership Committee

Contents

List of Tables

Summary

1.1. Purpose of this report – informing the Future Development Strategy

The purpose of this report is to summarise the technical assessment undertaken on different spatial scenarios for accommodating growth within the Wairarapa-Wellington-Horowhenua region (the region) over the next 30 years. This assessment was undertaken as part of the development of the Future Development Strategy.

Full information regarding this assessment can be supplied if required by contacting hello@wrlc.org.nz.

This report covers:

- Spatial scenarios for regional growth,
- Evaluation (qualitative and quantitative),
- High-level conclusions on the advantages and disadvantages of the spatial scenarios, and
- Emerging implications for growth.

This report plays a key role in understanding the implications of accommodating growth in our region in different ways, and has helped, along with other information, to inform the development of a regional Future Development Strategy (FDS). The other information includes:

- An updated Housing and Business Development Capacity Assessment (HBA),
- Relevant Long-Term Plans (LTPs) and infrastructure strategies,
- Māori, and in particular tangata whenua, values and aspirations for urban development,
- Feedback from stakeholder engagement as required in developing the Future Development Strategy,
- National policy direction under the Resource Management Act 1919 (RMA), and
- Other relevant national policy and legislation.

1.2. Spatial scenarios

The National Policy Statement on Urban Development 2020 requires *a consideration of the advantages and disadvantages of different spatial scenarios for achieving the purpose of the FDS.* Spatial scenarios modelling is a method of testing different futures. The idea is not to pick one as a winner but to understand the implications of growth. Four spatial scenarios (not options) were developed to test the implications of accommodating growth in our region in different ways.

The four spatial scenarios consist of:

- A '**baseline scenario'** which assumes that growth is distributed across the region, as enabled by recent District Plan changes and intensification plan changes and with a mix of building typologies.
- A '**dispersed scenario'** which focuses growth on enabled and planned greenfield areas.
- A '**Medium Density and Infill'** Scenario which focuses growth on medium density infill and townhouse development within existing urban areas.
- A '**Centralisation**' Scenario which focuses high density developments in main urban centres (including apartments and townhouses).

1.3. Overall results of urban form scenarios

Overall, the **centralised scenario** performs best across almost all of the assessment criteria, followed by the **medium density infill scenario**, indicating that more compact and higher density development would deliver better on the project objectives than current growth trends. Generally, the dispersed scenario scored worse than the baseline scenario. Further information on these scenarios can be found later in this report.

The key advantages and disadvantages of each scenario against the project objectives are summarised below in table 2.

Table 1: Objectives as a key for table 2.

OBJECTIVES
1. Increase housing supply, and improve housing affordability and quality, and housing and tenure choice.
2. Enable growth that protects and enhances the quality of the natural environment.
3. Enable growth that protects highly productive land, safe-guarding food production for future generations.
4. Improve multi-modal accesss to and between housing, employment, education and services.
5. Ensure development is integrated and efficiently uses existing built, social and community infrastructure or can be readily serviced by new infrastructure.
6. Plan development for a zero-carbon future, creating change to rapidly reduce emissions (including emissions from transport) and meet our regional climate change objectives.
7. Ensure development minimizes the impacts of and is resilient to climate change and natural hazards and avoid creating new risks.
8. Create local sustainable employment opportunities.
9. Align with mana whenua housing and other aspirations.

Table 2: Key advantages and disadvantages of the spatial scenarios

Scenario	*Advantages/Opportunities*	*Disadvantages/Challenges*
Baseline - Growth consistent with current policy direction	Would not cause any issues for housing supply because growth would be in accordance with predicted housing market trends. More opportunity to locate growth and avoid adverse effects on	No change in transport outcomes without transformative infrastructure investment. Somewhat worse over the 30-year period in terms of emissions reduction and the likelihood of

Scenario	*Advantages/Opportunities*	*Disadvantages/Challenges*
	areas of cultural significance to Mana Whenua and more opportunity for maintaining and developing traditional connections with whanau and whenua.	meeting regional climate change targets.  Could perpetuate existing inequities for Māori where access to health, education and employment is at greater distances, and could increase coastal pressures and emissions causing harm to te taiao.
Dispersed - Growth would be focused on greenfield areas (particularly in Kāpiti), with less emphasis on intensification	 Would not cause any issues for housing supply because growth would be in accordance with predicted housing market trends  Potentially lower exposure to natural hazards and climate change risk. However, this is only if new development is able to be designed and located to avoid high risk areas.[1] Scores better than the baseline scenario in terms of fluvial (river) and pluvial (rainfall) flood hazard exposure and growth in well-defined earthquake fault rupture and deformation zones (areas where an earthquake changes the land from how it was before the earthquake). Scores well in terms of other seismic hazards, such as subsidence, ground shaking and liquefaction. However not as well as the medium density infill scenario  More flexibility in relation to the location of growth and avoiding adverse effects on areas of cultural significance to Mana Whenua and to grow traditional kai.	 Highest potential to adversely affect natural environments.  Highest potential to adversely affect areas of highly productive land (land that is good for growing food and farming)  Lowest share of the population living near to existing community services and green spaces. Social access is also worse than the baseline for almost all social destinations under this scenario.  This scenario would have the worst transport outcomes of all the 4 scenarios without transformative infrastructure investment. Even with transformative investment (which would likely be prohibitively expensive under this scenario), transport outcomes are generally worse under some metrics (including Vehicle kms travelled VKT – a proxy for emissions from private vehicles) than under all other scenarios. This scenario would be the most expensive to service by public transport infrastructure, the most reliant on state highway access, and the most likely to increase VKT. This scenario would be the most expensive to service by electricity distribution infrastructure and would require significant investment in local council network extensions to service greenfield areas, with higher ongoing costs than under the baseline. In

[1] The GIS analysis did not take into account regulatory settings i.e. district plan rules.

Scenario	*Advantages/Opportunities*	*Disadvantages/Challenges*
		addition, this scenario is not supported by gas and electricity distribution infrastructure providers.  Scores worst of the 4 scenarios in terms of lowering overall regional emissions  Greater impacts on water quality through increased development in new areas. Possible displacement of local iwi and increases in housing prices (as land is bought up for development). Adverse impacts on te taiao due to higher transport emissions.
Medium Density Infill - Growth is focused on intensification in existing urban areas	 In general, this scenario has the greatest opportunity for locating housing near transport and jobs and where demand is. It is most likely to improve housing affordability and is likely to reconcile with current developers are willing to build. It strikes the best balance between having housing in the places people want to live and having the kinds of houses that meet diverse community needs.  Lower potential to adversely affect natural environments. Likely best at avoiding significant adverse impacts on marine ecosystem extent.  Low potential to adversely affect areas of highly productive land and impact on food production  Performs better than the baseline and dispersed scenario for accessibility across all social destinations analysed  Second best in terms of transport outcomes with transformative infrastructure investment. Supports social access by active and public transport modes and would be comparatively easy to service by bus by enhancing existing networks.	 Little change in transport outcomes without transformative investment. Would require upgrading existing water supply, wastewater and stormwater infrastructure.  Limits ability to build on ancestral lands or to grow kai, due to the increase in smaller housing sections under this scenario. Location of growth could have adverse environmental impacts. Limited infrastructure could lead to equity issues.

Scenario	*Advantages/Opportunities*	*Disadvantages/Challenges*
	Scores second best in terms of lowering overall regional emissions. Scores better than the baseline scenario in terms of fluvial (river) and pluvial (rainfall) flood hazard exposure and growth in well-defined earthquake fault rupture and deformation zones. The latter would be easiest to control under this scenario. Tightly defined infill development is preferable to be able to build away from other seismic hazards. Scores best, along with medium density infill scenario, in terms of creating local sustainable (enduring) employment opportunities. Lower risk of displacement of Māori from housing (for example, where they may be priced out of some markets due to movement of residents from central to more rural areas), protects high quality land, less risk of adverse impacts on sites of significance and less harm to te taiao through lower emissions.	
Centralisation - Growth is focused on high density developments in main urban centres	In general, its most efficient to locate housing in existing urban areas (centralisation/medium density infill), where amenities and access to employment is greatest. This scenario has the lowest potential to adversely affect natural environments. This includes the preservation of plants and animals and natural areas and marine ecosystems condition Highest potential to protect areas of highly productive land and impact on food production. This scenario is also best in terms of social access which means having the	Less likely to reconcile with market acceptance of risk (willingness to supply). Social access by private vehicle modes may be worse in the region's cities due to congestion. May be more challenging to find land to provide for distribution and logistics infrastructure. Rail improvements on the Hutt Valley line would be required. May have a higher share of projected population located within natural hazard areas, however this may be mitigated by regulations which do not allow development areas prone

Scenario	*Advantages/Opportunities*	*Disadvantages/Challenges*
	greatest share of the population living close to existing community services and green spaces and scoring best in terms of access to day-to-day social destinations by foot and access to hospitals by public transport. This scenario best supports social access by active and public transport modes.  Centralisation would result in the best transport outcomes, regardless of the transport future, however transformative infrastructure investment would significantly improve these outcomes. This scenario would be the best of all of the scenarios for getting the best transport outcomes using rail. This is the easiest scenario to service by gas distribution, telecommunications and electricity distribution infrastructure. Consolidation of growth would make it easier to prioritise council infrastructure investment.  Scores best in terms of lowering overall regional emissions.  Centralisation scores best in terms of coastal hazards, when new housing occurs away from coastal hazard areas in line with district plan settings. It also scores best in terms of fluvial (river) and pluvial (rainfall) flood hazards, and is an improvement on the baseline in terms of growth in well-defined earthquake fault rupture and deformation zones  Score best, along with medium density infill scenario, in terms of creating local sustainable employment opportunities.  Improves housing choice, protects high quality land, decreases risk of adverse effects on cultural sites and less harm to te taiao through lower emissions.	to high risk as a result of climate change or natural disasters.  Challenges to new housing choices due to concentration of population centrally outside of rohe of some iwi and less choice in types of housing. Less ability to grow kai in centralised areas but more protection for food production land in northern areas. With growth centralised potential for development for iwi in other rohe may be compromised.

Other key findings:

Growth generally has detrimental effects on water quality, regardless of location.

Every scenario would need to provide for Mana Whenua values and aspirations.

The "RLTP+ transport future[2]" results in significantly greater transport outcomes than the 'do nothing' transport future. High deprivation areas[3] have better walking access to social facilities than the region more broadly under all scenarios.

For mass movement hazards (landslides, rockfall mud and debris flows) and soil erosion, scenario risks are lower when growth is located on flat land, away from areas with risks of slope failure. Weather hazards (in particular wildfires), are similar across the region.

New renewable energy infrastructure development is anticipated under all scenarios. Each scenario would result in significant investment in electricity distribution infrastructure. Existing water network infrastructure constraints need to be addressed under all scenarios. Investment in roading and active mode facilities is required to meet existing transport needs before the requirements to service spatial scenarios can be met.

1.4. Implications for growth

The report authors have included implications for growth in Section 5. These have been identified individually by the report authors in response to the qualitative and quantitative assessment results. Skip to this section to understand more.

1.5. Acknowledgements

This report has been drafted by multiple authors from the Future Development Strategy project team, each with experience relevant to the areas of assessment. We want to thank all the contributions from the team, Wellington Regional Leadership Committee (WRLC) iwi members, infrastructure providers and experts that have contributed to this assessment.

The high-level conclusions in this summary report are captured in a more detailed report available on request. This evaluation assesses scenarios, not options, intended to inform the development of urban form directions for the region. The urban form directions for the region will also be informed by other inputs, as required by clause 3.14 of the National Policy Statement-Urban Development (NPS-UD).

[2] The 'RLTP+ transport future' is the current Regional Land Transport Plan (RLTP) package of transport interventions, as well as a "transformative programme" focussed on changing travel behaviours and reducing Vehicle-Kilometres-Travelled (VKT) of the light vehicle (private and commercial) fleet.

[3] It measures the level of deprivation in a scale from 1-10 for people in each small area. It is based on nine Census variables. High deprivation are areas that score 8-10 on this scale.

2. Methodology

2.1. Spatial scenarios

Four spatial scenarios (not options) were developed to test the implications of accommodating growth in our region in different ways.

The four spatial scenarios consisted of:

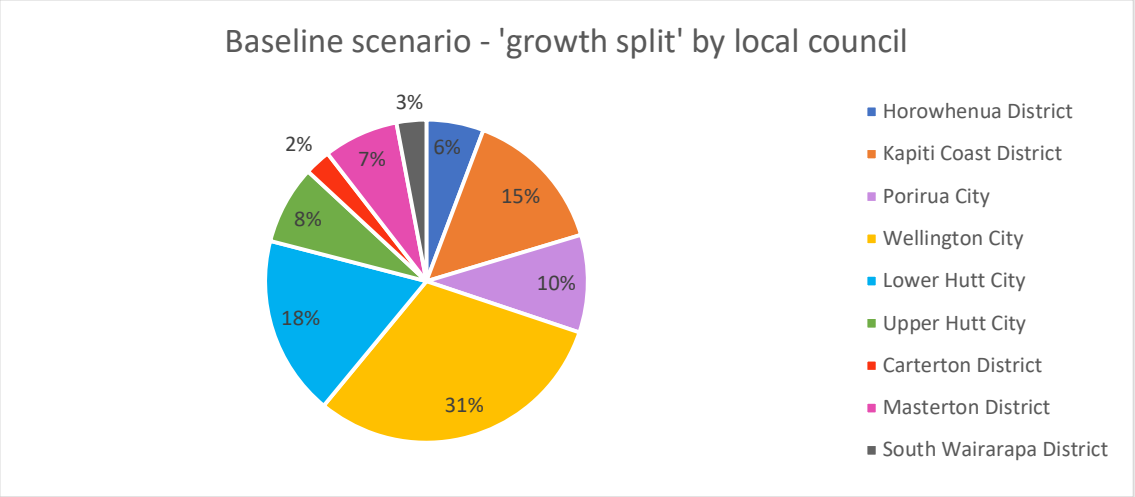
- **Scenario 1 - The 'Baseline' scenario**
  Growth consistent with current policy direction
  This scenario assumes that growth is distributed across the region, as enabled by recent District Plan changes and intensification plan changes and with a mix of building types e.g. apartments and standalone houses..

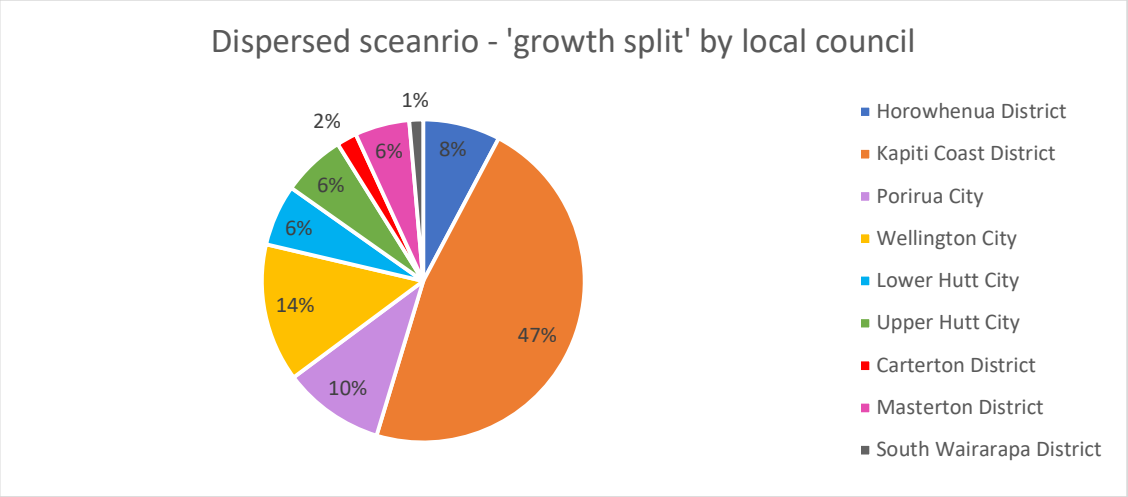
- **Scenario 2 - The 'Dispersed' scenario**
  Growth is focused on greenfield areas (particularly in Kāpiti), with less emphasis on intensification
  This scenario assumes that growth occurs in District Plan enabled and planned greenfield areas. This would result in almost half of regional growth occurring within the western Kāpiti/Horowhenua corridor and see some increase in medium density types such as townhouses.

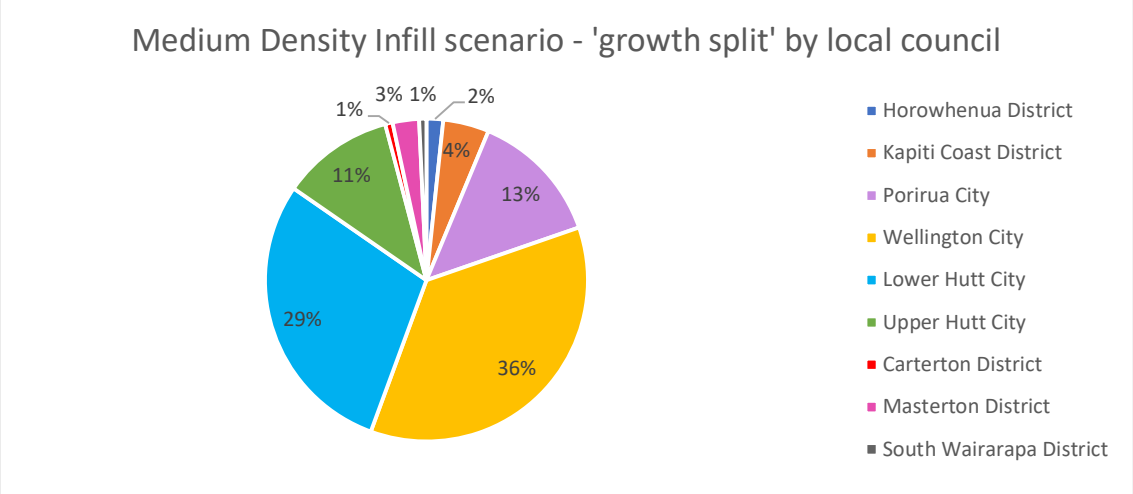
- **Scenario 3 – The 'Medium Density and Infill' Scenario**
  Growth is focused on intensification in existing urban areas
  This scenario assumes that growth occurs in medium density infill and townhouse development within existing urban areas. Under this scenario, the Wellington City and the Hutt Valley corridors would experience the highest rates of growth.

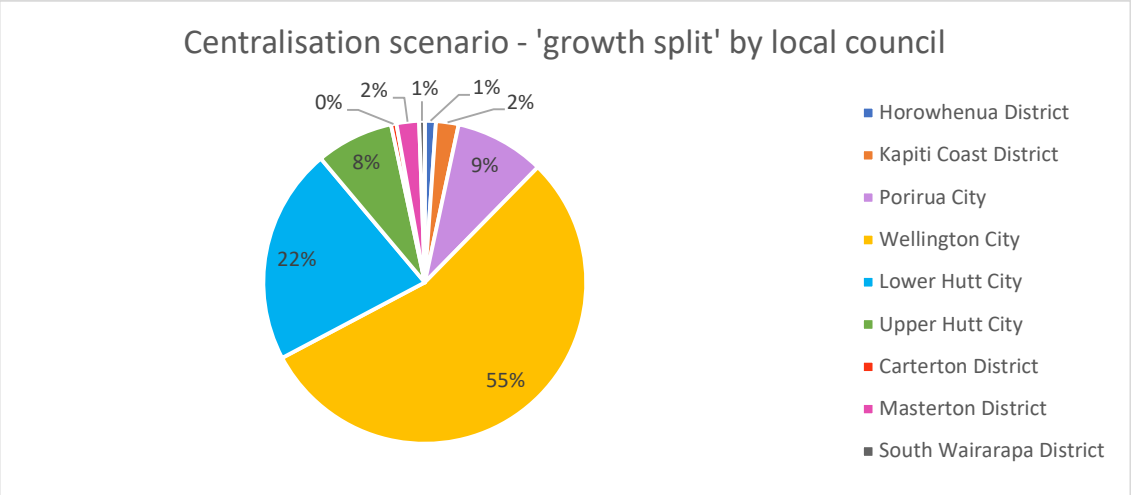
- **Scenario 4 – The 'Centralisation' Scenario**
  Growth is focused on high density developments in main urban centres
  This scenario assumes high density developments in main urban centres (including apartments and townhouses). Over half of the growth would occur within Wellington City, and a further 22% within Hutt City.

Each scenario assumes a population increase of approximately 200,000 people (or 89,000 households). The distribution of this population in each scenario by council is illustrated in graphs below.









While all of the scenarios are technically already enabled by current District Plan policy settings, Scenario 1 represents a future which follows on from the status quo, while Scenarios 2, 3 and 4 are focused on different development typologies (low, medium and high densities) and growth locations, testing the benefits of growth in both existing urban areas and greenfield development areas.

2.2. Scenario assessment methodology

The assessment included qualitative and quantitative methods to compare the economic, environmental, social and cultural outcomes of the scenarios.

The assessment consisted of:

- GIS spatial analysis,
- Quantitative analysis of the impact of each scenario on the transport network,
- SA1[4] level assessment of households' accessibility to social destinations,
- A qualitative multi-criteria analysis carried out by a panel of subject matter experts against the project objectives,
- A qualitative infrastructure impact assessment, and
- A qualitative assessment against iwi and hapū values and aspirations.

The assessment focused on answering how well (or otherwise) each scenario would deliver on the following objectives for the Future Development Strategy:

All assessment was undertaken at a regional scale, however some assessments also considered results at a 'corridor' scale (Wellington, Porirua, Hutt Valley, Wairarapa and Kāpiti/Horowhenua). Note: *Corridor scale results, where relevant, are available on request.*

The qualitative and quantitative results have been interpreted separately and are purposely not combined in this report. While the overall findings section brings together the results from both sets of analysis, where contradictory greater weight has in general been given to the findings of the quantitative assessment than the qualitative assessment of objectives 1-8, given that this assessment was more detailed and based on existing data sets and new modelling. Objective 9 was treated differently because these haven't been assessed by the quantitative analysis and it wouldn't be appropriate to combine or weight.

Key assumptions for the scenario analysis are detailed in Appendix D, while key limitations of the analysis is detailed in Appendix E.

[4] SA1s are defined at meshblock level used by Stats NZ for the Census and other data analysis.

2.3. GIS spatial analysis methodology

GIS mapping was used to test the potential impacts of the scenarios on a range of measures. The measures were chosen to reflect the Future Development Strategy objectives 2, 3, 4 and 7, as set out in Table 3 below.

The GIS analysis was undertaken at an SA1 level, with the scoring reflective of a percentage measure relative to the baseline (existing situation).

Table 2 GIS measures analysed

Relevant FDS objective	**GIS Measure**
Objective 2	• Quantity of "undeveloped" land consumed by future development relative to the baseline • Quantity of sensitive areas consumed by future development relative to the Baseline scenario (i.e. 'no-go'-areas such as flood plains or parks) • Percentage of potential loss in urban tree cover relative to the 'Baseline' scenario
Objective 3	• Quantity of highly productive rural land consumed for development relative to the Baseline scenario
Objective 4	• Proportion of households within a walkable catchment (800m) of community services (libraries, pools, community centres) • Proportion of households within a walkable catchment (800m) of green spaces greater than 3,000m^2 *This modelling only considered existing community services, and any services in growth areas, i.e. that have been planned as part of a structure plan have not been included. Likewise, the modelling only considered existing parks, and parks in growth areas, i.e. that have been planned as part of a structure plan have not been included.*
Objective 7	• Proportion of households located in areas vulnerable to sea level rise. • Proportion of households located in areas vulnerable to earthquake hazards. • Proportion of households located in flood hazard areas • Proportion of households located in areas that are potentially susceptible to slope failure

2.4. Assessment of scenario impacts on key transport metrics

An assessment of each of the scenarios using the Wellington Transport Strategy Model (WTSM) tested the impact of the scenarios on the regional transport network. This assessment was particularly relevant to Future Development Strategy objectives 4 (multi-modal social access), 5 (infrastructure to support development) and 6 (zero carbon).

This was done using two transport futures, described as follows:

- **The 'Do Nothing' transport future**
  This is essentially the current transport network.

- **The 'RLTP+' transport future'**
  This model builds upon the current Regional Land Transport Plan (RLTP) package of transport interventions, while also including a "transformative programme" focussed on changing travel behaviours and reducing Vehicle-Kilometres-Travelled (VKT) of the light vehicle (private and commercial) fleet.

For each scenario, the distribution of household growth was estimated at an SA1 level to create the land-use inputs for the WTSM.

The combinations of growth scenarios and transport futures were tested in the WTSM. This analysis tested the following key metrics at a regional level:

- *Daily VKT: Vehicle km travelled.* The number of km travelled by light private- and commercial-vehicles. Heavy commercial vehicles are not included here.
- *Daily PKT: Pax km travelled.* The number of km travelled by person using Public Transport.
- *Daily LV Trips: Light Vehicle Trips.* The number of trips of the light private and commercial vehicle fleet.
- *Daily PT Trips: Public Transport Trips***.** The number trips people take using Public Transport.
- *Daily Active Modes Trips:* The number of trips people make using active modes such as walking and cycling.

2.5. Assessment of household access to social destinations

This high-level analysis measured how well each scenario provided for access to different social destinations by different modes of transport. This assessment was particularly relevant to Future Development Strategy objective 4 (multi-modal social access).

This analysis compared at an SA1 level the proportion of households within a set of travel times to social destinations. The data includes existing households and new households for each scenario. However, only existing social destinations were included for the analysis.

The social destinations included were:

- Supermarkets
- General Practitioner doctors (GPs)
- Primary Schools
- Secondary Schools
- Tertiary Institutions
- Hospitals

Access from high deprivation areas to social opportunities via walking was also tested.

2.6. Qualitative multi-criteria analysis against project objectives

A Multi-Criteria Analysis (MCA) was used by subject matter experts to assess the positives and negatives of the spatial scenarios against seven of the project objectives[5]. The subject matter experts assessed the scenarios individually, based on their areas of expertise, against a set of key criteria (see table 4 below).

Table 3 MCA criteria developed for Future Development Strategy objectives

Objective	Criteria
1	Increase housing locational efficiency
	Housing affordability / ownership
	Reconcile with market acceptance of risk - market willingness to supply
	Reconcile with locational and typology choice/need - demand
2	Growth avoids significant adverse impacts on water quality/quantity
	Growth avoids significant adverse impacts on freshwater ecosystems (including stream reclamation)
	Growth avoids significant adverse impacts on wetland extent
	Growth avoids significant adverse impacts on terrestrial ecosystems extent
	Growth avoids significant adverse impacts on terrestrial ecosystems condition
	Growth avoids significant adverse impacts on marine ecosystems extent
	Growth avoids significant adverse impacts on marine ecosystems condition
3	Growth avoids highly productive land and where food is produced.
4	Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by active transport (walking and cycling) infrastructure.
	Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by public transport infrastructure.
	Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by private vehicle modes.
6	Growth, by way of location and intensity, does not compromise regional emissions reduction ambitions. Growth also supports change and rapid reductions in regional emissions; including from the region's largest emissions sources (transport, agriculture and stationary energy).
7	Growth is located in areas which are resilient to the effects of coastal hazards (including sea level rise, storm surge, inundation, coastal erosion and significant tsunami risk) and avoids creating new risks.
	Growth is located in areas which are resilient to the impacts of fluvial and pluvial flood hazards (river, stormwater and surface water flooding) and river erosion, and avoids creating new risks.
	Growth is located outside of well-defined earthquake fault rupture and deformation zones.
	Growth is located in areas which are resilient to other seismic hazards (in particular subsidence, ground shaking and liquefaction) and avoids creating new risks.
	Growth is located in areas which are resilient to mass movement hazards (landslides, rockfall mud and debris flows) and soil erosion, and avoids creating new risks.
	Growth is located in areas which are resilient to the impacts of weather hazards (in particular wildfires) and avoids creating new risks.
8	Growth is located in areas which can support local sustainable employment.
	Growth is located in areas which are well connected to regional employment (including via high quality internet connections for people working from home).

[5] Qualitative assessment of objectives 5 and 9 was undertaken separately.

The scoring was undertaken using the following rating scale in Table 5. Each scenario was scored against the criteria above, depending on whether the scenario would result in an improvement, neutral or negative change over the 30-year period. The rating scale ranged from -3 (significantly worse) to 3 (significantly better) as described below.

Table 4 MCA rating scale

3	Significantly better	Provides a considerable improvement so that over the 30-year period positive change is noticeable.
2	Moderately better	Provides some improvement and will be noticeably different over the 30-year period
1	Slightly better	Is hardly, but is still somewhat better over the 30-year period
0	Neutral	No discernible or positive or negative difference over the 30-year period
-1	Slightly worse	Is hardly, but is still somewhat, worse over the 30-year period
-2	Moderately worse	Is somewhat worse over the 30-year period
-3	Significantly worse	Is considerably worse so that over the 30-year period negative change is noticeable

An overall score for the scenarios by objective was determined by averaging the scores for each criterion. To obtain an overall scoring for each scenario, the objective scores were averaged. No weighting was applied, as each objective and criteria was deemed to be of equal importance so given equal weight (there is no hierarchy among the project objectives).

The results of the MCA and assumptions used were discussed by the subject matter experts at a moderation workshop also attended by members of the Future Development Strategy project team.

2.7. Qualitative infrastructure impact assessment

A webinar for infrastructure providers was held on 20 March 2023. These providers were invited to provide feedback on the spatial scenarios for the purpose of checking how readily these could be serviced by infrastructure. This assessment is particularly relevant to Future Development Strategy objective 5 (integrated and efficient infrastructure).

Infrastructure providers were identified using the guides in the NPS-UD requirements for Future Development Strategy. The infrastructure sectors invited[6] include:

- Development infrastructure (council-controlled water and land transport)
- The energy sector (electricity generation, transmission, and distribution, gas distribution)
- Public open space
- Social infrastructure (e.g., schools and healthcare facilities)
- Telecommunication networks
- Transport (state highways, rail, port, airport).

Qualitative feedback on the spatial scenarios was completed by some infrastructure providers, based on their assessment of the impact of each spatial scenario on their own networks and assets. The criteria used was that" growth *can be readily serviced by your infrastructure"*.

[6] For full list of infrastructure providers invited see the Future Development Strategy Engagement Report.

2.8. Qualitative assessment against iwi and hapū values and aspirations

A qualitative assessment of the scenarios against objective 9 was undertaken by the project team on behalf of WRLC iwi members due to capacity limitations.

The assessment was a separate process from the scenario assessment for objectives 1-8 and was qualitative only. The assessment for objective 9 aimed to apply a te ao Māori lens in considering both the opportunities and challenges associated with each scenario, and to interrogate how well these would provide for iwi and hapū values and aspirations.

The assessment was informed by *Te Tirohanga Whakamua (see Appendix C)* – a statement of iwi and hapū values and aspirations for urban development in the Wairarapa-Wellington-Horowhenua region. It was also informed by engagement with WRLC iwi members on the preparation of the draft Future Development Strategy, including discussion of the scenarios at Future Development Strategy workshops in April and July 2023., WRLC iwi members were given multiple opportunities to comment on this assessment, but no feedback was given. This assessment is therefore limited in its findings due to not being carried out with direct input from WRLC iwi members or other Māori representatives, such as urban Māori. We acknowledge that the assessment approach is therefore not reflective of all Māori or all Mana Whenua views in the Wairarapa-Wellington- Horowhenua region.

3. Results – quantitative analysis

3.1. GIS spatial analysis

The full set of GIS spatial analysis results are set out in Appendix A. Key findings are summarised below.

Impacts of scenarios on the natural environment

Table 6 below sets out the results of the assessment for the natural environment. A higher percentage generally indicates greater loss of natural environmental values relative to the loss of natural values that would occur under the baseline scenario. While these percentages are high level approximates (development through careful planning might not actually encroach on sensitive natural environments), they demonstrate that:

- The dispersed scenario has the highest potential to affect natural areas,
- Infill and centralised scenarios are more contained within urban environments, and therefore score lower in all three of the measures.
- The dispersed scenario is likely to affect existing undeveloped greenfield land in parts of the region differently.

Overall, the centralised scenario appears to result in the least quantity of affected natural areas due to the majority of growth to be planned as infill development within existing urban areas.

Table 5 Relative quantity of "natural environment" affected by growth (higher number is worse)

	Baseline (business as usual)	Dispersed scenario	MD infill scenario	Centralisation scenario
Wellington	100%	157%	76%	72%
Porirua	100%	257%	158%	102%
Kapiti/Horowhenua	100%	538%	59%	44%
Hutt Valley	100%	85%	80%	70%
Wairarapa	100%	140%	47%	41%
Overall	**100%**	**233%**	**80%**	**66%**

Impacts of scenarios on the highly productive land

Table 7 below sets out the results of the assessment for highly productive land. A higher percentage generally indicates greater potential loss of highly productive land. A similar pattern as the 'natural environment' analysis can be observed. Overall, the centralised scenario appears to result in the lowest risk of developing on highly productive land.

Table 6 Relative quantity of "highly productive land" affected by growth (higher number is worse)

	Baseline (existing situation)	Dispersed scenario	MD infill scenario	Centralisation scenario
Wellington	n/a	n/a	n/a	n/a
Porirua	100%	155%	132%	91%
Kapiti/Horowhenua	100%	210%	89%	88%
Hutt Valley	100%	105%	82%	65%

Wairarapa	100%	99%	75%	72%
Overall	**100%**	**159%**	**84%**	**80%**

Impacts of scenarios on household access to community services

Table 8 sets out the assessment on household access to community services. A higher percentage generally indicates that a larger population lives within 800m of a community service. In the dispersed scenario a larger share of the population lives further away from community services compared to the baseline scenario. Overall, the centralised scenario appears to result in the best outcome.

Table 7 Proportion of households close to community services (higher number is better)

	Baseline (existing situation)	Dispersed scenario	MD infill scenario	Centralisation scenario
Wellington	57%	56%	56%	62%
Porirua	31%	26%	33%	34%
Kapiti/Horowhenua	16%	11%	15%	15%
Hutt Valley	32%	31%	35%	35%
Wairarapa	17%	15%	18%	18%
Overall	**37%**	**32%**	**38%**	**42%**

Impacts of scenarios on household access to green spaces

Table 9 sets out the proportion of households with access to greenspaces. A higher percentage generally indicates that a larger population lives within 800 metres of a green space larger than 3,000m2. The modelling shows that in the dispersed scenario a notably larger share of the population lives further away from existing parks and reserves compared to the baseline scenario, however it is expected that this scenario would have a more favourable outcome if new parks and reserves that are anticipated to be a part of any planned future greenfield developments, were included in the modelling.

It should also be noted that the modelling does not differentiate between types of green spaces, whereas different types of parks and reserves (i.e. town belt, recreation areas, neighbourhood parks etc) serve different purposes in a community.

Overall, the centralised scenario appears to result in the most favourable outcome with regards to access to existing parks and reserves.

Table 8 Proportion of households close to green spaces (higher number is better)

	Baseline (existing situation)	Dispersed scenario	MD infill scenario	Centralisation scenario
Wellington	82%	81%	82%	85%
Porirua	87%	77%	85%	88%
Kapiti/Horowhenua	72%	53%	71%	72%
Hutt Valley	82%	82%	85%	85%
Wairarapa	57%	53%	71%	72%
Overall	**79%**	**72%**	**80%**	**82%**

Impacts of scenarios on hazard risk

Table 10 sets out the assessment on hazard risk for each scenario. A higher percentage generally indicates that a larger population lives in an area that is sensitive to natural hazards The dispersed scenario appears to be most suitable for development in all areas, except Wairarapa which scores best in the baseline scenario. Across all scenarios, hazards with the largest exposure to population are earthquake hazard (predominantly in Kāpiti Coast and Horowhenua) and flood hazard (Kāpiti Coast/Horowhenua, Hutt Valley and Wairarapa). Due to the risks of sea level rise to areas in Lower Hutt, such as Petone, Seaview and Eastbourne, the Hutt Valley scores significantly higher than other areas in the sea level rise measure.

Table *9* Proportion of households close to hazard areas

	Baseline (existing situation)	Dispersed scenario	MD infill scenario	Centralisation scenario
Wellington	5.8%	5.5%	5.5%	6.2%
Porirua	4.7%	4.0%	6.2%	6.7%
Kāpiti/Horowhenua	15.7%	11.9%	14.8%	14.5%
Hutt Valley	17.2%	17.1%	19.1%	19.0%
Wairarapa	7.7%	8.0%	8.1%	8.1%

3.2. Quantitative analysis of scenario impact on the transport network

Transport outcomes by scenario and transport future

The results of the transport analytics are set out in Table 11 below. In terms of the transport metrics assessed:

- a **decrease** in VKT and trips by light private and commercial vehicles is a preferred transport outcome when compared to current usage, (status quo today), with an assumption that the baseline scenario is no different to the status quo under transport future 1.
- an **increase** in PKT and trips by public and active transport modes is a preferred transport outcome when compared to current usage, except where the increase in PKT is due to increased travel distances rather than an increase in public transport trips (assuming that persons prefer to commute shorter distances and that shorter distance public transport trips result in less congestion and emissions).

Table 10 Transport outcomes by scenario and by 'transport future'

Transport metric	'Do nothing' transport future				'RLTP+' transport future			
	Baseline scenario	Dispersed scenario	MD infill scenario	Central scenario	Baseline scenario	Dispersed scenario	MD infill scenario	Central scenario
Vehicle kilometres travelled (VKT) by light private and commercial vehicles	100	123	95	92	85	104	81	78
Kilometres travelled by persons using public transport (PKT)	100	195	87	92	182	340	170	186
Trips by light private vehicle and commercial vehicle	100	101	98	95	84	85	83	80

Trips by Public transport	100	114	101	106	158	180	162	168
Trips by active modes (e.g. walking and cycling)	100	86	100	125	142	123	142	176

The results are presented relative to the Baseline scenario and 'Do Nothing' transport future, as this represents a future where growth following current trends and maintaining the current transport network. A higher number indicates an increase in the associated metric relative to the baseline.

Key findings for each scenario are that:

- Baseline Scenario:
    - Under a *'Do Nothing'* transport future, there would be no change from current transport network trends.
    - Under an '*RLTP+'* transport future, transport outcomes would improve, particularly active transport and public transport trips and PKT.

- Dispersed Scenario:
    - Under a '*Do nothing'* transport future, transport outcomes would generally get worse, with a significant increase in VKT and decrease in active mode trips. PKT would significantly increase, however this is due to increased travel distances.
    - Under an *'RLTP+'* transport future, all transport outcomes would improve, with the exception of VKT which would slightly increase. PKT is the highest of any scenario under this transport future, driven by both significant increases in public transport trips and increased travel distances.

- Medium Density Infill Scenario:
    - Under a '*Do nothing'* transport future, transport outcomes would get marginally better, however active transport and public transport trips would be largely unchanged.
    - Under an *'RLTP+'* transport future, transport outcomes would significantly improve, in particularly public transport trips and active transport trips.

- Centralisation scenario
    - Under a '*Do nothing'* transport future transport network outcomes would get slightly better, with particular increases in trips by active travel modes.
    - Under an *'RLTP+'* transport future, transport outcomes would significantly improve with the highest reductions in VKT and trips by private and light vehicles, substantial increases in PKT, public trips and active travel modes.

Of the four scenarios, centralisation would result in the best transport outcomes (under either transport future). This is because trips lengths shorten, and public and active transport infrastructure improves, as more people live near services and other social and economic opportunities.

The medium density infill scenario is second best, with the baseline scenario coming in third (the baseline scenario transport outcomes are closer to the medium density infill scenario results under the RLTP+ transport future).

PKT would be greatest under 'dispersed do-nothing' and 'dispersed RLTP+' however this is partially down to the travel distances involved. The number of public transport trips is also greatest under 'dispersed RLTP+', however would come at the greatest cost in terms of RLTP+ interventions (note: options have not been costed. This refers to the anticipated cost, as these improvements would need to be implemented across entire urban footprint. The investments and interventions associated

with the dispersed scenario are anticipated to be far greater than by accommodating growth in existing urban areas along existing transport corridors.

Comparison of Transport futures

Table 12 below compares the transport futures results in table 11 above showing these as a percentage change between the 'RLTP+' transport future and the 'do nothing' transport future. For example, under the baseline scenario the 'RLTP+' transport future results in a 15% reduction in VKT compared to the 'do nothing scenario'.

Table *11* – Percentage change in the transport outcomes by transport metric for each scenario based on the two transport futures

Transport metric	Percentage change in transport outcomes ('RLTP+' compared to the 'do nothing' transport future)			
	Baseline scenario	**Dispersed scenario**	**MD infill scenario**	**Central scenario**
Vehicle kilometres travelled (VKT) by light private and commercial vehicles	-15%	-15%	-15%	-15%
Kilometres travelled by persons using public transport (PKT)	82%	74%	95%	102%
Trips by light private vehicle and commercial vehicle	-16%	-16%	-15%	-16%
Trips by Public transport	58%	58%	60%	58%
Trips by active modes (e.g. walking and cycling)	42%	43%	42%	41%

This table shows that the 'RLTP+' transport future results in a significant improvement in transport outcomes across all scenarios when compared to the 'do nothing' transport future. The scale of improvement under an 'RLTP+' transport future (from the 'do nothing' transport future) is generally constant across all scenarios and metrics, except in the case of PKT. The centralisation scenario (followed by the medium density infill scenario) would see the greatest uplift in PKT from the 'do nothing' transport future to the RLTP+ transport future. This suggests that transformative transport interventions have the greatest potential to deliver uplift in PKT when growth is concentrated and higher density.

Overall, quantitative analysis of scenario impact on the transport network shows that the RLTP+ transport future results in significantly greater transport outcomes than the 'do nothing' transport future.

3.3. Quantitative assessment of household access to social destinations

The results of the accessibility analysis are in Table 13 below. The results are for all households in the region – not just new households (i.e. the growth).

Table 12 Full set of accessibility measure results

Percentage of Households within 10 mins walk to Social Destinations by 2051				
	Baseline	**Dispersed**	**MD infill**	**Centralisation**
Supermarket	27%	23%	27%	32%
GP	32%	27%	33%	37%
Primary School	42%	38%	44%	47%
Secondary School	9%	8%	9%	10%

Percentage of Households within 30min drive, 45min PT to a Tertiary Institution by 2051				
	Baseline	**Dispersed**	**MD infill**	**Centralisation**
30 min drive by car	89%	79%	92%	92%
45m by public transport	99%	99%	99%	99%

Percentage of Households within 30min drive, 45min PT to a Hospital by 2051				
	Baseline	**Dispersed**	**MD infill**	**Centralisation**
30 min drive by car	89%	79%	92%	92%
45m by public transport	57%	48%	61%	64%

NZ DEP AREAS 8-10[7]	Walking Access to Social Opportunities			
	Baseline	**Dispersed**	**MD infill**	**Centralisation**
Supermarket	32%	31%	32%	35%
GP	40%	39%	41%	42%
Primary	50%	49%	51%	51%
Secondary	13%	12%	12%	13%

A higher percentage indicates improved access with regards to the associated metric. The key findings are that:

- The medium density infill and centralised scenarios perform better than the baseline scenario for accessibility across all destinations analysed.
- The dispersed scenario performs worse than the baseline scenario for accessibility for almost all destinations analysed.
- For access to day-to-day social destinations within a 10-minute walk, the centralisation scenario provides the greatest access.
- For access to tertiary education institutions and hospitals within a 30-minute car journey, the centralisation and medium density infill scenarios provide households with the greatest access (92%). This is significantly higher than under the dispersed scenario.
- For access to tertiary education institutions within 45 minutes by public transport, almost all households are provided for by all scenarios.

[7] It measures the level of deprivation in a scale from 1-10 for people in each small area. It is based on nine Census variables.

- For access to hospitals within 45 minutes by public transport, the centralised scenario, followed by the medium density scenario are the best, as both are significantly better at this than the dispersed scenario. However, even under the centralisation scenario, only 64% of households would have access to hospital by public transport within 45 minutes. Less than half of all households would have access to hospital by public transport within 45 minutes under the dispersed scenario, which is a 9% reduction from the baseline scenario.
- High deprivation areas have better walking access to social facilities than the region more broadly under all scenarios. This is greatest when comparing the access to GPs and primary schools under the dispersed scenario, with social access being over 10% greater for high deprivation areas than the region as a whole.

4. Results – qualitative analysis

4.1. Multi-criteria analysis against project objectives

Appendix B contains the full set of MCA scores by corridor, as well as for the region overall.

Tables 14 to 20 below show the MCA results at a regional scale under each objective and by key criteria. Key findings are summarised below.

Objective 1 - Housing

Table 13 MCA results against the criteria for Objective 1

Objective 1: Increase housing supply, and improve housing affordability and quality, and tenure choice.	**Regional assessment**			
	Baseline	**Dispersed**	**Medium Density Infill**	**Centralisation**
Increase housing locational efficiency	**-1**	**-3**	**1**	**3**
Housing affordability / ownership	**1**	**-1**	**2**	**1**
Reconcile with market acceptance of risk – market willingness to supply	**0**	**0**	**-1**	**-1**
Reconcile with locational and typology choice/need – demand	**0**	**-3**	**1**	**-2**

Key results:

- In general, its most efficient to locate housing in existing urban areas (centralisation/medium density infill), where amenity and access to employment is greatest.
- The medium density infill scenario would likely most improve housing affordability, based on the supply of more affordable smaller standalone and terraced housing in existing urban areas.
- The baseline scenario, greenfield and medium density infill scenarios are most likely to reconcile with market acceptance of risk (wiliness to supply).
- The medium density scenario best strikes the balance between meeting locational demand and typology choice, providing the best distribution of supply within each district.

Objective 2 – Natural environment

Table 14 MCA results against the criteria for Objective 2

Objective 2: Enable growth that protects and enhances the quality of the natural environment.	**Regional assessment**			
	Baseline	**Dispersed**	**Medium Density Infill**	**Centralisation**
Growth avoids significant adverse impacts on water quality/quantity	**-2**	**-2**	**-3**	**-2**
Growth avoids significant adverse impacts on freshwater ecosystems (including stream reclamation)	**-2**	**-2**	**-3**	**-1**
Growth avoids significant adverse impacts on wetland extent	**-2**	**-2**	**-3**	**-1**
Growth avoids significant adverse impacts on terrestrial ecosystems extent	**-2**	**-3**	**-2**	**-1**
Growth avoids significant adverse impacts on terrestrial ecosystems condition	**-2**	**-3**	**-2**	**-1**
Growth avoids significant adverse impacts on marine ecosystems extent	**-2**	**-3**	**-1**	**-1**
Growth avoids significant adverse impacts on marine ecosystems condition	**-2**	**-3**	**-2**	**-1**

Key results:

- Growth generally has detrimental effects on water quality, regardless of location.
- Centralisation has the least impact on freshwater ecosystems and wetland extent, as the habitat has already been lost.
- For terrestrial ecosystem extent and condition, while centralisation will have significant impacts in the Wellington corridor, overall, it has the least widespread impact as it concentrates negative impacts in a smaller area.
- Medium density infill scores best for all corridors in terms of avoiding significant adverse impacts on marine ecosystem extent.
- Marine ecosystems condition is generally least impacted in locations where marine water quality is already contaminated[8] i.e., centralisation growth scenario.

Objective 3 – Food production

Table 15 MCA results against the criteria for Objective 3

Objective 3: Enable growth that protects highly productive land, safe-guarding food production for future generations.	Regional assessment			
	Baseline	Dispersed	Medium Density Infill	Centralisation
Growth avoids highly productive land and where food is produced.	-1	-3	0	1

Key results:

Medium density infill and centralisation will likely have the best outcomes for the preservation of highly productive land (HPL) and food production, due to less encroachment onto greenfield land.

Objective 4 – Social access

Table 16 MCA results against the criteria for Objective 4

Objective 4: Improve multi-modal access to and between housing, employment, education, and services.	Regional assessment			
	Baseline	Dispersed	Medium Density Infill	Centralisation
Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by active transport (walking and cycling) infrastructure.	-1	-3	1	2
Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by public transport infrastructure.	-1	-3	1	2
Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by private vehicle modes.	1	0	0	-1

Key results:

- Denser/more concentrated the growth better supports social access by active and public transport modes.
- Social access by private vehicle modes may be worse in the region's cities under the centralisation scenario due to congestion.

[8] Contaminant pollution to the coast includes from failing or under capacity water infrastructure, litter and physical pressure at coastal recreation areas (trampling, pollution, litter).

Objective 6 – Zero-carbon future

Table 17 MCA results against the criteria for Objective 6

Objective 6: Plan development for a zero-carbon future, creating change to rapidly reduce emissions (including emissions from transport) and meet our regional climate change objectives	Regional assessment			
	Baseline	Dispersed	Medium Density Infill	Centralisation
Growth, by way of location and intensity, does not compromise regional emissions reduction ambitions. Growth also supports change and rapid reductions in regional emissions; including from the region's largest emissions sources (transport, agriculture and stationary energy).	-1	-3	1	3

Key results:
The higher the density the scenario, the lower the expected overall regional emissions.

Objective 7 – Natural hazard and climate change risks

Table 18 MCA results against the criteria for Objective 7

Objective 7: Ensure development minimises the impacts of, and is resilient to, climate change and natural hazards and avoids creating new risks.	Regional assessment			
	Baseline	Dispersed	Medium Density Infill	Centralisation
Growth is located in areas which are resilient to the effects of coastal hazards (including sea level rise, storm surge, inundation, coastal erosion and significant tsunami risk) and avoids creating new risks.	-1	0	-1	1
Growth is located in areas which are resilient to the impacts of fluvial and pluvial flood hazards (river, stormwater and surface water flooding) and river erosion, and avoids creating new risks.	-2	-1	-1	0
Growth is located outside of well-defined earthquake fault rupture and deformation zones.	-2	0	-1	-1
Growth is located in areas which are resilient to other seismic hazards (in particular subsidence, ground shaking and liquefaction) and avoids creating new risks.	-2	-1	-1	-2
Growth is located in areas which are resilient to mass movement hazards (landslides, rockfall mud and debris flows) and soil erosion, and avoids creating new risks.	-1	1	-1	-2
Growth is located in areas which are resilient to the impacts of weather hazards (in particular wildfires) and avoids creating new risks.	-2	0	-1	-2

For many of the natural hazards present in the region, the level of risk under the scenarios is associated with the proportion of development planned for the corridor, however not exclusively, as not all natural hazards are present in all of the corridors.

The scoring against objective 7 takes into consideration hazard settings within district plans, including mapping and regulations, and also building standards.

Key results:

- Centralisation scores best overall in terms of coastal hazards (including sea level rise, storm surge, inundation, coastal erosion, and significant tsunami risk), but only if new housing development occurs away from coastal hazard areas.
- With regard to fluvial and pluvial flood hazards (river, stormwater, and surface water flooding) and river erosion, the dispersed, medium density infill and centralisation scenarios all represent an overall improvement on baseline scenario, however centralisation has the best outcome (although the Hutt corridor is still at high risk under this scenario).
- In terms of well-defined earthquake fault rupture and deformation zones, the dispersed, medium density infill and centralisation scenarios all represent an overall improvement on baseline scenario. Under medium density and controlled scenarios, it could be easier to control risks from fault hazard rupture, if development is more tightly defined.
- For other seismic hazards (in particular subsidence, ground shaking and liquefaction), greenfield and medium density infill scenarios score best overall, however tightly defined infill development is preferable to dispersed development as it allows better controls for managing seismic hazards risks.
- For mass movement hazards (landslides, rockfall mud and debris flows) and soil erosion, scenario risks are lower when growth is located on flat land, away from areas with risks of slope failure.
- Weather hazards (in particular wildfires), are similar across the region.

Objective 8 - Employment

Table 19 MCA results against the criteria for Objective 8

Objective 8: Creating local sustainable employment opportunities.	**Regional assessment**			
	Baseline	**Dispersed**	**Medium Density Infill**	**Centralisation**
Growth is located in areas which can support local sustainable employment.	**1**	**-2**	**2**	**2**
Growth is located in areas which are well connected to regional employment (including via high quality internet connections for people working from home).	**1**	**-1**	**2**	**2**

Key results:

- Centralisation and medium density infill scenarios score best by locating growth in places that are well connected to regional employment, can support more employment and reduce reliance on commuting across the region.

4.2. Infrastructure impact assessment

The key themes from the qualitative assessments of the scenarios undertaken by infrastructure providers are summarised below by infrastructure sector:

Energy sector

- The transition to a low emission economy will need to occur within the Future Development Strategy time period. Decarbonisation will include electrification and alternative gas mix options (biogas and green hydrogen).
- The region will need additional renewable generation capacity. Knowing future urban growth areas will help with forward planning and site selection to avoid conflict.
- The region will need electricity network improvements, comprising:
    - new infrastructure to service new growth areas
    - new infrastructure to improve security of supply, and
    - maintenance and upgrade of existing aging infrastructure.

- Each spatial scenario would result in significant investment in electricity distribution infrastructure, with the dispersed scenario the most expensive to service.
- For one gas and electricity distributor, the centralisation scenario was preferred in terms of readily servicing growth with existing infrastructure. This was followed by the medium-density scenario, and then the dispersed scenario. The baseline scenario was not preferred.

Transport

- For freight operations:
    - A low-carbon future would require hub-and-spoke freight connections close to customers.
    - Port operations will remain multi-modal into the future.
    - A centralised or denser urban development scenario may make it challenging to find land to provide for distribution and logistics infrastructure.
- Public transport:
    - The dispersed scenario is the most expensive to service[9], in particular because of rail network constraints north of Porirua and need for significant investment in bus infrastructure if dispersed urban development is low-density.
    - The centralised scenario places much of the growth near rail stations, so from a rail perspective this is easier to service, however some improvements on the Hutt Valley line would be required.
    - The medium-density infill scenario is easier to service by bus, as growth is placed where good bus services are already located.
- For local transport provision, including active modes:
    - Investment in roading and active mode facilities is required to meet existing transport needs before the requirements to service spatial scenarios can be met.
- For roads:
    - Dispersed urban development may be more reliant on state highway access, reducing the impact on local arterial roading connections.
    - Dispersed urban development is more likely to increase Vehicle Kilometres Travelled.

Telecommunications:

- The centralised scenario is preferred; however, the network programme would need to change over time to build the network wherever it is needed to meet customer demands.
- Under any scenario, at the onset of development Road Controlling Authorities, utilities providers, and developers should explore trench share opportunities with fibre providers. If this is not considered it could be more costly to provide fibre to a development.

Education:

- Overall certainty around locations of development, and long-term land requirements for schools is key.
- Intensified urban development may require new ways of working cross agency to deliver school assets in non-traditional ways.

Regional parks:

- The overall supply of regional parks is sufficient to accommodate population growth. It is more likely that dispersed urban development will drive recreation visits for regional parks.

[9] While options have not been costed, this is likely to be financially prohibitive.

Council infrastructure:

- Dispersed scenario:
    - Significant investment in network extension to service greenfield areas.
    - Onsite solutions for some infrastructure (e.g. water) may be required, potentially carrying additional long-term risk for councils
    - Ongoing operational and maintenance costs would increase above cost assumed under the baseline scenario.
- Medium-density infill scenario:
    - Would require upgrading the capacity of existing trunk infrastructure, e.g. additional capacity for wastewater treatment and disposal.
    - Growth may occur sporadically across the urban area, therefore prioritisation of infrastructure upgrades would be more difficult.
- Centralisation scenario:
    - Would remove the need for additional growth-related infrastructure in the western corridor but would not remove the need to continue to invest in addressing current constraints in growth areas and providing for ongoing maintenance and improving resilience of existing networks.
    - Growth occurring in well-defined urban areas would make it easy to prioritise infrastructure investment.

4.3. Qualitative assessment against iwi and hapū values and aspirations

The qualitative assessment of scenarios against objective 9 was undertaken on behalf of WRLC iwi members The assessment was informed by *Te Tirohanga Whakamua* – a statement of iwi and hapū values and aspirations for urban development in the Wairarapa-Wellington-Horowhenua region – see Appendix C. It was also informed by engagement with WRLC iwi members on the preparation of the draft Future Development Strategy.

The analysis identifies opportunities and challenges for aligning growth with mana whenua housing and other values and aspirations.

Table 20 Opportunities for growth to align with mana whenua housing and other values and aspirations.

Opportunities identified			
Baseline	**Dispersed**	**Infill**	**Centralised**
With continued growth consistent with the existing locations of growth spread out across the region we can plan choose to better avoid areas of natural hazards and climate change and areas of interest to Mana Whenua, more than with the centralised/infill scenarios In this scenario fewer new roads will need to be developed which means that there is a lower level of risk for adverse effects on cultural sites such as wāhi tapu. Opportunity to build and acknowledge cultural histories in areas where urban development already exists and in new development areas - creative visibility and accessibility of way Māori culture and stories are reflected in the urban landscape – more people will see these cultural histories because growth is more evenly distributed. More options for Mana Whenua to live within the rohe of their affiliated iwi. Growth is more evenly distributed which would reduce the impact of urban development (e.g. construction or higher population impacts such as waste and sewage) to be concentrated	As development will occur in new places, we can plan to avoid areas of natural hazards and climate change and areas of interest to Mana Whenua. More ability to grow and gather kai in the traditional way – through more space and access for mahinga kai, communal gardens). Could build new self-contained/distributed infrastructure e.g. water into greenfield development, distributed energy generation networks. More options for Mana Whenua to live within the rohe of their affiliated iwi. Options for development around rural/non-urban marae – more central hub including health, education and employment with marae. Might help to retain young iwi members by providing opportunities locally, if education and employment opportunities can be realised. Opportunity to build and acknowledge cultural histories in new development areas.	Allays concerns about displacement of people in undeveloped traditional areas and cost of housing in these areas increasing e.g. Wellington people going to Featherston, as provides housing options in centralised places. Opportunity to build and acknowledge cultural histories in areas where urban development already exists - creative visibility and accessibility of the way Māori culture and stories are reflected in the urban landscape – this scenario will reach more people than greenfield Might attract young iwi members to return to the region (more housing choice in urban areas) if this housing scenario can be packaged with employment opportunities Protects high quality land and undisturbed waterways and improves housing choice and density. In this scenario no new major roads will need to be developed which means that there is a lower level of risk for adverse effects on cultural sites such as wāhi tapu.	Allays concerns about displacement of people in undeveloped traditional areas and cost of housing in these areas increasing e.g. Wellington people going to Featherston, as provides housing options in centralised places Opportunity to build and acknowledge cultural histories in areas where urban development already exist – creative visibility and accessibility of the way Māori culture and stories are reflected in the urban landscape – this scenario will reach more people than greenfield Might attract young iwi members to return to the region (more housing choice in urban areas where it is assumed they prefer to live) if this housing scenario can be packaged with employment opportunities. Protects high quality land and undisturbed waterways and improves housing choice and density In this scenario no new roads will need to be developed which means that there is a lower level of risk for adverse effects on cultural sites such as wāhi tapu’

Opportunities identified			
Baseline	**Dispersed**	**Infill**	**Centralised**
on any one natural feature e.g. Wellington Harbour. This would allow more local mitigation to protect and enhance many environments.		Reduced reliance on cars can encourage healthier communities through more active transport aligning with aspirations around health Development in Wellington and Lower Hutt likely to positively affect some Mana Whenua as this is where the population is concentrated. More options for some Mana Whenua (Taranaki Whānui ki Te Upoko o Te Ika and Ngāti Toa Rangatira) to live within their traditional lands. Scenario aligns with a whole system approach (transitioning to a zero-carbon future), benefits health, the broader environment and aligns with te ao Māori and the interconnectedness of things.	Development in Wellington likely to positively affect some Mana Whenua as this is where the population is concentrated. More options for some Mana Whenua (Taranaki Whānui ki Te Upoko o Te Ika and Ngāti Toa Rangatira) to live within their traditional lands. Reduced reliance on cars can encourage healthier communities through more active transport aligning with aspirations around health. Scenario aligns with a whole system approach (transitioning to a zero-carbon future), benefits health, the broader environment and aligns with te ao Māori and the interconnectedness of things.

Table 21 Challenges for growth to align with mana whenua housing and other values and aspirations.

Challenges identified			
Baseline	**Dispersed**	**Infill**	**Centralised**
Lack of equity at present is likely to continue as greenfield and some urban centres are further out where access to health, education and employment is harder and more expensive - this in particular is related to current public transport offerings. Continual impact on the land through greenfield development throughout the	More impact on the land than previously i.e. in areas where there was previously no development. More people moving to greenfield areas and taking over the land e.g. Ōtaki, Wairarapa and causing the displacement of Mana Whenua and other Māori and/or an increase in housing prices.	Limits ability to build on ancestral land – particularly in the Wairarapa and Kāpiti/Horowhenua. Less ability to grow kai with limited land per home. Distributed infrastructure e.g. water, if a goal would need to be	Limits ability of some Mana Whenua to build on ancestral land outside of Māori Purpose Zones – particularly in the Wairarapa and Kāpiti/Horowhenua. Limits new housing choice for Mana Whenua to apartment/high density However, if other people sell and move into higher density, then that may free up traditional housing stock.

Challenges identified			
Baseline	**Dispersed**	**Infill**	**Centralised**
region but mostly in the western corridor which may create high levels of pressure on the coastal environment and impact heavily on cultural values (although less than the dispersed scenario). Not the best option for climate change and emissions as more people in general likely to drive – this impacts long term on the environment including increased air and water pollution.	Likelihood of increased climate change impacts and higher emissions as more people in general likely to drive – this impacts long term on the environment including increased air and water pollution. Worse outcomes for the health of communities, if car dependence increases for new residents in areas not serviced by public transport links that improve access around the region. Lack of equity as greenfield is further out where access to health, education and employment is harder and more expensive - this in particular is related to current public transport offerings. As most of the greenfield growth is in the western corridor (Northern Porirua – Horowhenua and in particular Kāpiti) this will create new pressures on rivers and the coastal environment, impacting on the mana, wairua and mauri of te taiao.	retrofitted/redeveloped and limited opportunities for this. A focus on infill areas may mean less ability to fund major new regional infrastructure e.g. public transport, outside Wellington and Lower Hutt, resulting in a continued access and equity issue for those further out. As most growth is in areas close to the Wellington and Porirua Harbours and Hutt River, this will create additional pressure on the river and coastal environment which will further impact on the mana, wairua and mauri of te taiao.	Distributed infrastructure e.g. water, if a goal would need to be retrofitted /redeveloped and limited opportunities for this. Most of the region's growth in areas of higher risk to the impacts of climate change and natural hazard meaning mana whenua's development aspirations could be impacted unless mitigated. Iwi to iwi discussions about managed retreat will be needed as required. Less ability to grow kai locally and with limited or no land per home. A focus on centralised areas (e.g. Wellington City and Lower Hutt City centre) likely to mean less ability to fund regional infrastructure e.g. public transport, outside these areas resulting in a continued access and equity issue for those further out. As most of the growth is in the Wellington and Lower Hutt this will create additional pressure on freshwater, the harbour and coastal environment which will further impact on the mana, wairua and mauri of te taiao.

4.4. Overall findings

In this report, we have set out the key findings from both the qualitative and quantitative analysis undertaken to inform the Future Development Strategy. Overall, the **centralised scenario** performs best across almost all of the assessment criteria, followed by the **medium density infill scenario**. This indicates that regional growth which is more compact and higher density would be best placed to deliver on the project objectives. Generally, the dispersed scenario scored worse than the baseline scenario. For more detail see Table 1.

5. Implications for growth

Key implications for growth

This report has been drafted by multiple authors from the Future Development Strategy project team, each with experience relevant to the areas of assessment. The report authors have identified key implications for growth in response to the scenario analysis. These are set out in Table 23 below.

Table 22 Key Implications for growth

1 – Housing	***2 - Natural environment***	***3 - Food Production***
• Growth should consider the efficiencies of locating development near to existing centres. • Increasing the supply of medium density infill will help to support housing affordability, however other housing typologies should also form part of the preferred approach (e.g. greenfield development in Kāpiti, and a mix of medium density infill and centralised development in cities). • Growth planning should recognise that the market is most likely to support the supply of greenfield and medium density infill. • Growth planning should recognise the role of market demand in terms of housing supply within each district (both locationally and in terms of typology), while recognising that today's market preferences are influenced by historical growth patterns.	• Detailed mapping and assessment of preferred growth locations will be important to determine the true impact of development on the natural environment. • The impact of development on freshwater quality and ecosystems, wetland extent, terrestrial ecosystems extent and quality, and marine ecosystem extent and condition should carefully be considered through growth planning. Particularly for greenfield development, given that these areas are currently unaffected by urban pollution. • Infill development should be planned to avoid vegetation loss, urban ecosystem loss and further fragmentation or locating within wetlands and significant natural areas. • Development located away from the coast will lower impacts on marine ecosystems. • Coastal recreation arising from new urban development should be planned, designed and located to enhance and minimise impacts on	• Growth should be in accordance with the NPS-HPL (avoid highly productive land). • The impact on food production should be considered when determining the location of greenfield development; particularly in the Wairarapa, Kāpiti and Horowhenua. • The impact on food production needs to consider not just production, but also supply chain implications (e.g. if food production is pushed further away from domestic market or processing, distance for transport and labour becomes more difficult/costly and challenges viability).

	coastal marine ecosystems. • The location and design of infill and greenfield development should prioritise avoiding direct impacts, minimising indirect effects, and providing opportunities for enhancement.	
4 - Social Access (multimodal) • Denser growth patterns (greenfield and infill) better support social access by sustainable transport modes (active and public transport). • Walking, cycling and public transport infrastructure needs to be built to support social access. • New community services (including some provision for commercial and social activities) and parks should be established within any new urban areas.	***5 - Integrated and efficient infrastructure servicing*** • Providing for a low-carbon future should be a continuing driver of infrastructure investment. • More compact higher density development is generally easier and more cost effective to service by Infrastructure, however there are existing constraints on trunk infrastructure networks such as energy, water and transport. • Council infrastructure providers highlighted the need to deliver existing committed investments and provide infrastructure for existing gaps prior to any investment decisions on new infrastructure which may impact the scale of future investments. • Consideration of new growth areas could identify the indicative costs, dependencies of growth areas for infrastructure, and prioritisation and staging of development areas with associated infrastructure needs.	***6 - Zero-Carbon Future*** • The emissions associated with growth need to be considered in terms of both location and design, with higher density development (centralisation and medium density infill) favoured. • Any greenfield development should be located close to existing transport corridors, recognising the emissions that come not only from new developments but also from new infrastructure. • Active/public transport connections to and between amenities and employment will be important for transport emissions. • Preserving habitat is far preferable from an emissions perspective to planting new trees, and this should be considered when planning growth. Where greenfield development does occur, any loss of trees should be replaced as part of the development. • Reducing transport emissions through VKT reduction will require a range of interventions in

		addition to better integrated transport and land-use planning and transport policy levers.
7 - Natural Hazards and Climate Change risks • Development needs to be designed according to best practice hazard risk management standards using a risk-based approach. • Development should only occur in areas where it can be managed or mitigated. Growth planning should avoid developing housing in high-risk areas (including future high-risk areas) and areas where hazards can't be managed and mitigated. • Hazard modelling should be undertaken according to best practise. • All regional and district plans need to contain up to date risked based hazard management rules and policies for development to be resilient to natural hazards and climate change impacts. • To increase resilience to seismic and flood hazards, growth shouldn't occur **only** in Wellington City or the Hutt Valley. • The utilities infrastructure required to support growth should be hazard resilient or similarly upgraded. • Natural hazard risks may be more complex to avoid and mitigate than values associated with other objectives.	***8 – Employment*** • If Wellington City is expected to remain the major employer in the region, then connections to this employment hub is essential for other outcomes (e.g. climate change mitigation and social access), as well as ensuring there is not a deficit of workers. • Scenarios should locate (or ensure good connections/linkages between) new areas of growth and areas where current and future jobs are located and anticipated. The HBA and regional industrial land study should feed into this analysis. • Consideration should be given to reducing the reliance on commuting across the region by locating growth in areas where new employment is sustainable. • Improving the road, rail, water and communications infrastructure in the Wairarapa would open up more opportunities for industries and businesses to consider relocating or emerging here.	**9 - Mana Whenua Housing and other values and aspirations** Growth should implement the values and aspirations of iwi and hapū as set out in *Te Tirohanga Whakamua* and as expressed through regular and ongoing conversations with Mana Whenua and Māori in our region (including urban Māori) over time. This includes (but is not limited to): • Support both individual iwi and regional Mana Whenua values and aspirations, mana motu hake and tino rangatiratanga as set out in Te Tiriti. • Maintain cultural heritage sites and sites of importance. • Support food sovereignty and ability to protect kai. • Create visibility of stories and identities in urban and rural spaces. • Plan for climate change and natural disasters, including the movement of coastal iwi and the impacts of migrating people on inland iwi. • Restore and protect the water and the whenua. • Support variety of affordable community housing options. • Support equitable health outcomes and promote economic and employment opportunities. • Move towards a circular economy and green infrastructure.

Appendix A - Quantitative assessment results - GIS spatial analysis

	Baseline						Dispersed						Medium Density Infill						Centralisation					
	Wellington	**Porirua**	**Kapiti/ Horowhenua**	**Hutt Valley**	**Wairarapa**	**Overall**	**Wellington**	**Porirua**	**Kapiti/ Horowhenua**	**Hutt Valley**	**Wairarapa**	**Overall**	**Wellington**	**Porirua**	**Kapiti/ Horowhenua**	**Hutt Valley**	**Wairarapa**	**Overall**	**Wellington**	**Porirua**	**Kapiti/ Horowhenua**	**Hutt Valley**	**Wairarapa**	**Overall**
Total quantity of consumed "undeveloped land" for development (relative to baseline)	100%	100%	100%	100%	100%	100%	296%	536%	1160%	110%	247%	471%	30%	247%	62%	53%	34%	67%	17%	119%	38%	41%	20%	40%
Quantity of sensitive areas / biodiversity areas consumed for development (relative to baseline)	100%	100%	100%	100%	100%	100%	100%	106%	212%	83%	116%	119%	97%	127%	67%	90%	74%	92%	97%	114%	59%	87%	72%	88%
% loss in urban tree cover (comparison with scenario and NPS-IB)	100%	100%	100%	100%	100%	100%	75%	128%	243%	63%	57%	109%	102%	101%	49%	97%	34%	81%	101%	72%	35%	82%	32%	70%
Quantity of productive rural land consumed for development	n/a	100%	100%	100%	100%	100%	n/a	155%	210%	105%	99%	159%	n/a	132%	89%	82%	75%	84%	n/a	91%	88%	65%	72%	80%
No. / proportion of daily person trips by private vehicle -per capita	100	100	100	100	100	100	109	103	70	111	112	101	99	92	109	95	108	98	91	94	111	97	107	96
No. / proportion of daily person trips by PT -per capita	100	100	100	100	100	100	117	97	230	101	73	115	99	108	100	100	84	101	98	110	101	103	97	106
Number of households and people within a walkable catchment (800m) of community services (libraries, pools, community centres)	57%	31%	16%	32%	17%	37%	56%	26%	11%	31%	15%	32%	56%	33%	15%	35%	18%	38%	62%	34%	15%	35%	18%	42%
Number of households and people within a walkable catchment (800m) of green space greater than 3000 sqm.	82%	87%	72%	82%	57%	79%	81%	77%	53%	82%	53%	72%	82%	85%	71%	85%	59%	80%	85%	88%	72%	85%	59%	82%
Average daily vehicle kilometres travelled (VKT)	100	100	100	100	100	100	136	117	117	115	119	122	97	92	106	90	104	95	87	94	104	95	103	92

per household - light Veh only																							
Average daily vehicle kilometres travelled (VKT) total - light Veh only	100	100	100	100	100	100	120	116	211	100	105	123	98	102	81	100	79	95	99	96	75	100	77	92
Population / employment located in areas vulnerable to sea level rise	4.20%	1.85%	4.83%	10.40%	0.54%	5.431456	4.21	1.59	4.5	9.84	0.56		4.24	2.35	4.77	12.43	0.65		4.24	2.58	4.61	12.16	0.66	
Population / employment located in areas vulnerable to earthquake hazards	12.79%	11.54%	42.25%	21.27%	6.04%		12.31	9.92	30.27	22.28	6.38		12.47	15.95	40.32	23.19	6.35		13.81	17.4	39.7	23.87	6.34	
Population / employment located in areas mapped flood hazard areas (regional study)	5.67%	5.07%	15.22%	36.97%	21.56%		5.37	4.33	12.43	36.27	22.29		5.38	6.11	13.7	40.71	23.15		6.54	6.68	13.12	40.02	23	
Population / employment located in areas on steep land potentially susceptible to slope failure (over threshold of 20% slope)	0.50%	0.30%	0.43%	0.10%	2.68%		0.1	0.3	0.43	0.13	2.68		0.04	0.24	0.55	0.09	2.22		0.04	0.26	0.52	0.08	2.29	
No. / proportion of jobs accessible to households by private vehicle within a 30 min drive AM peak	100	100	100	100	100	100	92	72	42	131	100	84	105	106	113	105	90	109	110	118	129	104	90	122
No. / proportion of jobs accessible to households by public transport within a 45 min journey AM peak	100	100	100	100	100	100	95	85	74	96	96	84	97	100	100	109	92	108	106	110	104	108	93	117

Appendix B - Qualitative assessment results – Multi Criteria Analysis

Objective	Criteria	Baseline						Greenfield						Medium Density Infill						Centralisation					
		WGTN	Porirua	Kāpiti/ Horowhenua	Hutt	Wairarapa	Overall	WGTN	Porirua	Kāpiti/ Horowhenua	Hutt Valley	Wairarapa	Overall	WGTN	Porirua	Kāpiti/ Horowhenua	Hutt Valley	Wairarapa	Overall	WGTN	Porirua	Kāpiti/ Horowhenua	Hutt Valley	Wairarapa	Overall
1	Increase housing locational efficiency	0	-1	0	0	-1	-1	-3	-2	1	0	0	-3	2	1	1	2	1	1	3	2	3	3	2	3
	Housing affordability / ownership	1	1	0	1	0	1	-2	0	3	-2	-1	-1	2	2	-2	2	-1	2	2	1	-2	1	-1	1
	Reconcile with market acceptance of risk - market willingness to supply	0	0	0	0	0	0	-1	2	3	0	1	0	0	0	-1	-1	0	0/-1[10]	-2	0	-1	-1	0	-1
	Reconcile with locational and typology choice/need - demand	0	0	0	0	0	0	-3	0	2	-2	-1	-3	1	1	-2	1	-1	1	2	1	-3	-1	-3	-2
2	Growth avoids significant adverse impacts on water quality/quantity	-2	-2	-3	-2	-2	-2	-3	-3	-3	-2	-1	-2	-2	-3	-3	-3	-2	-3	-2	-2	-1	-2	-1	-2
	Growth avoids significant adverse impacts on freshwater ecosystems (including stream reclamation)	-1	-1	-3	-2	-2	-2	-1	-3	-3	-2	-1	-2	-2	-3	-3	-3	-2	-3	-1	-1	-1	-1	-1	-1
	Growth avoids significant adverse impacts on wetland extent	-2	-3	-3	-2	-1	-2	-1	-2	-3	-1	-3	-2	-2	-3	-2	-3	-2	-3	-3	-1	-1	-2	-1	-1
	Growth avoids significant adverse impacts on terrestrial ecosystems extent	-2	-2	-3	-2	-3	-2	-1	-2	-3	-1	-3	-3	-2	-3	-2	-3	-2	-2	-3	-1	-1	-2	-1	-1
	Growth avoids significant adverse impacts on terrestrial ecosystems condition	-2	-2	-2	-2	-3	-2	-1	-2	-3	-1	-3	-3	-2	-3	-2	-3	-2	-2	-3	-1	-1	-2	-1	-1

[10] For the purpose of summary tables in the body of this report, this scoring has been taken to be '-1'. This is because the scoring was not neutral across the region against these criteria. Under this scenario, all corridors were neutral with the exception of the Kapiti/Horowhenua and Hutt Valley corridors which experienced a hardly, but is still somewhat, worse outcome over the 30-year period.

	Growth avoids significant adverse impacts on marine ecosystems extent	-2	-2	-3	-1	-1	-2	-1	-3	-3	-1	-1	-3	-1	-1	-1	-1	-1	-1	-3	-1	-1	-2	-1	-1
	Growth avoids significant adverse impacts on marine ecosystems condition	-2	-2	-3	-1	-1	-2	-1	-3	-3	-1	-1	-3	-2	-2	-1	-2	-1	-2	-3	-1	-1	-3	-1	-1
3	Growth avoids highly productive land and where food is produced.	2	0	-2	-1	-2	-1	2	0	-3	-1	-3	-3	2	0	-1	-1	-1	0	2	2	-1	1	-1	1
4	Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by active transport (walking and cycling) infrastructure.	1	0	-1	0	-1	-1	0	-3	-3	-3	-3	-3	2	2	1	2	2	1	3	3	0	3	1	2
	Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by public transport infrastructure.	0	0	-1	0	-1	-1	0	-3	-3	-3	-3	-3	2	2	1	2	1	1	3	3	0	3	0	2
	Social access to and between local and regional housing, employment, education and services/opportunities is well provided for by private vehicle modes.	1	1	1	1	1	1	0	0	0	0	0	0	-1	0	0	0	0	0	-3	-2	0	-2	0	-1
6	Growth, by way of location and intensity, does not compromise regional emissions reduction ambitions. Growth also supports change and rapid reductions in regional emissions; including from the region's largest emissions sources (transport, agriculture and						-1						-3						1						3

	stationary energy).[11]																								
7	Growth is located in areas which are resilient to the effects of coastal hazards (including sea level rise, storm surge, inundation, coastal erosion and significant tsunami risk) and avoids creating new risks.	-1	-1	-1	-2	3	-1	-1	-1	1	-1	2	0	-1	-1	0	-2	2	-1	0	1	2	-1	3	1
	Growth is located in areas which are resilient to the impacts of fluvial and pluvial flood hazards (river, stormwater and surface water flooding) and river erosion, and avoids creating new risks.	-1	-1	-1	-2	-2	-2	0	0	-1	-1	-1	-1	-1	-1	0	-2	-1	-1	-1	0	0	-2	-1	0
	Growth is located outside of well-defined earthquake fault rupture and deformation zones.	-2	-1	0	-2	-1	-2	-1	-1	-1	0	1	0	-1	-1	1	-1	0	-1	-1	-1	1	-1	1	-1
	Growth is located in areas which are resilient to other seismic hazards (in particular subsidence, ground shaking and liquefaction) and avoids creating new risks.	-2	-1	-1	-3	-1	-2	-1	-1	-1	-2	0	-1	-1	-1	0	-2	0	-1	-3	-1	1	-2	0	-2
	Growth is located in areas which are resilient to mass movement hazards (landslides, rockfall mud and debris flows) and soil erosion, and avoids creating new risks.	-2	-1	2	-2	2	-1	-1	-1	2	-1	0	1	-1	-1	1	-2	1	-1	-3	-1	1	-2	0	-2

[11] Objective 6 was assessed at a regional level only. This is because the location emissions occur is irrelevant to the regional emissions profile.

	Growth is located in areas which are resilient to the impacts of weather hazards (in particular wildfires) and avoids creating new risks.	-1	-1	-1	-2	-2	-2	0	0	-1	-1	0	0	-1	-1	0	-1	-1	-1	-2	-1	0	-1	-1	-2
8	Growth is located in areas which can support local sustainable employment.	1	1	-1	1	-1	1	-2	1	-3	-2	0	-2	1	1	1	3	1	2	3	1	-1	1	0	2
	Growth is located in areas which are well connected to regional employment (including via high quality internet connections for people working from home).	1	1	1	1	-1	1	-2	1	2	-2	0	-1	1	1	2	2	1	2	3	1	2	1	1	2

Te Tirohanga Whakamua

Statement of iwi and hapū values and aspirations for urban development for the Wairarapa-Wellington-Horowhenua region

Tuanui | Future Vision

Ko te Tiriti o Waitangi te tūapapa o ngā rautaki hapori tirohanga whakamua hei huhua te rangatiratanga o tēnā o tēnā o ngā iwi.

A future for the Wairarapa-Wellington-Horowhenua region founded on Te Tiriti and realised through the tino rangatiratanga of mana whenua.

Pou 1 | Rangatiratanga

(Self-determination, autonomy)

Mana whenua actively drive decision-making and influence society and the economy because they are resourced and empowered to govern and implement actions for their communities in each rohe.

Whānau decide what is right for their community.

Treaty partnership is thriving and underpins all development decisions in our towns and cities.

Pou 2 | Mātauranga Māori

(Māori worldviews, language, culture, knowledge, and customs)

Mana whenua are the constant. This is recognisable because Māori culture, te reo me nga tikanga a iwi are thriving, well understood and visible in our urban and rural spaces.

Government systems reflect strong partnership between the Crown and mana whenua.

Tikanga, mātauranga, whakapapa and te ao Māori perspectives are recognised, supported and respected. This is reflected in decision making and governance at all levels.

Pou 3 | Kotahitanga/ Ōritetanga/ Mana taurite

(Unity, solidarity, collective action, equity)

Targeted support, including direct mana whenua governed funding, ensure equitable outcomes for Māori in all aspects, including health, housing, the economy and justice.

Unity through diversity where the voice of mana whenua is strong and respected. There are both bespoke local solutions and regional solutions that benefit everyone.

Pou 4 | Kaitiakitanga

(Holistic wellbeing between people and all the elements of nature through care and stewardship)

Land, water, the sea and humans are in harmony and balance ki uta ki tai. The mauri of each of these elements is restored, protected, and sustained and supporting the wellbeing of all life and living beings.

Growth in our region supports thriving life and abundant nature.

Tūāpapa | Foundation

Mana whenua are kaitiaki through whakapapa and have a responsibility to protect, replenish, and sustain te taiao me te whenua. Everyone in our region shares this responsibility through relationships based on trust, aroha, manaakitanga, tika and pono and through a steadfast and unwavering commitment to Treaty partnership and cultural compliance with all elements of Te Tirohanga Whakamua. This foundation must be maintained forever by all to stay strong and continue to hold up the whare.

Kōkiri 1

Growth supports Treaty partnership and is directed towards benefits for all people in the region, and has a positive cumulative impact. It is recognised that all areas of change are interrelated.

Kōkiri 2

There is movement away from a linear economy model and towards a circular approach, and development is informed by nature-based solutions wherever possible.

Kōkiri 3

When planning for growth, the environment comes first, and growth should only occur where it creates positive environmental outcomes and is in tune with nature and the biodiversity of the region.

Kōkiri 4

Planning focuses on decolonisation, removing barriers that iwi face and setting us up to respond to our challenges independently.

Kōkiri 5

Investment is directed toward reducing inequality and growing healthy economic opportunities for Māori communities, and funding distribution empowers mana whenua with what is needed in each rohe.

Kōkiri 6

The children of today are equipped with the information, tools and knowledge they need for the future of tomorrow, including climate change and natural disaster planning.

Appendix D – Key assumptions associated with the scenario assessment

GIS spatial analysis

Overall assumptions used for the quantitative GIS analysis:

- For the purpose of this analysis, the baseline represents the existing situation, using 2021 population data per Statistical Areas (SA1). The projections for each scenario were distributed across a combination of SA1 and known greenfield areas (provided by the individual Councils). Future growth in various scenarios is represented by higher values for each address point, relative to the projected growth.
- For growth projections within the existing urban area (infill), the projected growth numbers within these SA1 areas were evenly distributed across existing address points within this area. As it was not possible to distinguish between residential and commercial, in SA1s with mixed use the population was spread among commercial address points.
- For growth areas outside the existing urban area (defined greenfield areas) future population growth was distributed across a 50m by 50m grid, essentially creating new hypothetical address points, within that area. It is noted that the provided growth areas across the region were in variable stages of development.
- In order for the analysis to result in a consistent output across the various areas, the analysis was undertaken at the highest level, ignoring any potential layout or land use configurations that may already have been proposed within (some of) these areas. As a result, the outputs can only be considered at a regional level and as comparison between growth areas and cannot be used to assess effects within individual growth areas. An example of this is where an even distribution of growth across a greenfield area might appear to affect 'sensitive' land where further well-considered development of that area, e.g. through structure planning, might be able to avoid development on these sensitive areas.
- Detailed assumptions that were made as part of this analyses have been detailed below.

Detailed methodology and assumptions used for the quantitative GIS analysis:

Pedestrian Catchment Analysis (Community Services)

Swimming pools, libraries and community halls were used as the origin layer. Where possible these were sourced from ArcGIS servers (WCC, PCC, HCC). Otherwise OpenStreetMap was used, the categories being 'community centre', 'swimming pool', 'library'. These were quality checked on Google Maps, especially to eliminate disused/demolished buildings.

An analysis was run on a pedestrian network which produced 800m walkable catchments. The existing and future address points were then joined to the catchments and the population summed for both. The percentage of the total projection that fell within the catchments was then calculated for each region.

Pedestrian Catchment Analysis (Parks)

The category 'parks' from OpenStreetMap was used in the analysis. Although some councils have parks and reserves available on ArcGIS servers, it varies as to what is classified as a park without being able to distinguish between golf courses, regional parks etc. By using the OSM parks category we got a fairer representation of urban parks across all councils.

Origin points were generated every 10m on all parks over 3000m^2, and all points within 15m of the pedestrian network were selected. An analysis was run as above, also for 800m catchments. It should be noted that this method doesn't distinguish between fenced and unfenced parks that run alongside roads, thereby capturing some address points which would have more than an 800m walk to the nearest park entrance, but a manual survey of entrance points for all parks was outside the scope the analysis.

Sensitive Area Analysis

A raster of NoGo areas produced by GWRC was used for this analysis. This includes flood plains, parks etc. The raster was made into a vector layer, and all address points which intersected the NoGo layer were summed for each region, for each scenario. As the aim was to quantify the amount of growth which would occur in these zones and represent them as percentages, the baseline scenario ('Business as usual') was set at 100, and all scenarios were converted to a percentage in relation to this.

A weakness with this analysis is that where the development in the greenfield areas is proposed is often not yet defined. The intention in many of these areas will probably be to avoid the NoGo zones, so development on a greenfield area which is 20% 'NoGo', where a maximum of 80% is needed for development, may not need to encroach on the NoGo zone at all. On the other hand, sometimes development may be planned here, perhaps even more than 20% of it.

LUC Soils

LUC soil classes 1-3 were filtered from the NZLRI Land Use Capability dataset from the LRIS portal. All address points which intersected the soil classes were summed for each region, for each scenario. The analysis does not take into account whether areas are already earmarked for development in the district plan. As above, the baseline scenario was set at 100%, and all scenarios were converted to a percentage in relation to this.

Undeveloped Land Analysis

Greenfield development formed the basis of this analysis. For each scenario the sum of the population attributed to future address points was calculated per region and multiplied by 110m^2 as a proxy for area per dwelling. As above, all scenarios were converted to a percentage in relation to the baseline scenario.

Tree Canopy Analysis

GWRC's tree canopy layer for the Greater Wellington area (not including Horowhenua) was used as the basis for this analysis. The layer was first clipped against building footprints, as these were often covered by the vector tree canopy layer. The total area of the tree canopy within each SA1 was then calculated. An average of "area without tree canopy per person (2021)" for each of the following SA1 FDS categories was then calculated:

- CBD
- Centre 1 and 2
- Urban 1, 2, 3

SA1s with a population density of fewer than 1000 people per km^2 were not used in the calculation. This was done to eliminate SA1s that covered large tracts of undeveloped land which would have been given too much weight despite their non-urban character.

These averages were then applied to population growth for each of the scenarios in each of the SA1s, depending on their categorisation. The sum of the "area without tree canopy" needed for the population growth was treated as the area of the tree canopy that could theoretically be removed. This sum was not allowed to be more than the sum of the tree canopy found today for each SA1. As above, all scenarios were converted to a percentage in relation to the baseline scenario.

This method gave logical results for the most part. Greenfield development in tracts which are today predominately trees scored highly, as did densification in central areas where there will be a battle for space. However, for greenfields which are today largely farmland, it doesn't seem logical that the few trees there today would have to make way for development when there is so much other space to build. In fact, these areas will most likely get more tree canopy as they are developed. Therefore, SA1s with all these characteristics were taken out:
Population density less than 1000 per km^2
Tree canopy less than 20 % today
Size greater than 1 km^2

For Horowhenua current tree cover was estimated as the average for the relevant FDS category per SA1.

Quantitative analysis of scenario impact on the transport network

- Current land use assumptions were developed at a high level using SA2 data.
- The transport networks currently assumed are generic for all land use scenarios a future improvement would be to optimise the transport networks iteratively under the preferred scenario to deliver the desired outcomes.
- A series broad assumption have been made regarding how car ownership and other metrics might vary according to the nature of any planned development (low / medium / high density)
- High level assumptions (using an economics model) have been developed regarding how the spatial distribution of employment might change under the FDS land use scenarios. The model is based on assumption of incremental changes, with the underlying economic being well established. It accepts population number inputs by TA. Hence, finer subtleties in Population distribution within the TAs will not come through in the job projections data was not available for Horowhenua. Further, the model uses Business Frame job numbers, which have been scaled to match Census based Job-Numbers to Population ratio from the WTSM Model (0.48)

SA1 level assessment of households accessibility to social destinations

- The social destinations of greatest importance for urban development includes supermarkets, GPs, educational institutions and hospitals.
- That car travel, public transport and walking are preferred methods of transport to reach social destinations.
- That a 45-minute public transport trip, 30-minute drive or 10-minute walk are acceptable travel times to reach these social destinations.
- That walking access to social destinations would be most important for households within high deprivation areasThat analysis at the level undertaken is be sufficient for the purpose of the FDS to explain the social access trends which would be experienced under the different scenarios.
- That transport network infrastructure would be unchanged over the 30-year period

Qualitative multi-criteria analysis carried out by a panel of subject matter experts against project objectives.

Various assumptions informed this assessment. These are set out below. The following key assumptions were made by the subject matter experts and influence how each scenario was scored, and ultimately how the outcomes of the MCA should be interpreted and understood.

<u>Objective 1 Housing</u>

- The Sense Partners data/projections are reconciled with the demand preferences of the Wellington Region and the anticipated locations where that demand will be met.
- Demand preference relates to a combination of price, location and housing typology.
- Housing Location Efficiency relates to people's relative access to employment and amenities.
- Housing affordability is based on relative demand and supply within each district, the provided typology, and consideration for the extent to which it is more expensive to provide housing in some locations than others.
- Greenfield development is the easiest and typically least risky development to undertake from perspective of a developer.
- Oversupply of greenfield reduces the propensity for urban redevelopment to occur and potentially reduces the level of urban amenity.
- Assumes that the construction industry does not have the capability to build the centralised scenario (not many developers do very high density at the moment), and that the market would not accept this scenario (not everyone wants to live in central Wellington).
- No new centres are created.
- Access to employment activities is not constrained in each scenario/location.
- Supporting infrastructure is provided.
- The population can be generally 'pushed' around the region.

<u>Objective 2 Natural Environment</u>

- Growth cannot occur without impacting on the natural environment. The scoring therefore reflects the degree of impact within each corridor, relative to itself across the scenarios and compared to the current state of the natural environment.
- Best practice in urban development, (e.g. water sensitive urban design, and infrastructure management is occurring, sediment control practices are high performing, development accounts for climate change).
- Infrastructure which is fit for purpose regarding scale and quality will be upgraded and provided for to serve development.
- Three waters reform implemented.
- All existing environmental protections remain in place and at current level of stringency, however continued loss of streams or wetland is anticipated.
- All significant natural areas (SNAs) are protected.
- The national CBT commitment to protect 30% of natural ecosystems by 2030 is supported.
- 30% permeable surface in any new development.
- The extent and condition of marine ecosystems is already under pressure in Wellington and the Hutt, so these areas start from a lower baseline than the rest of the region.
- Infill development will result in a loss of natural environmental values because people will be forced to build on areas that were previously avoided for good reason (e.g. wetlands).

Objective 3 Food Production

- In the absence of an RPS-HPL, areas of highly productive land (HPL) are based on NPS-HPL requirements (LUC 1-3).
- Food production systems are generally similar to what they are now, although acknowledging a potential shift away from ruminants to plan based agriculture where there is HPL.
- Encroachment in food producing areas would not influence food security due to the national excess of food production.
- Intensification of existing urban environments will have less of an impact on HPL, due to less encroachment into greenfield areas

Objective 4 Multi-modal social Access,

- Walking, cycling and public transport infrastructure will be built to support both existing development and growth areas.
- A shorter travel distance is preferable for all travel modes (reduced commuting time, most attractive for walking and cycling), except for private vehicles increases in really high-density development areas due to congestion.
- Housing occurs around existing services and employment under the centralised scenario.
- Housing occurs within walking and cycling distance to services and employment under the medium density infill scenario.
- Kāpiti/Horowhenua and Wairarapa corridors remain largely reliant on commuting to the Wellington, Porirua or Hutt centres for work or entertainment.

Objective 6 Zero-carbon Future

- Key emissions associated with growth include the emissions embodied emissions from use of existing buildings and infrastructure, and ongoing emissions from activities that are enabled or constrained by new development.
- Higher densification and concentration is best, however densification along transport public transport corridors is second best (requires large infrastructure upgrades so doesn't score as highly as centralisation).
- Preserving existing trees is better than planting replacement trees as mitigation.

Objective 7 Natural Hazards

- Existing regulatory requirements persist, however, assumes that District Plan reviews that which are currently underway will better manage natural hazards.
- The methods adopted to manage natural hazards (and development areas will be similar to those we use today.
- Utilities infrastructure built to support growth will be hazard resilient.
- DPs will zone to only allow development where hazards can be managed or mitigated + high hazard locations are avoided for housing.
- The assessment of flood hazards takes into account all fluvial flooding.
- Development in general will be set well back from the coast and that development in areas subject to pluvial flooding will be limited.

Objective 8 Sustainable Local Employment

- More people is good for the employment market.
- Wellington, Porirua and the Hutt corridors can all create more jobs based on current labour shortages, and current commuter patterns in the case of Wellington City
- Employment growth in the Wairarapa is limited by water, transport and communications infrastructure.
- Based on current commuter patterns, that employment growth in Kapiti is limited.
- Assumes that working from home patterns will not change much (1-day-a-week average).

Qualitative infrastructure impact assessment

- The scenarios provide sufficient detail for infrastructure providers to assess impacts on the infrastructure network, including requirements for new and upgraded infrastructure.
- Infrastructure investment will go ahead where needed to cover current gaps in provision.

Qualitative assessment against iwi and hapū values and aspirations

- That papakainga, including multi-generational housing can be built under any option – it might look different e.g. low density under greenfield option vs apartment/s living under centralised.
- That whilst more people correlate with more jobs and employment patterns/distribution across the region might change, we will not see a wholesale change (a large majority of jobs will still be in Wellington City).
- There will be improved public transport throughout the region, and walking, cycling, and public transport infrastructure will be built.
- Māori Purpose Zones which have been identified in plans (e.g. Hongoeka) will provide for Māori cultural needs, including social, cultural and economic development, and allows whānau to maintain an ongoing relationship with their ancestral land.

Appendix E – Key limitations of the scenario assessment

GIS spatial analysis

The main limitations to the undertaken spatial analysis are:

- Differences in level of detail in existing growth area plans across the region. Areas with existing structure plans provide a higher level of accuracy in planned locations for residential growth. Areas that have not gone through a structure planning exercise generally covered a larger area that may cover areas such as no-go areas, highly productive land or natural hazards. As a result these areas were included in the analysis, noting that development on these 'sensitive' areas can likely be avoided in advanced planning stages.
- The analysis was based on existing community services and parks and reserves. It is likely that large greenfield developments will provide for new services and increase the share of population that lives within a walkable catchment of these services.
- Infill will increase the number of people within the catchments of existing community services and parks and reserves. However, the analysis did not consider the capacity of existing services or parks or the types of activities that parks and reserves provide.

Quantitative analysis of scenario impact on the transport network

The approach for the FDS transport modelling has been purposefully pragmatic given timeframes. Limitations of the approach and options for future improvements are listed below:

- Current land use assumptions were developed at a high level using SA2 data – for subsequent work, it is suggested that these are developed / refined at a more detailed SA1 level including consideration of housing typologies and characteristics.
- The transport networks currently assumed are generic for all land use scenarios a future improvement would be to optimise the transport networks iteratively under the preferred scenario to deliver the desired outcomes.
- A series broad assumptions have been made regarding how car ownership and other metrics might vary according to the nature of any planned development (low / medium / high density) – these assumptions are appropriate for the current stage of analysis but should be refined moving forward.
- high level assumptions have been developed regarding how the spatial distribution of employment might change under the FDS land use scenarios – these should be refined during any subsequent more detailed work, as part of any broader work to optimise the scenarios to achieve the desired outcomes.
- there is significant uncertainty regarding the population growth rates both across New Zealand and the Wellington Region – for subsequent testing, it is suggested that scenarios including lower / higher growth rates should be assessed as sensitivity tests.

The limitations outlined above are common to all scenarios, and if addressed would be unlikely to materially affect the reported relatively between the Scenarios. It is noted that any future assessment of regional scenarios against transport futures should include improvements to the assumptions and analysis along the lines of the following are recommended:

- Population distribution defined at a finer spatial resolution, including consideration of age structure,
- Refinement of employment assumptions,
- Refinement of the transport network under the preferred scenario to optimise and deliver the desired outcomes, and
- Development of a transport network that is tailored to the distribution of population and jobs, including sufficient capacity in Public Transport.

SA1 level assessment of households accessibility to social destinations

- The main limitation with this analysis is that only access to existing facilities have been measured. Development of either greenfield sites or intensified brownfield sites would likely include some provision for commercial and social activities. Therefore, the difference between scenarios would likely be less than in the analysis.
- Given this limitation, the accessibility analysis may provide a proxy for other measures. For example, the cost of providing additional social infrastructure to provide consistent levels of accessibility. Another measure may be the extent to which existing centres and services are supported by improving access or density within a centre.
- Based on the accessibility results as a high-level indicator of the cost to maintain accessibility to social destinations, the distributed scenario decreases accessibility across the region. If maintaining or improving access to social destinations was required under a distributed urban development scenario, it may be more costly compared to the medium density infill or centralisation scenarios which generally perform better than baseline.
- The next phase of FDS development should investigate how to improve accessibility and walkability in existing urban areas through better network design and investigate how provision of social infrastructure can be supported in greenfield development opportunities.

Qualitative multi-criteria analysis carried out by a panel of subject matter experts against project objectives

The main limitations to the assessment include that:

- Limited timeframes impacted the granularity and level of detail and accuracy possible.
- Some of the subject matter experts did not have sufficient knowledge of the Horowhenua District, given that their expertise related to the Wellington region. The assessment therefore cannot be reliably applied to growth in Horowhenua with a high degree of confidence.
- The scenarios did not identify exact growth locations and densities within SA2 units, meaning that a number of broad assumptions about the scenarios have had to be made when undertaking assessment against the objectives (including those relating to the natural environment, natural hazards and highly productive land). This means that the subject matter experts were unable to categorially conclude that certain values would be unaffected by the scenarios. In the case of some objectives (particularly consideration of the natural environment) this has contributed to the negative scoring, due to precautionary assumptions about where the development might occur. For subsequent work it is suggested that a more detailed level assessment is undertaken.
- Future regulations and policy settings are unknown, so the assessment has relied on the general direction of existing regulatory requirements, e.g., in relation to the natural hazards objective, it has been assumed that plans will improve how they deal with their hazard chapters as they go through plan reviews over the time-period.
- Similar uncertainties influence the assessment of other objectives, e.g. food production systems would be similar[12] and that currently employment centres can accommodate more jobs.
- Consideration of overland flow path and flood water hazards could be strengthened with input from Wellington Water and territorial authorities. For subsequent work it is suggested that this occurs.

[12] A move away from ruminants to more plant-based agriculture was recognised, however this would require HPL to occur.

- The spatial extent of the corridors used for the assessment did not align well with some topics 'on the ground', as the regulatory environment and impacts varied within some corridors. This had the effect of averaging out the scoring. For example, for natural hazards this had the effect of scoring resilient areas in Upper Hutt poorly because of the significant natural hazard constraints in Lower Hutt.
- In the absence of an RPS-HPL at this stage, assessment of impacts on 'highly productive land' has been based on the transitional definition contained in the NPS-HPL.
- There are uncertainties about the distribution of jobs in 30 years' time. For subsequent work it is suggested that the correlation between industrial land supply and demand, as well as expected commuter flows in 30 years' time is considered. More data would support this analysis.

Qualitative infrastructure impact assessment

- Not all infrastructure providers responded with an assessment
- Responses contained varying levels of detail.
- The analysis was undertaken at a high level. No business case or costing of options was undertaken to inform the analysis of infrastructure required to support scenarios.
- The scenarios were not sufficiently detailed for infrastructure providers to undertake a comprehensive analysis of infrastructure network requirements (both new infrastructure and existing network upgrades).
- A moderation meeting to check assumptions was not held, assumptions were detailed on individual response forms.

Qualitative assessment against iwi and hapū values and aspirations

- WRLC iwi members were engaged in a number of different elements of the FDS drafting process, and due to capacity issues were not able to engage in-depth in all elements of the process, including this scenario evaluation.
- This assessment was not undertaken by iwi and hapū, it was based on conversations at a hui and draft content of *Te Tirohanga Whakamua* – statement of iwi and hapū values and aspirations for urban development for the Wellington-Wairarapa-Horowhenua region. The material was sent around to iwi partners to comment.
- The assessment is undertaken at a regional scale and at a high level, meaning that implications for different rohe, iwi and hapū are not detailed.
- The assessment does not specifically reference the specific iwi and hapū values and aspirations which it its findings are in relation to.
- The scenarios are not designed in sufficient detail to determine in detail how they would align with all of the identified iwi and hapū aspirations and values.
- Urban Māori make up a large proportion of the population in our region and they were not engaged with in this assessment.

wrlc.org.nz