

# TECHNICAL REPORT: SCENARIO EVALUATION

Attachment 1 – Subject Matter Expert Feedback

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THE  
AUCKLAND  
PLAN



**Auckland Plan**

**Scenario Evaluation Workstream**

**Attachment 1:**

**Subject Matter Expert Feedback**

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# 1 Economic wellbeing

## 1.1 Protection of productive rural land

### *Introduction*

This work examines the impact of the four integrated land use and transport scenarios on different soil classes of rural land in Auckland. The New Zealand Land Resource Inventory states that 25 per cent of the land area within the Auckland region<sup>1</sup> is listed as Land Use Capability Classes (LUC) 1, 2 and 3<sup>2</sup> (“land of moderate to high value for primary production” and referred to as “prime agricultural land”)<sup>3</sup>. This is a higher percentage than for New Zealand as a whole, however, approximately a quarter of this prime rural land in Auckland has already been urbanised and lost to production. It is important to note that while LUC classes 1, 2 and 3 are considered highly important for agricultural production (particularly for horticulture, and sheep and beef farming); LUC classes 4 to 8 also serve a critical role in agricultural production where activities do not require high quality soils, such as forestry and glasshouses. The loss of soils to greenfield expansion can have far reaching impacts on the region wide rural production base, therefore, this assessment is critical for analysing the potential impacts of different urban patterns and expansion on Auckland’s agricultural land resources.

This analysis comprises two assessment components: a quantitative GIS analysis of the loss of LUC soil types in each of the scenarios; and a qualitative analysis involving assessment of the Auckland Council Rural Advisory Panel’s (RAP) submission on the Auckland Plan Discussion Document and comments from a recent RAP workshop on the land use and transport scenarios. Combined, these assessments will allow an overall assessment and scoring of each of the scenarios.

### *Quantitative GIS Analysis*

Land Use Capability is the hierarchical classification system used in assessing the capability of certain land areas to sustain continuous production (Landcare Research, 2000). The land is assessed in terms of versatility for productive use; factors that limit the land’s capability for productive use; and characteristics that determine productive use (e.g. erosion, soil and landform, etc.). The LUC classification system is typically an expression of three components, but for the purposes of this evaluation only the LUC class code is assessed. The table below shows the LUC classes.

LUC Class Code	Description
1	Land with virtually no limitations for arable use and suitable for cultivated crops, pasture or forestry.
2	Land with slight limitations for arable use and suitable for cultivated crops, pasture or forestry.
3	Land with moderate limitations for arable use, but suitable for cultivated crops, pasture or forestry.
4	Land with moderate limitations for arable use, but suitable for occasional cropping, pasture or forestry.
5	High producing land unsuitable for arable use, but only slight limitations for pastoral or forestry use.
6	Non-arable land with moderate limitations for use under perennial vegetation such as pasture or forest.
7	Non-arable land with severe limitations to use under perennial vegetation such as pasture or forest.
8	Land with very severe to extreme limitations or hazards that make it unsuitable for cropping, pasture or forestry.

Source: Landcare Research, 2000; p6

<sup>1</sup> Based on the regional area prior to the amalgamation.

<sup>2</sup> Auckland Regional Council, ARPS (1999), chapter 12, page 1.

<sup>3</sup> Auckland Regional Council, ARPS (1999), Appendix D, page 39.

The future growth/expansion areas, shown in the scenario concept maps were used as the basis for the evaluation. These were overlaid with existing data of the LUC soil categories.

The quantity (hectares) and relative percentage of loss of LUC soils 1, 2, 3 and combined LUC soils of 4 to 8 are shown in the following two tables. Also see attached maps (Appendix 1) showing loss of productive soils for each scenario.

Table 2: Hectares (Ha) of Productive Land Lost

LUC Class Code	Scenario A	Scenario B	Scenario C	Scenario D	Total Across Region
1	99	206	99	276	4172
2	3085	6415	3085	13642	50698
3	1264	1684	1264	6188	62946
4 to 8	590	1,548	590	13,584	316,971
<b>Total (LUC 1 – 8)</b>	<b>5,037</b>	<b>9852</b>	<b>5037</b>	<b>33690</b>	<b>434787</b>
<b>Total (LUC 1 - 3)</b>	<b>4448</b>	<b>8304</b>	<b>4448</b>	<b>20106</b>	<b>117816</b>

\*Note: Data does not include land areas of LUC soils lost prior to 1999 MUL, but does include Future Urban Areas (MUL shifts) since 1999 – hence why Scenario A and C have loss of productive soils.

Table 3: Percentage of Productive Land Lost

LUC Class Code	Scenario A	Scenario B	Scenario C	Scenario D	Total Across Region
1	2.37%	4.93%	2.37%	6.61%	4172
2	6.09%	12.65%	6.09%	26.91%	50698
3	2.01%	2.68%	2.01%	9.83%	62946
4 to 8	0.19%	0.49%	0.19%	4.29%	316,971
<b>Total (LUC 1 – 8)</b>	<b>1.16%</b>	<b>2.27%</b>	<b>1.16%</b>	<b>7.75%</b>	<b>434787</b>
<b>Total (LUC 1 - 3)</b>	<b>3.78%</b>	<b>7.05%</b>	<b>3.78%</b>	<b>17.07%</b>	<b>117816</b>

\*Note: Data does not include land areas of LUC soils lost prior to 1999 MUL, but does include Future Urban Areas (MUL shifts) since 1999 – hence why Scenario A and C have loss of productive soils.

It is evident that Scenario D results in significant amounts of highly productive land lost with some 20,106 ha, or 17.07%, of LUC soils 1, 2 and 3 converted to urban land. In total, Scenario D results in a region wide loss of 33690 ha or 7.75% of land (LUC 1 – 8). Scenario B has the next most significant impact on productive soils. This scenario results in a loss of 8,304 ha or 7.05% of LUC soils 1 to 3 and a region wide loss of 9,852 ha or 2.27% of rural land (LUC 1 – 8). Scenario A and C have the same urban footprint and represent a compact urban form (no expansion beyond the MUL); these two scenarios have the least impact with a loss of 4448 ha (3.78%) LUC soils 1 to 3 and region wide a loss of 5,037 ha (1.16%).

#### Qualitative - Rural Advisory Panel Assessment

Containing urban growth within the MUL was supported by the Rural Advisory Panel<sup>4</sup>, while the uncontrolled release of land for housing was considered detrimental to the protection of productive rural land. Any continued growth into rural areas was seen to have likely adverse consequences for rural production activities. The panel acknowledged that pockets of urban development are present in the rural area, however, if future growth was to occur in the rural area that this would be best based around existing rural towns and settlements. A prominent issue affecting productive activities in rural areas was the availability of water. Concern was raised that if there is future growth in rural areas, consideration needs to be given to how conflicts regarding water will be managed. In some areas, it may need to be recognised that rural productive

<sup>4</sup> The Rural Advisory Panel is represented by the following representative groups of the rural sector: Horticulture New Zealand, Federated Farmers, Fonterra, New Zealand Winegrowers, New Zealand Forest Owners Association, Rural Contractors New Zealand, Aggregates and Quarry Association of New Zealand, Sport-horse/Equestrian Associations, Aquaculture Associations.

values should prioritise rural water use, or, if no water is available for rural production activity, it may be appropriate to consider such areas for urban development.

*Scenario A and C* - Relatively small impact on rural areas as there is no greenfield expansion into rural areas, and minimal growth in rural towns and settlements – very few comments provided on these scenarios.

*Scenario B* - Seen as the realistic or more likely scenario, it provides a balanced approach, allowing a small amount of greenfield growth on the urban periphery while also focussing a lot of growth in major satellite centres. Focusing growth in rural centres has benefits for infrastructure investment within these centres, which would otherwise not receive with no growth.

*Scenario D* - Protection of rural land areas and productive soils is critical for the future of Auckland’s rural production systems. This scenario is seen as detrimental to these values and the least desirable

### Conclusions

The combination of qualitative and quantitative assessments clearly shows Scenario D with the greatest loss of productive rural land resource. This scenario would severely impact rural productivity within the Auckland region with a total loss of 33,690 hectares of rural land to urban activities, with over 20,000 hectares of this being of LUC soils 1 – 3 (prime agricultural land). The GIS analysis of Scenario B had the next biggest impact on the loss of productive soils lost with 9,852 hectares of land lost across the Auckland region and over 8,000 hectares of that being of LUC soils 1 – 3. The qualitative analysis provided by the Rural Advisory Panel found that Scenario B, while losing some rural land areas to urbanisation, was considered a more realistic future for Auckland’s growth, particularly with its focus of growth around existing rural towns and settlements (satellites). Scenarios A and C quantitatively had no impact on rural productive soils (beyond what is already planned for in Future Urban Areas), additionally the qualitative analysis revealed no true impacts of these two scenarios on rural productive soils.

Conclusively, the criteria of: *protection of productive rural land* is scored for the four scenarios as below.

Table 4: Overall Assessment of Performance Measure

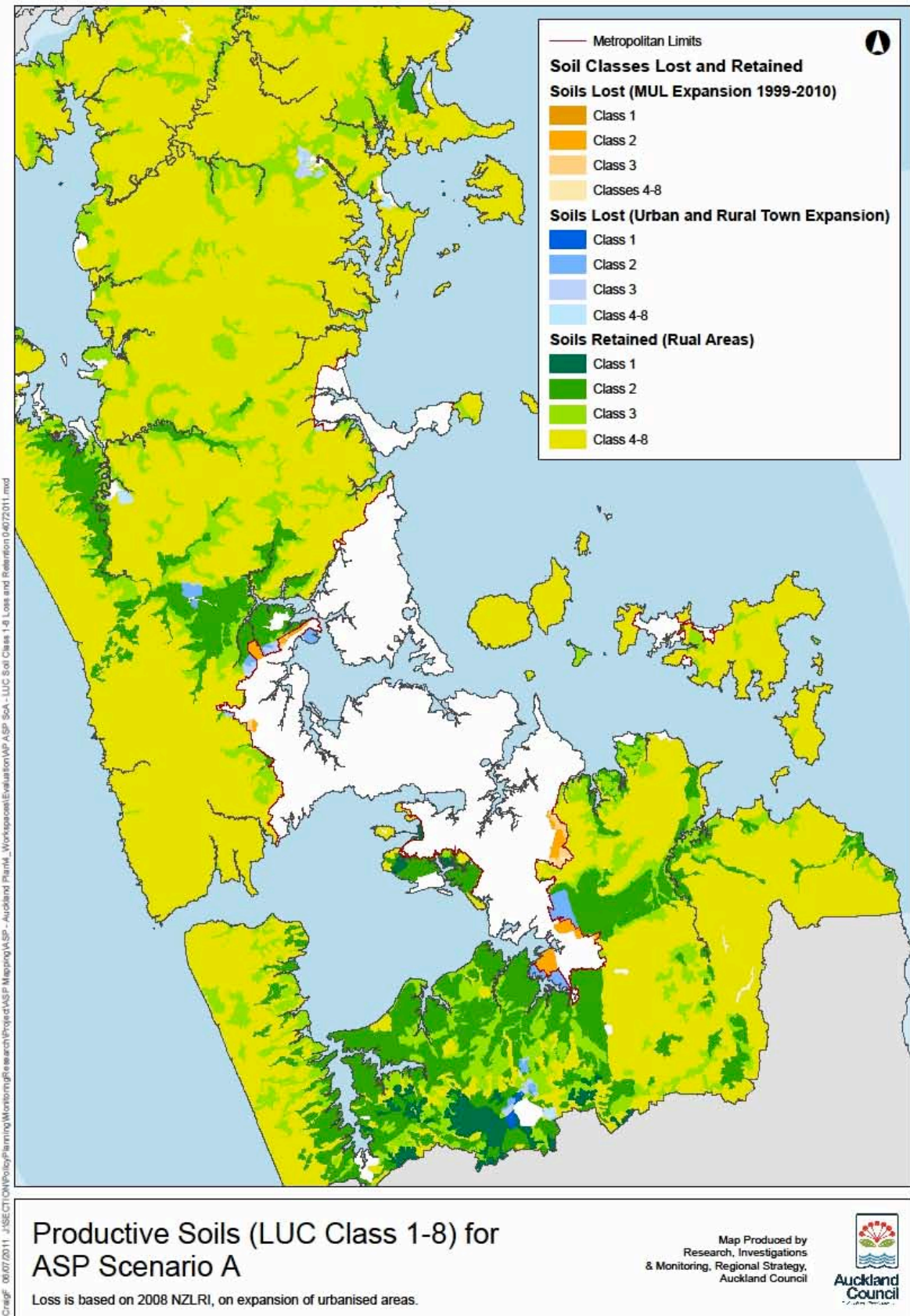
Criteria	Scenario A	Scenario B	Scenario C	Scenario D
Protection of productive rural land	0	X	0	XX

### Reference:

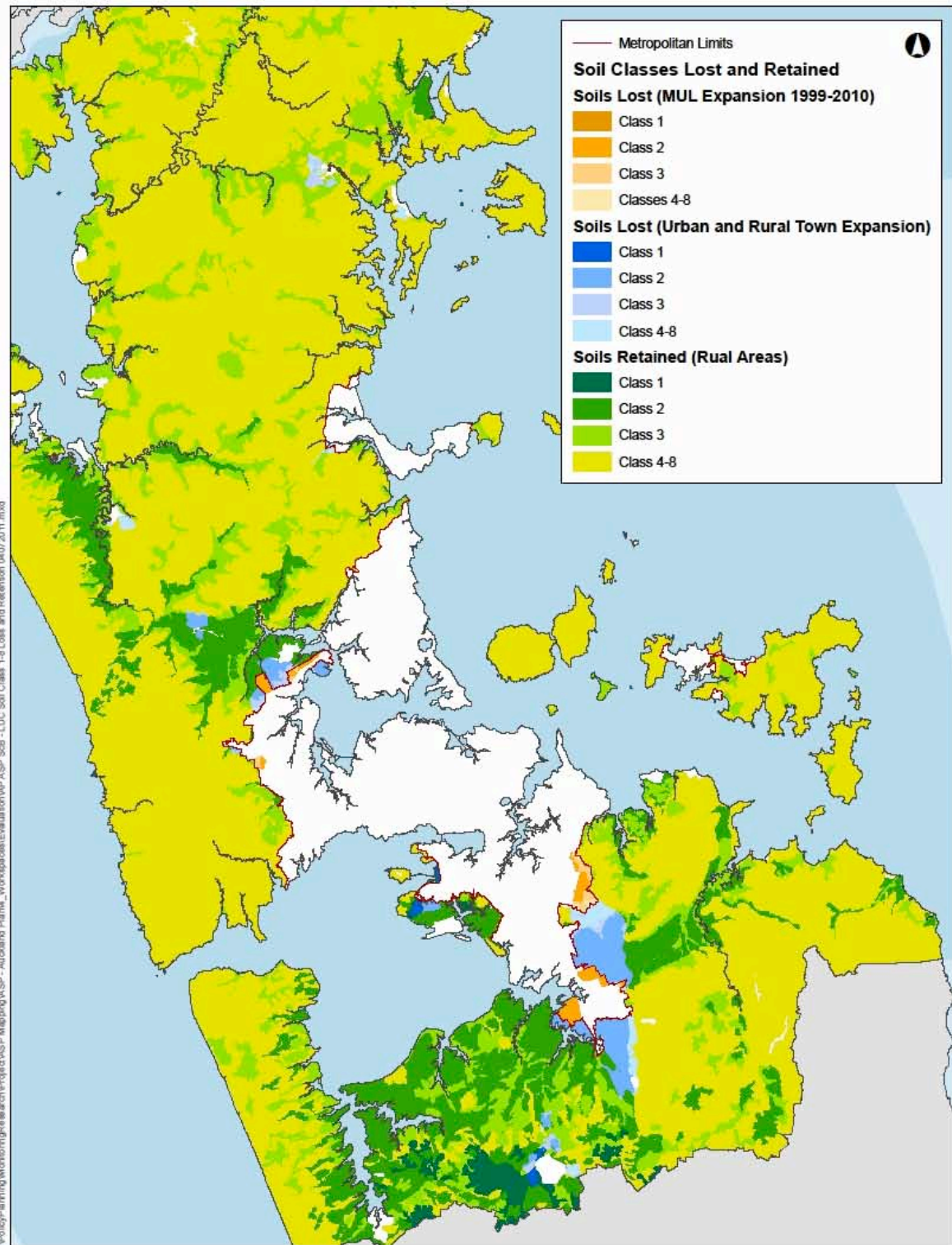
Newsome, P. F. J., Wilde, R. H., & Willoughby, R. H. (2000). *Land Resource Information System Spatial Data Layers*. Palmerston North: Landcare Research New Zealand Ltd.

Appendix 1

Scenario A



**Scenario B**



Craigf: 08/07/2011 - J:\SECTION\Policy\Planning\Monitoring\Research\Project\ASP Mapping\ASP - Auckland Plan\4 - Workspaces\Evaluation\WP ASP S&B - LUC Soil Class 1-8 Loss and Retention 08/07/2011.mxd

**Productive Soils (LUC Class 1-8) for ASP Scenario B**

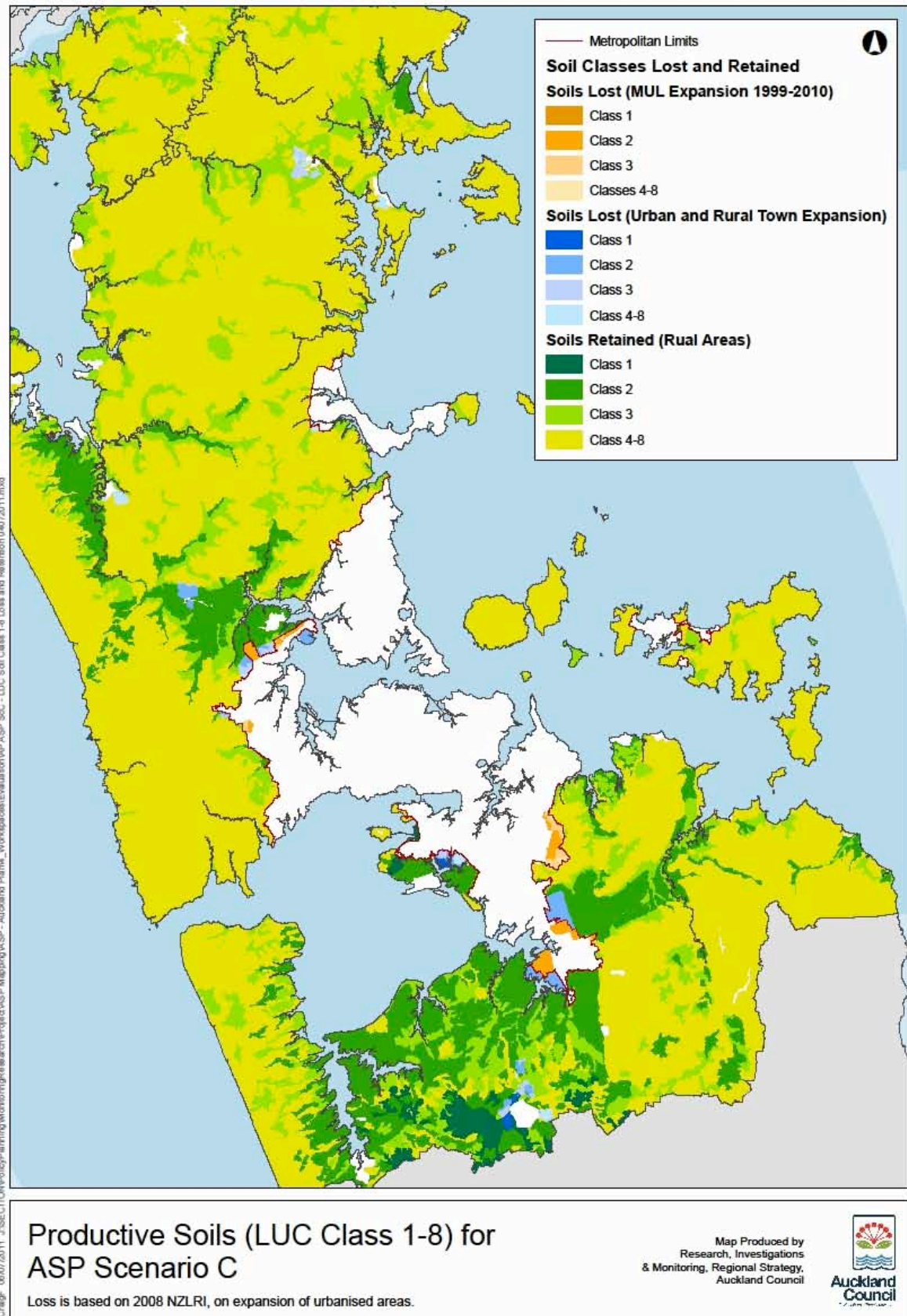
Loss is based on 2008 NZLRI, on expansion of urbanised areas.

Map Produced by  
 Research, Investigations  
 & Monitoring, Regional Strategy,  
 Auckland Council

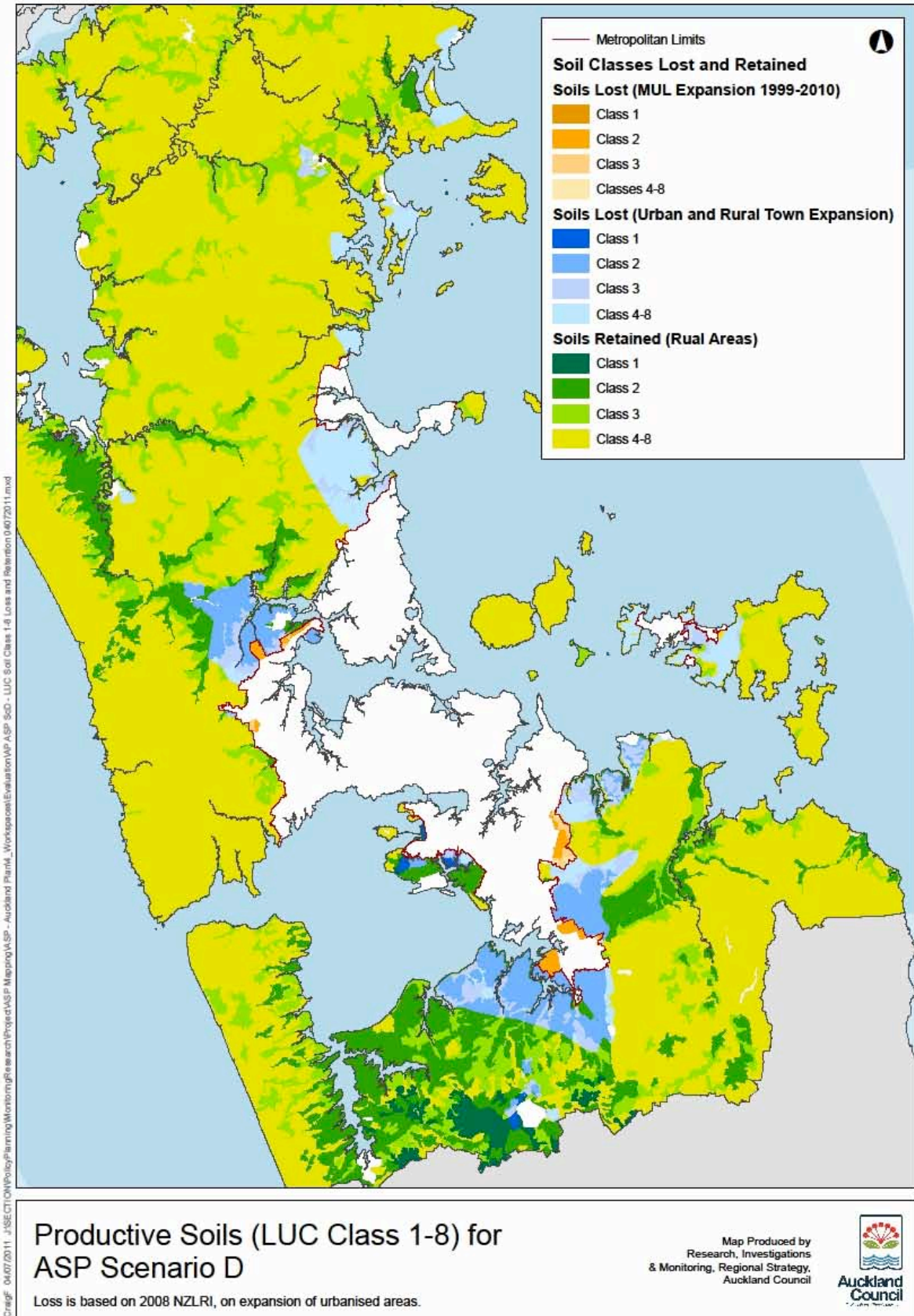




Scenario C



Scenario D



## 2 Environmental wellbeing

### 2.1 Protection of or enhancement of marine values

#### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
<b>Protection of or enhancement of marine values</b>	<b>X</b>	<b>XX</b>	<b>XX</b>	<b>XXX</b>

#### Key Comments

- Marine ecosystems are clearly affected by adjacent land-based activities. Some of Auckland's near-shore marine receiving environment currently shows signs of degradation associated with land-use activities; however, the majority of the marine environment in the region still retains comparatively high biological diversity and functioning ecosystems.
- Urban intensification threatening already impacted coastal and marine receiving environments is preferred over Greenfield development degrading comparatively unimpacted coastal and marine receiving environments.
- The level of threat to marine receiving environments generally increases as urban development increases. Potential threats from urbanisation include increased risk of sediment release, discharge of urban stormwater contaminants, potential for human sewage discharges and increased level of usage, development and disturbance of the coastal edge and nearshore environment.
- All marine ecosystems contain elements that are vulnerable to the threats from urban development. In general, estuarine ecosystems and other sheltered and lower energy areas will be more exposed to the threats of sedimentation and increased stormwater contamination than more open and exposed coastal areas. Preservation of the natural character of the coast and the protection of outstanding natural features and landscapes are matters of national importance and should be key determinants of Auckland's future urban form.
- Avoiding adverse effects rather than relying upon the ability to mitigate or remedy adverse effects provides greater certainty that important coastal and marine environmental uses and values will continue to be available for future generations (e.g. catchments are not urbanised). Where it has been determined that development is appropriate, good design is essential in reducing the potential risks of development to coastal and marine receiving environments (and to land and fresh water). Tools such as water sensitive urban design (WSUD) aim for ecologically sustainable development that uses, conserves and enhances the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life now and in the future can be improved.
- Urban development within a catchment generally has a net negative cumulative impact on coastal and marine receiving environments. Of the four scenarios, Scenario A is considered to have the least negative impact and Scenario D is considered to have the most significant negative impact on the marine receiving environment. The Dairy Flat Expansion Area presented in Scenario D is arguably the single worst development option of all scenarios, due to its proximity to the Okura estuary.

#### Criterion description

Risks from Scenarios A-D to marine receiving environment ecological values are derived from qualitative consideration of information on relative marine value, potential sources of threat, and sensitivity/vulnerability and level of exposure of the marine receiving environment to those threats.

Risks to coastal natural character and landscape values are considered in terms of the location of existing development and identified areas or sites of significance.

### **Measures for Assessment**

This evaluation of scenarios is driven by assessment of the relative risks to marine receiving environmental values (such as coastal and marine ecosystem values) and the consequent influences on various social, cultural and economic values/uses of the coastal marine environment.

The scoring reflects the level of potential risk from the proposed development scenarios estimated by assessing relative coastal/marine receiving environmental; value, sensitivity/ vulnerability, exposure to stressors, and scale of likely effect.

### **General Principles**

- Greatest certainty that important coastal and marine environment uses and values will continue to be available to future generations is achieved when their exposure to sources of adverse effect is avoided (e.g. catchments are not urbanised) rather than relying upon the uncertain ability to mitigate or remediate these adverse effects.
- The level of threat to marine receiving environments generally increases as urban development increases.
- Although well managed urban development may lead to improvements in some discharges over those from current land use (eg established rural vs urban sediment release rates, or opportunities to improve runoff quality during brownfields development), the net cumulative effect of urban development within a catchment is still to generally have a negative impact on marine receiving environments.
  - Consequently all scoring in this evaluation uses only the 'negative impact' ratings from the possible seven point scoring system to reflect this (which limits the ability to distinguish other than large differences in likely effect).
- Urbanising catchment development is associated with an increased risk of sediment release, particularly during the development phase, despite the application of best management practice.
- Rural land use can also lead to significant sedimentation effects; however, urbanisation generally increases the threat of sediment release above this level during the development phase.
- Rural land use may be associated with significant nutrient discharges.
- In the longer term, sediment levels are expected to reduce as the urbanised catchment is stabilised. This may reduce sediment discharges to lower levels than the previous rural land use, but the threat swings towards increased discharge of urban stormwater contaminants that impact upon water and sediment quality. The potential for human sewage discharges from the sewerage system is also increased with urbanisation.
- Urbanising catchments also increases the level of usage, development and disturbance of the coastal edge and near shore. This is related to an increased number of people (and their pets) accessing the coast (eg disturbance to bird roosting areas, increased recreational use of beaches), increased commercial and industrial activities in the coast (eg commercial shipping, ferries), installation of infrastructure required to service the development (pipes, wharfs, jetties, marinas, causeways, etc), increased demand for seawalls, groins, and other natural hazard mitigation/protection structures, etc. Such uses and structures can adversely affect the landscape and natural character values of the coast. Some of these structures can alter the principal forcing factors likely to determine the continued viability of current habitats. For example, causeway construction can alter local hydrodynamics leading to increased sedimentation, loss of sandy habitat, shift to muddy habitat, mangrove expansion, loss of wading bird roosting areas, etc. This may accelerate adverse effects of urbanisation on these receiving environments, or may cause environmental degradation even without any associated urbanisation.

- All marine ecosystems contain elements that are vulnerable to the threats from urban development. In general, estuarine ecosystems and other sheltered and lower energy areas will be more exposed to the threats of sedimentation and increased stormwater contamination than more open and exposed coastal areas.
- Preservation of the natural character of the coast and the protection of outstanding natural features and landscapes are matters of national importance (RMA section 6) and should be key determinants of Auckland's future urban form. Concentrating new development in areas of existing development generally has less impact on natural character and landscapes than expanding into new areas.
- Preservation of natural character is dependent on the presence of natural elements, arranged in natural patterns and underpinned by natural processes. It relates to the functioning of environmental processes as well as the visual effects of development. It includes matters such as the natural darkness of the night sky, natural landforms, ecological and geological aspects, and experiential attributes (NZCPS policy 13) which can be affected by expansion of development into new areas. Development in existing areas can also affect natural character through the loss of natural elements such as visible cliff faces and coastal vegetation.
- The Auckland Plan is one of the council's primary means of achieving policies 6 and 7 of the NZ Coastal Policy Statement (2010). Matters that these policies require consideration of include: the rate at which development should be enabled to provide for the reasonably foreseeable needs of population growth without compromising the other values of the coastal environment; the consolidation of existing coastal settlements and urban areas where this will contribute to the avoidance or mitigation of expanding or sporadic patterns of settlement and urban growth; where and how to provide for future development in the coastal environment, and identification of areas where particular forms of development are inappropriate.
- Activities that have a functional need to be in the coastal marine area should be provided for by avoiding developments that may preclude such activities eg avoiding new developments that may preclude marine industry or fishing industry facilities where they require development with a land/sea interface.

#### **Current Situation**

- Marine ecosystems are clearly affected by any type of land-based activity that generates material that is discharged into the coastal environment through the stormwater or wastewater networks or by overland runoff.
- Some of Auckland's near-shore marine receiving environment currently shows signs of degradation associated with land-use activities. The quality of the coastal waters (sediment quality, water quality and impacts upon habitat and biological community structure and biodiversity) is generally poorest in the inner harbours but is relatively good in outer harbour or open coastal locations. Open coast sites generally have the best coastal water quality, primarily due to the prevailing higher energy conditions present (eg strong dispersion by tide and waves), their distance from freshwater inputs and isolation from contaminants resulting from urban land uses. Inner harbour sites tend to have the poorest water quality because of their proximity to freshwater inputs that carry contaminants from land and because they are poorly flushed low energy systems.
- Although some near-shore coastal areas are showing signs of degradation associated with land use activities, the majority of the marine environment in the region still retains comparatively high biological diversity and functioning ecosystems that are not greatly affected by activities controlled under the Resource Management Act. It is important to recognise their value and continue to invest in the management of these ecosystems, in order to protect, maintain or enhance these valuable natural resources and broad spectrum of goods and services they underpin or provide directly.
- Auckland's coastal areas are largely developed or modified to some degree. There are remaining areas with a high degree of natural character and which have outstanding natural landscapes and features. These are generally in the off-shore and rural parts of the region.

## Assumptions

- Safe recreational use of coastal waters:
  - Water quality & human health – (pathogen exposure risk) – assumption is that any new development will require sufficient controls so that sewage discharges and overflows etc will generally be avoided. Receiving waters of particular recreational importance (bathing beaches – safe to swim) will not be unduly compromised by any development scenario. Water clarity & hazards - assumed to be adequately controlled within any development scenario – and/or potential impacts avoided where they would change areas of currently high natural character or other high coastal environment value.
  - Navigation and safety – taken care of by Harbourmaster bylaws etc
- Moorings, marinas, safe anchorages, and preferred boating destinations, etc will not be a limiting factor in determining appropriate coastal development. They can co-exist with coastal development (eg marinas close to Auckland). Adequate requirements can be built into any development scenario as long as the other factors (eg preservation of areas of high natural character) are met.
- Access to and along the coast – assumed to be retained or quite possibly enhanced as part of any development proposal. For example development linked to providing increased public access to the coast (access ways), boat ramps, jetties, etc). Access along the coast is not necessarily compromised by development (evidenced by popular coastal areas in heavily developed parts of the region) although it can change the form of experience provided by the access opportunity.
- Historical, cultural (including iwi), & coastal natural hazard issues – assumed to be ‘covered’ by feedback of other teams.
- Reverse sensitivity issues (eg continued protection for established marine farms to function by limiting allowable development in contributing catchments) – assume that Greenfields development will avoid areas containing established activities that are sensitive to such development in the first instance. Where Greenfields development is considered appropriate, it is assumed that design approaches will accommodate established activities.
- Visual Amenity value – assumed to be adequately protected by actions to protect areas of high natural character, high landscape, or high ecological value. Also can co-exist with coastal development (eg high amenity coastal areas close to cities).

## Mitigation measures

Where it has been determined that development is appropriate, good design is essential in reducing the potential risks of development to coastal and marine receiving environments (and to land and fresh water). Where mitigation measures are appropriate, this assessment promotes the use of good design tools such as those set out below:

Water sensitive urban design (WSUD) – aims for ecologically sustainable development that uses, conserves and enhances the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life now and in the future can be improved. Water sensitive urban design includes measures that:

- protect or enhance water quality and preserve natural habitat and ecosystems
- mimic natural drainage regimes, including groundwater recharge where appropriate
- enable 'greener' forms of development
- reduce the amount and form of hard infrastructure and impervious surfaces
- reduce the concentration of stormwater and its potential to cause erosion
- encourage using construction materials that do not leach zinc and copper into stormwater
- reduce the discharge of contaminants to sensitive fresh or marine receiving waters

- improve visual and physical amenity values<sup>5</sup>.

WSUD may involve:

- Catchment Management Planning, Structure planning – integrated management of complex environmental, economic, social and cultural issues within a defined catchment or spatial area.<sup>6</sup>
- Buffers – ensuring an appropriate buffer between development and the marine receiving environment. Greater setbacks may be appropriate, for instance, where the marine receiving environment is sensitive to development, where the land has a high erosion risk or where there are outstanding natural landscapes identified.
- Riparian retirement and restoration – riparian enhancement assists in protecting the downstream effects of urbanisation on the marine receiving environment.

## **Scenario A**

### **Discussion**

Scenario A represents Change 6 to the ARPS. The urban development generally focuses upon containment and intensification, with a greater number of large centres but fewer centres overall and two corridors identified. Growth is generally contained within existing urban limits, with no additional Greenfield development beyond that already identified as 'Future Urban'.

This scenario exposes the regional marine receiving environment to the lowest threats largely because it provides the most contained level of expansion (ie no completely new marine receiving environments or coastal landscapes are exposed to new urbanising impacts). However, it also has the potential to cause the greatest impacts upon the existing marine receiving environments unless appropriate mitigation measures, including water sensitive urban design, offset this.

**Score:** X Small negative impact

Ranking relative to other scenarios: 1st (best overall option, provided best practice development employed)

### **Policy Issues**

Implementation of this scenario needs to place a strong emphasis on managing the effects of intensified development eg increased impervious areas leading to less trapping of contaminants; loss of open space and natural character elements within urban landscapes.

### **Greenfields**

Scenario A is identified as the preferred scenario overall, as it does not involve development extending into new areas. As identified in the 'General Principles' (above) when considering urban intensification threatening already impacted marine receiving environments versus Greenfield development degrading as yet comparatively unimpacted coastal and marine receiving environments, intensification is preferable.

## **Scenario B**

### **Discussion**

Scenario B focuses the majority of growth within the current urban area with the provision for intensive Greenfield development at the urban peripheries, significant growth in satellite centres and intensification in areas of high amenity (ridgelines and coastal areas).

Implications:

<sup>5</sup> Adapted from: <http://www.aucklandcity.govt.nz/council/services/stormwater/aucklandcity.asp#water>

<sup>6</sup> Adapted from: <http://www.qualityplanning.org.nz/plan-topics/structure-planning.php>

- Increased growth within the current urban area and intensification of areas of high amenity has the potential to further adversely affect already compromised areas.
- Expansion of the MUL for Greenfield development and growth in satellite centres may increase risk of impact, depending on the location of growth in proximity to the marine receiving environment and/or areas identified as containing conservation, natural character, landscape values etc.
- An increase in business centres and business may carry greater risks for the marine receiving environment. There is an increased risk of pollution from industrial activities (compared with residential and commercial activities), through discharge or accidental spill of contaminants. Additionally, business land-use activities often have higher building coverage than residential activities and in some cases 100% building coverage on a site is permitted. Creating large impervious surface areas and increasing stormwater run-off can increase the risk of contaminated stormwater entering the marine receiving environment.
- Intensification of areas of high coastal amenity will increase the risk of ecological and amenity values within the coastal environment (which includes the water space and its associated landward catchments) being adversely affected.
- Creation/expansion of satellite towns, urban intensification and expansion of the MUL in close proximity to estuarine (low flushing) environments (e.g. Warkworth, Helensville) leads to increased risk of sedimentation and increased stormwater contamination compared with similar development above open coast (med-high flushing) environments.

**Score:** XX Moderate negative impact  
**Ranking relative to other scenarios:** 3rd

#### **Policy Issues**

Implementation of this scenario needs to place a strong emphasis on development controls in Greenfield areas and on managing the effects of intensified development in the coastal environment eg increased impervious areas leading to less trapping of contaminants; loss of open space and natural character elements within urban landscapes.



## Greenfields

Satellites	Score	
<p>Helensville</p>	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- recognised high social, economic, cultural and environmental values</li> <li>- high ecological values susceptible to degradation</li> <li>- Kaipara river to Helensville water quality degraded and susceptible due to poor flushing</li> <li>- multiple Coastal Protection Areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- increased sediment loading and stormwater contamination into an already stressed system</li> <li>- exacerbating the current ecological degradation of the Kaipara Harbour by increased sediment deposition and transport through the harbour</li> <li>- effects on ecological values</li> <li>- potential effects on important social, cultural and economic values if Kaipara Harbour is further degraded.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is due to the relative scale of development (7,000 new dwellings) and its proximity to the sensitive and already stressed marine receiving environment.</li> </ul> <p><b>Mitigation</b> (see explanation at beginning of document):</p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffer between development and marine receiving environment.</li> </ul>	<p>XXX</p>
<p>Kumeu/ Huapai</p>	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Kaipara Harbour via long reach of Kaipara River</li> <li>- Kaipara River to Helensville water quality degraded and susceptible due to poor flushing</li> <li>- Kaipara Harbour recognised as having high social, economic, cultural and environmental values.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- further degrading water quality of Kaipara River</li> <li>- some sediment and associated contaminants would reach Kaipara Harbour</li> <li>- contribution to degradation of Kaipara Harbour and effects on social, cultural, economic and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'small negative impact' scoring is given due to the separation from the marine receiving environment and the potential for contaminant attenuation.</li> </ul> <p><b>Mitigation:</b></p>	<p>X</p>

	<ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Riparian retirement and restoration.</li> </ul>	
Pukekohe	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Manukau Harbour and Waikato River.</li> <li>- moderate separation from the marine receiving environment</li> <li>- Northern Pukekohe drains to headwaters of streams discharging to Hingaia/Drury</li> <li>- low energy muddy and depositional receiving environments</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'moderate negative impact' scoring is given due to the moderate separation from the marine receiving environment and relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	XX
Warkworth	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Mahurangi Harbour</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- areas of high natural character and outstanding natural landscapes identified in close proximity to Warkworth and within the immediate receiving environment.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- increased sediment loading and stormwater contamination into an already stressed system</li> <li>- exacerbating the current ecological degradation of the Mahurangi Harbour by increased sediment deposition and transport through the harbour</li> <li>- effects on ecological values</li> </ul>	XXX

	<ul style="list-style-type: none"> <li>- potential effects on identified areas of high natural character and ONLs</li> <li>- potential effects on important social, cultural and economic values if Mahurangi Harbour is further degraded.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is due to the scale of development and its proximity to the sensitive and already stressed marine receiving environment.</li> <li>- scenario B and D development in this area are both considered to have a strong negative impact. However, the impact of scenario B is considered to be less than scenario D, due to the lesser scale of development proposed.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers</li> <li>- Riparian retirement and restoration.</li> </ul>	
Wellsford	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Kaipara Harbour, via Oruawharo River or Hoteo River</li> <li>- there is a reasonable separation from the coast</li> <li>- Kaipara Harbour recognised as having high social, economic, cultural and environmental values.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- increased sediment loading and stormwater contamination into the already stressed Kaipara Harbour</li> <li>- exacerbate the current ecological degradation of the harbour by increased sediment deposition and transport</li> <li>- contribute to adverse effects on social, cultural, economic and ecological values of the Kaipara Harbour.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'small negative impact' scoring is due to the relatively small scale of development (1085 additional dwellings) and the moderate separation from the coast providing contaminant attenuation potential.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Riparian retirement and restoration.</li> </ul>	X
Wesley (new town)	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Manukau Harbour via streams discharging to Hingaia/Drury</li> <li>- moderate separation from the marine receiving environment</li> </ul>	XX

	<ul style="list-style-type: none"> <li>- low energy muddy and depositional receiving environments</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'moderate negative impact' scoring is given due to the moderate separation from the marine receiving environment and relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	
Dairy Flat (new town)	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Weiti, Okura and Rangitopuni, which have very different values, sensitivities, and potential vulnerabilities to adverse effects from this development</li> <li>- the Okura estuary is of noted ecological significance, sensitivity, value, and remains in good condition (CPA-1 and CPA-2, marine reserve). It is a low energy estuarine environment and new discharges to the estuary should be avoided. There are also areas of high natural character and outstanding natural landscapes identified around the Okura estuary. As presented, this development does not discharge directly into the Okura estuary, but there is potential for the Okura to be adversely affected through discharges to the Weiti</li> <li>- the Weiti River is largely a low energy tidal creek system identified as mostly CPA-2 with some CPA-1 areas near the mouth. Sediment discharges into the Weiti that do not settle out have potential to adversely affect Karapiro Bay and the Okura estuary</li> <li>- the Rangitopuni river runs for a comparatively long distance across rolling countryside before discharging into the upper Waitemata Harbour near Riverhead. The marine receiving environment is identified as CPA-2; however, attenuation potential within the stream system is comparatively high.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- depending on which catchment the development is located in, there is potential for adverse effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'moderate negative impact' scoring is given due to the potential discharges to the Weiti River and, indirectly, the Okura estuary. This could be reduced to 'small negative impact' if the development</li> </ul>	XX

	<p>were to be contained completely within the Rangitopuni catchment</p> <ul style="list-style-type: none"> <li>- the development presented in B would have significantly less negative impact than the 'Dairy Flat Expansion Area' proposed in scenario D (threshold of 10,000 dwellings in scenario B in a contained area vs 32,000 dwellings in D over a large area)</li> <li>- the development presented for this area in Scenario D is considered to have unacceptable risks, while mitigation measures in scenario B could reduce the scoring to 'small negative impact'.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- impacts of creating a new town at Dairy Flat could be greatly reduced if the development area were to be shifted to lie mostly or completely within the Rangitopuni catchment</li> <li>- Catchment Management Planning.</li> </ul>	
<b>Group 1 Industrial Greenfields</b>		<b>Score</b>
Whenuapai Business	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Upper Waitemata Harbour via Wairohia and Totara Creek catchments</li> <li>- a low energy marine ecosystem with high ecological values</li> <li>- CPA-2 areas identified.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- sediment deposition and stormwater contamination from the proposed development would contribute to the current adverse effects on the Upper Waitemata Harbour</li> <li>- effects on ecological values</li> <li>- development should support and complement the marine industry based at Whenuapai. There is relatively little coastal land available in Auckland for marine industry uses.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is considered to be sensitive to further development, the 'moderate negative impact' scoring is given relative to the intensity of development proposed in scenario D (threshold of 5,000 employees in scenario B vs 25,000 employees in D) and relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers.</li> </ul>	XX
Drury Business	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains via Hays Creek and Hingaia into the Drury Creek and Pahurehure Inlet in Manukau Harbour</li> <li>- low energy muddy tidal creek areas susceptible to degradation</li> </ul>	XX

	<p>because of poor flushing characteristics</p> <ul style="list-style-type: none"> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is considered to be sensitive to further development, the 'moderate negative impact' scoring is given relative to the intensity of development proposed in scenario D (threshold of 7,000 employees in scenario B vs 25,000 employees in D) and relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	
<p>Airport Stage 2</p>	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to the mid-eastern Manukau harbour but is split between three catchments, partially draining east to the Pukaki Creek, south to the harbour, and north to Oruarangi creek (and the restored previous oxidation pond area)</li> <li>- Pukaki is a muddy depositional tidal creek arm of the harbour yet to experience high contaminant accumulation</li> <li>- Oruarangi is recovering from previously being blocked by the oxidation ponds</li> <li>- discharge across the airport area towards the harbour would reach a sensitive but moderately exposed area with a lower accumulation potential</li> <li>- high ecological values</li> <li>- some CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment deposition and stormwater contamination from the proposed development would contribute to the current adverse effects on the Manukau Harbour</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- this development has the same scale and intensity as scenario D and</li> </ul>	<p>XX</p>

	<p>therefore the same scoring.</p> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	
Paerata Business	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains via Hingaia/Drury to Manukau Harbour</li> <li>- low energy muddy tidal creek areas susceptible to degradation because of poor flushing characteristics</li> <li>- high ecological values</li> <li>- CPA areas identified</li> <li>- moderate separation from marine receiving environment.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- potential land disturbance, more industrial potential = higher stormwater contaminant risk</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- this development has a similar scale and intensity as scenario D and therefore the same scoring.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	XX
Silverdale West Business	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains roughly 50/50 into the Weiti and Orewa estuaries</li> <li>- high ecological values</li> <li>- CPA areas identified</li> <li>- Weiti is a low energy tidal creek system identified as mostly CPA-2, with some CPA-1 areas near the mouth. Sediment discharges into the Weiti that do not settle out have potential to adversely affect Karapiro Bay and the Okura estuary</li> <li>- Orewa estuary is a tidal lagoon identified as a CPA-2. It is already substantially filled with sediment (mostly coastal sand) where localised accumulation of sediment would occur at creek discharge points and a large percentage of runoff and sediment may flush out into the medium-high energy coastal area of Orewa beach.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- increased industrial development is considered to significantly increase the potential for sediment and stormwater contaminants to settle out in the upper reaches of these marine receiving environments.</li> </ul>	XX

	<p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'moderate negative impact' scoring has been applied as the indicative development area is located on the western side of the highway, providing for a greater separation from the marine receiving environment.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	
<b>Residential Expansion Areas</b>		<b>Score</b>
Brookby Valley	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to medium to low energy south-eastern quarter of Manukau Harbour</li> <li>- sandflats identified as valuable and susceptible</li> <li>- moderate separation from the marine receiving environment</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- the level of risk expected from the development is moderate due to the moderate separation from the marine receiving environment</li> <li>- longer term risk that this area of the harbour would increasingly become more like the quite heavily compromised north-east areas of the Manukau Harbour.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- this development has a similar number of new dwellings as scenario D, over a smaller area (i.e. scenario B is more intensive than D). However, given the moderate distance from the marine receiving environment, the same scoring has been given to both scenario B and D.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	XX
Drury Residential	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains via Hays Creek and Hingaia into the Drury Creek and Pahurehure Inlet in Manukau Harbour</li> <li>- low energy muddy tidal creek areas susceptible to degradation because of poor flushing characteristics</li> </ul>	XX



	<ul style="list-style-type: none"> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is considered to be sensitive to further development, the 'moderate negative impact' scoring is given relative to the intensity of development proposed in scenario D (threshold of 5,000 dwellings in scenario B vs 10,000 dwellings in D) and relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	
Northwest Expansion Area	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Upper Waitemata Harbour</li> <li>- a low energy marine ecosystem with high ecological values</li> <li>- CPA-2 areas identified.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- sediment deposition and stormwater contamination from the proposed development would contribute to the current adverse effects on the Upper Waitemata Harbour</li> <li>- effects on ecological values</li> <li>- extending urbanisation towards Kumeu and Huapai would add to the sediment and urban stormwater burden the ecosystems of the southern Kaipara Harbour are exposed to.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is considered to be sensitive to further development, the 'moderate negative impact' scoring is given relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Riparian retirement and restoration.</li> </ul>	XX

## **Scenario C**

### **Discussion**

Scenario C will intensify growth within the current MUL, but disperse this growth across many centres at lower densities than in Scenario A. Increased capacity will be provided in numerous local and neighbourhood centres and through general infill throughout suburban areas. This will result in a greater number of smaller growth centres and lower densities in larger areas.

Implications:

- Limiting urban development to the existing urban area minimises the risk of degradation of areas not already in a degraded state. However, the likelihood of already degraded marine receiving environments being further degraded through urban intensification will increase.
- Scenario C provides for more intensive development in low-flushing areas such as the inner Waitemata and Manukau Harbours than scenario A. Intensification of areas in close proximity to low-flushing environments will increase the risk of sedimentation and adverse effects on ecological values in these areas.

**Score:** XX Moderate negative impact

Ranking relative to other scenarios: 2nd

Scenario C has the same overall 'moderate-strong negative impact' scoring as scenario B. Note, however, that scenario C is considered to involve less risk as it does not involve the Greenfield development envisaged by scenario B and the consequent potential risks of development impacting on 'new' marine receiving environments. The overall scoring for these two scenarios is the same (despite B posing more potential risk), due to the coarse assessment tools used in considering the impacts of each scenario.

### **Policy Issues**

Implementation of this scenario needs to place a strong emphasis on managing the effects of intensified development eg increased impervious areas leading to less trapping of contaminants; loss of open space and natural character elements within urban landscapes.

### **Greenfields**

Scenario C does not involve development extending into new areas. As identified in the 'General Principles' (at the beginning of this assessment) when considering urban intensification threatening already impacted marine receiving environments versus Greenfield development degrading as yet comparatively unimpacted coastal and marine receiving environments, intensification is preferable.

## **Scenario D**

### **Discussion**

Scenario D represents significantly greater expansion into new areas outside the MUL than any other scenario and consequently carries the highest risks.

**Score:** XXX Strong negative impact

Rating relative to other scenarios: 4th (LAST)

### **Policy Issues**

This scenario provides for urban expand along the coast, including in a number of areas identified as containing conservation values and high amenity values. It would be inconsistent with the policy direction of a number of policy statements and plans, including the New Zealand Coastal Policy Statement, Auckland Regional Policy Statement and Auckland Regional Plan: Coastal.

**Greenfields**

<b>Group 1 Industrial Greenfields</b>		<b>Score</b>
<p>Whenuapai Business</p>	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Upper Waitemata Harbour via Wairohia and Totara Creek catchments</li> <li>- a low energy marine ecosystem with high ecological values</li> <li>- CPA-2 areas identified.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- sediment deposition and stormwater contamination from the proposed development would contribute to the current adverse effects on the Upper Waitemata Harbour</li> <li>- effects on ecological values</li> <li>- large scale/intensity of proposed development would increase risk of effects compared with scenario B proposed development in this area</li> <li>- development should support and complement the marine industry based at Whenuapai. There is relatively little coastal land available in Auckland for marine industry uses.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the intensity of development proposed (threshold of 5,000 employees in scenario B vs 25,000 employees in D, over the same area).</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers.</li> </ul>	<p>XXX</p>
<p>Drury Business</p>	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains via Hays Creek and Hingaia into the Drury Creek and Pahurehure Inlet in Manukau Harbour</li> <li>- low energy muddy tidal creek areas susceptible to degradation because of poor flushing characteristics</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- large scale/intensity of proposed development would increase risk of effects compared with scenario B proposed development in this area.</li> </ul> <p><b>Reasons for rating:</b></p>	<p>XXX</p>

	<ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the intensity of development proposed (threshold of 7,000 employees in scenario B vs 25,000 employees in D, over the same area)</li> <li>- mitigation opportunities are more difficult in scenario D than B, due to the more intensive development.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	
Airport Stage 2	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to the mid-eastern Manukau harbour but is split between three catchments, partially draining east to the Pukaki Creek, south to the harbour, and north to Oruarangi creek (and the restored previous oxidation pond area).</li> <li>- Pukaki is a muddy depositional tidal creek arm of the harbour yet to experience high contaminant accumulation.</li> <li>- Oruarangi is recovering from previously being blocked by the oxidation ponds.</li> <li>- discharge across the airport area towards the harbour would reach a sensitive but moderately exposed area with a lower accumulation potential.</li> <li>- low energy muddy tidal creek areas susceptible to degradation because of poor flushing characteristics</li> <li>- high ecological values</li> <li>- some CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment deposition and stormwater contamination from the proposed development would contribute to the current adverse effects on the Manukau Harbour</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- this development has the same scale and intensity as scenario B and therefore the same scoring.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	XX
Paerata Business	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains via Hingaia/Drury to Manukau Harbour</li> <li>- low energy muddy tidal creek areas susceptible to degradation because of poor flushing characteristics</li> </ul>	XX

	<ul style="list-style-type: none"> <li>- high ecological values</li> <li>- CPA areas identified</li> <li>- moderate separation from marine receiving environment.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- potential land disturbance, more industrial potential = higher stormwater contaminant risk</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- this development has the same scale and intensity as scenario B and therefore the same scoring.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of other business and residential development proposed in this catchment on the south-eastern part of the Manukau Harbour.</p>	
Silverdale West Business	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains roughly 50/50 into the Weiti and Orewa estuaries.</li> <li>- high ecological values</li> <li>- CPA areas identified</li> <li>- Weiti is a low energy tidal creek system identified as mostly CPA-2, with some CPA-1 areas near the mouth</li> <li>- Orewa estuary is a tidal lagoon identified as a CPA-2. It is already substantially filled with sediment (mostly coastal sand) where localised accumulation of sediment would occur at creek discharge points and a large percentage of runoff and sediment may flush out into the medium-high energy coastal area of Orewa beach.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- increased industrial development is considered to significantly increase the potential for sediment and stormwater contaminants to settle out in the upper reaches of these marine receiving environments.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although this development scenario results in a threshold of 15,000 employees (compared with 10,000 in scenario B over the same area), the same scoring has been applied to both scenarios due to indicative development area being located on the western side of the highway, providing for a greater separation distance from the marine receiving environment.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	XX

Residential Expansion Areas	Score
<p>Brookby Valley</p> <p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to medium to low energy south-eastern quarter of Manukau Harbour</li> <li>- sandflats identified as valuable and susceptible</li> <li>- moderate separation from the marine receiving environment</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- moderate separation from marine receiving environment and the medium risk rating for the immediate receiving environment supports a rating of medium adverse risk</li> <li>- longer term risk that this area of the harbour would increasingly become more like the quite heavily compromised north-east areas of the Manukau.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- this development has a similar number of new dwellings as scenario B, over a larger area (i.e. scenario B is more intensive than D). However, given the moderate distance from the marine receiving environment, the same scoring has been given to both scenario B and D.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of the Karaka, Ramarama, Takanini, Brookby, Drury development on the south-eastern part of the Manukau Harbour.</p>	XX
<p>Dairy Flat Expansion Area</p> <p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- the Dairy Flat expansion area covers a very large area, extending from west of the motorway to the east coast</li> <li>- the area drains to the Weiti inlet, the Okura estuary and the Waitemata Harbour via the Rangitopuni, which have very different values, sensitivities, and potential vulnerabilities to adverse effects from this development</li> <li>- the Okura estuary is a low energy estuarine environment of noted ecological significance, sensitivity, value, and remains in good condition (CPA-1 and CPA-2, marine reserve). New discharges to the estuary should be avoided. There are also areas of high natural character and outstanding natural landscapes identified around the Okura estuary</li> <li>- the Weiti River is largely a low energy tidal creek system identified as mostly CPA-2 with some CPA-1 areas near the mouth. Sediment</li> </ul>	XXX

	<p>discharges into the Weiti that do not settle out have some potential to adversely affect Karapiro Bay and the Okura estuary</p> <ul style="list-style-type: none"> <li>- the Rangitopuni river runs for a comparatively long distance across rolling countryside before discharging into the upper Waitemata near Riverhead. The marine receiving environment is identified as CPA-2; however, attenuation potential within the stream system is comparatively high.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain into 'new' areas not currently degraded</li> <li>- urbanises the whole area from Albany to Silverdale/Orewa, including areas that are currently not urban</li> <li>- the massive risk of ecological impact on the highly sensitive Okura estuary is unacceptable.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the much larger scale of proposed development compared with scenario B would significantly increase risk of adverse effects on social, cultural and ecological values, particularly in the Okura and Weiti catchments</li> <li>- mitigation measures can reduce the potential negative impacts of scenario B development in the Dairy Flat area; however, mitigation measures will not be able to reduce the impacts of scenario D - full avoidance of the Okura catchment is the only option</li> <li>- as presented, this expansion area is the single worst development option of all scenarios, due to its proximity to the Okura estuary. The Okura estuary is considered a no-go area and any development within the Okura catchment is not acceptable.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers</li> <li>- impacts of expansion at Dairy Flat could be greatly reduced if the development area were to be shifted to lie mostly or completely within the Rangitopuni catchment. Any development needs to be outside the Okura catchment.</li> </ul>	
Drury Residential	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains via Hays Creek and Hingaia into the Drury Creek and Pahurehure Inlet in Manukau Harbour</li> <li>- low energy muddy tidal creek areas susceptible to degradation because of poor flushing characteristics</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after</li> </ul>	XXX

	<p>construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</p> <ul style="list-style-type: none"> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- larger scale/intensity of proposed development would increase risk of adverse effects compared with scenario B.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the scale of the development relative to development B (threshold of 10,000 in scenario D over a larger area than the threshold of 5,000 in scenario B).</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of the Karaka, Ramarama, Takanini, Brookby, Drury development on the south-eastern part of the Manukau Harbour.</p>	
<p>Karaka Residential</p>	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- this area drains into the tidal creek arms of the upper Pahurehure inlet and the wider and more open body of the Manukau harbour</li> <li>- the marine receiving environment is at risk from sediment, and associated contaminants, as the low energy environment of the Pahurehure inlet is susceptible to deposition and contaminant accumulation</li> <li>- in the Ellett's Beach area the energy is higher but so is the sensitivity and value of the receiving environment</li> <li>- high ecological values</li> <li>- CPA areas identified, including important roost for wading birds.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- involves urbanisation of a large area of currently rural land</li> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- there is almost no opportunity for attenuation of contaminants during passage through streams before reaching the coast. Consequently this development is considered to carry a considerable risk of adverse effect to the marine receiving environment.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to new development of a currently rural area with a sensitive marine receiving environment.</li> </ul> <p><b>Mitigation:</b></p>	<p>XXX</p>



	<ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers - impacts of residential expansion in the Karaka Point area could be reduced with a buffer area between the development area and marine receiving environment.</li> </ul> <p>Note the potential cumulative effects of the Karaka, Ramarama, Takanini, Brookby, Drury development on the south-eastern part of the Manukau Harbour.</p>	
Leigh Expansion Area	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- despite proximity of the Leigh development to the neighbouring marine reserve at Goat Island, the potential to affect the more open coast areas would be less than the potential to affect the more sheltered harbour areas</li> <li>- Whangateau Harbour is recognised as being of regional significance and exhibits high environmental quality of social, cultural and scientific significance</li> <li>- CPA areas identified</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- Areas of high natural character, outstanding natural landscapes and outstanding natural features identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- urbanises a relatively large area from Leigh to Ti Point</li> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain to the open coast and the Whangateau Harbour</li> <li>- effects on social, cultural and ecological values</li> <li>- urban expansion at this scale would adversely affect the identified natural character values, Outstanding Natural Landscapes (ONLs) and Outstanding Natural Features (ONFs).</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the relative scale of development over an area of currently rural land. Contained development could reduce the scoring to 'moderate negative impact'.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers</li> <li>- Impacts of residential expansion in the Leigh area could be reduced by ensuring contained development and locating away from the identified high natural character, ONL and ONFs and the Whangateau Harbour catchment.</li> </ul>	XXX
Mahurangi West	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Mahurangi Harbour, a low energy marine ecosystem with</li> </ul>	XXX

Expansion Area	<p>high ecological values</p> <ul style="list-style-type: none"> <li>- CPA areas identified</li> <li>- a number of marine farms are located near this part of Mahurangi Harbour.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- areas of high natural character, outstanding natural landscapes identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- urbanises an area that is currently rural</li> <li>- this development would affect the highly valued and comparatively low energy marine ecosystem of the Mahurangi harbour, already known to be suffering ecological degradation caused by increased sediment deposition and transport through the harbour</li> <li>- increased stormwater contamination</li> <li>- effects on ecological values</li> <li>- potential effects on identified areas of high natural character and ONLs</li> <li>- potential effects on important social, cultural and economic values if Mahurangi Harbour is further degraded.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the relative scale of development (nearly 6000 new dwellings) in an area that is currently rural.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers - ensuring a buffer between further development and the Mahurangi Harbour, areas of high natural character and ONLs would reduce the risk of adverse effects on these values.</li> </ul>	
Martins Bay	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- new areas of growth are envisaged at Martins Bay, with some of the area draining to the Mahurangi Harbour and some to the open coast</li> <li>- CPA areas identified</li> <li>- a number of marine farms are located in the Mahurangi Harbour near this proposed development area.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- areas of high natural character, outstanding natural landscapes identified.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- effects of discharges on the open coast areas are generally less than effects on more sheltered harbour areas. Potential sedimentation and contamination effects on the Mahurangi Harbour are of greatest concern since the harbour is already suffering ecological degradation</li> </ul>	XXX

	<ul style="list-style-type: none"> <li>- effects on ecological values</li> <li>- potential effects on identified areas of high natural character and ONLs</li> <li>- potential effects on important social, cultural and economic values if Mahurangi Harbour is further degraded.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the relative scale of development (nearly 5000 new dwellings) in an area that is currently rural.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers - ensuring a buffer between further development and the Mahurangi Harbour, areas of high natural character and ONLs would reduce the risk of adverse effects on these values.</li> </ul>	
Northern Expansion Area	<p><b>Marine receiving environment:</b> A large area around Warkworth would be urbanised, extending to Snells Beach.</p> <ul style="list-style-type: none"> <li>- drains to Mahurangi Harbour, a low energy marine ecosystem with high ecological values</li> <li>- CPA areas identified</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- areas of outstanding natural landscapes identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- this development would affect the highly valued and comparatively low energy marine ecosystem of the Mahurangi harbour, already known to be suffering ecological degradation caused by increased sediment deposition and transport through the harbour</li> <li>- increased stormwater contamination</li> <li>- effects on ecological values</li> <li>- potential effects on identified areas of high natural character and ONLs</li> <li>- potential effects on important social, cultural and economic values if Mahurangi Harbour is further degraded.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is due to the scale of development and its proximity to the sensitive and already stressed marine receiving environment.</li> <li>- scenario B and D development in this area are both considered to have a strong negative impact. However, the impact of scenario D is considered to be much greater than scenario B, due to the larger scale of development proposed and the location of the development immediately adjacent to the Mahurangi Harbour and extending to Snells Beach.</li> </ul>	XXX

	<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers - ensuring a buffer between further development and the Mahurangi Harbour, areas of high natural character and ONLs would reduce the risk of adverse effects on these values.</li> </ul>	
Northwest Expansion Area	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains to Upper Waitemata Harbour</li> <li>- a low energy marine ecosystem with high ecological values</li> <li>- CPA-2 areas identified.</li> </ul> <p><b>Impacts of development:</b></p> <ul style="list-style-type: none"> <li>- sediment deposition and stormwater contamination from the proposed development would contribute to the current adverse effects on the Upper Waitemata Harbour</li> <li>- effects on ecological values</li> <li>- extending urbanisation towards Kumeu and Huapai would add to the sediment and urban stormwater burden the ecosystems of the southern Kaipara Harbour are exposed to.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the development involves over 20,000 new dwellings, the 'moderate negative impact' scoring is given relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers.</li> </ul>	XX
Omaha Expansion Area	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- Whangateau Harbour is recognised as being of regional significance and exhibits high environmental quality of social, cultural and scientific significance. One of the more vulnerable low energy areas identified within the harbour, south of the causeway, would be affected by the envisaged Omaha development</li> <li>- CPA areas identified.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- areas of high natural character and outstanding natural landscapes identified in vicinity.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain to the open coast and the Whangateau Harbour</li> <li>- effects on social, cultural and ecological values</li> <li>- urban expansion at this scale would adversely affect the identified</li> </ul>	XXX

	<p>natural character, ONL and ONF.</p> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is given due to the scale (additional 3,000 dwellings) and location of the development.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	
Puhoi Residential	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- new growth areas around Puhoi would expose the identified environmentally sensitive estuary to the potential impacts of urbanisation</li> <li>- the marine receiving environment contains areas identified as CPA-1 and CPA-2.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- areas of outstanding natural landscapes identified in vicinity.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction)</li> <li>- effects on social, cultural and ecological values</li> <li>- urban expansion could adversely affect the identified ONLs.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is considered to be sensitive to further development, the 'small negative impact' scoring is given due to the small scale of development (an increase of 74 dwellings).</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Riparian retirement and restoration</li> <li>- Buffers.</li> </ul>	X
Ramarama Residential	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- this area drains into the tidal creek arms of the upper Pahurehure inlet and the wider and more open body of the Manukau harbour</li> <li>- the marine receiving environment is at risk from sediment, and associated contaminants, as the low energy environment of the Pahurehure inlet is susceptible to deposition and contaminant accumulation</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- medium to low energy south-eastern quarter of the Manukau harbour would be exposed to further development risks</li> </ul>	XX

	<ul style="list-style-type: none"> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- currently relatively undisturbed values and sensitive habitats in these areas would be exposed to urbanisation risks.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is sensitive to the further development (over 9,000 new dwellings in Ramarama), the 'moderate negative impact' scoring is given relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul> <p>Note the potential cumulative effects of the Karaka, Ramarama, Takanini, Brookby, Drury development on the south-eastern part of the Manukau Harbour.</p>	
Takanini Stage 3	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- drains into the tidal creek arms of the upper Pahurehure inlet and the wider and more open body of the Manukau harbour</li> <li>- the marine receiving environment is at risk from sediment, and associated contaminants, as the low energy environment of the Pahurehure inlet is susceptible to deposition and contaminant accumulation</li> <li>- high ecological values</li> <li>- CPA areas identified.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- medium to low energy south-eastern quarter of the Manukau harbour would be exposed to further development risks</li> <li>- sediment (during construction) and stormwater contaminants (after construction) would drain directly into the poorly flushed tidal creek areas and be carried into the Pahurehure Inlet</li> <li>- contribution to degradation of Manukau Harbour and effects on social, cultural and ecological values</li> <li>- currently relatively undisturbed values and sensitive habitats in these areas would be exposed to urbanisation risks.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- although the marine receiving environment is sensitive to the further development (over 9,000 new dwellings in Takanini Stage 3), the 'moderate negative impact' scoring is given relative to development in proximity to other sensitive receiving environments that are less degraded - such as the Kaipara Harbour.</li> </ul> <p><b>Mitigation:</b></p>	XX

	<ul style="list-style-type: none"> <li>- Catchment Management Planning</li> <li>- Water Sensitive Urban Design.</li> </ul> <p>Note the potential cumulative effects of the Karaka, Ramarama, Takanini, Brookby, Drury development on the south-eastern part of the Manukau Harbour.</p>	
Waiheke Expansion Zone	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- high ecological values</li> <li>- a number of CPAs identified</li> <li>- high, medium and low energy characteristics</li> <li>- susceptible to degradation.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- high natural character areas and outstanding natural landscapes and features identified in some areas of development.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- identified areas of high natural character, ONLs and ONFs would be adversely affected by the proposed scale of development</li> <li>- effects from discharges expected to be more pronounced in lower energy areas.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'moderate negative impact' scoring is given on the assumption that development is carefully managed and avoids sensitive receiving environments.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning</li> <li>- Buffers – between development and low-energy receiving environments, areas of high natural character, ONLs and ONFs.</li> </ul>	XX
Waiwera Expansion Area	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- environmentally sensitive estuary</li> <li>- CPAs identified.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- high natural character areas and outstanding natural landscapes identified in some areas of development.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- continuous development along coast, including urbanising non-urban areas</li> <li>- identified areas of high natural character and ONLs would be adversely affected by the proposed development</li> <li>- impacts of urbanisation, in particular, sedimentation and stormwater contamination, would affect the ecological values of the estuary.</li> </ul>	XXX

	<p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is due to the relative scale of development (nearly 3,000 new dwellings) over an area of currently rural land where the marine receiving environment is sensitive to the further development (ecologically sensitive estuary; outstanding natural landscapes on open coast).</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	
Whitford Beachlands	<p><b>Marine receiving environment:</b></p> <ul style="list-style-type: none"> <li>- development of the relatively steep land in the Whitford-Beachlands area would drain to the medium to low energy Whitford embayment and contributing tidal creek arms</li> <li>- the valued ecological resource are already somewhat sediment stressed</li> <li>- some CPAs identified.</li> </ul> <p><b>Coastal natural character and landscapes:</b></p> <ul style="list-style-type: none"> <li>- some areas of high natural character and outstanding natural landscapes identified in the vicinity of the proposed development.</li> </ul> <p><b>Impacts of expansion:</b></p> <ul style="list-style-type: none"> <li>- continuous development along coast, including urbanisation of currently rural land</li> <li>- medium to low energy receiving environment would be exposed to increased risks of ecological degradation and disturbance</li> <li>- sediment (during construction) and stormwater contaminants (after construction)</li> <li>- currently relatively undisturbed values and sensitive habitats in these areas would be exposed to urbanisation risks</li> <li>- identified areas of high natural character and ONLs would be adversely affected by the proposed scale of development.</li> </ul> <p><b>Reasons for rating:</b></p> <ul style="list-style-type: none"> <li>- the 'strong negative impact' scoring is due to the urbanisation of a relatively large area of rural land where the marine receiving environment is sensitive to further development. (over 11,000 new dwellings in Whitford/Beachlands, extending to Maraetai)</li> <li>- there is potential to reduce negative impacts to 'moderate' given the large area identified for development – any growth should avoid areas such as the steep, erosion-prone Mangemangeroa catchment.</li> </ul> <p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>- Water Sensitive Urban Design</li> <li>- Catchment Management Planning.</li> </ul>	XXX



## 2.2 Protection of or enhancement of stream corridors and Improved water quality (impact on public health)

### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
Protection of or enhancement of stream corridors	X	XXX	XX	XXX
Improved water quality (impact on public health)	X	XXX	XX	XXX

### Measures for assessment

The four growth scenarios are assessed based on key spatial layers related to environment quality and management areas. Discussion around the current situation relating to water infrastructure, water quality, principles of water management and land use are also provided for context.

In general, urban development has negative effects on surface water, stormwater and groundwater. Development is reliant on water infrastructure but water can also place constraints on development. For example, historic wetland areas can have high groundwater tables, and be associated with present day flooding risks. Additionally, treatment of stormwater for quality and quantity needs to be more innovative for areas of high water sensitivity.

The specific assessment criteria are:

- The current state of the land:
  - land cover;
  - surrounding land-use;
  - current impervious surface;
  - ecological state;
  - ARP: ALWP management areas, and the presence of;
  - lake and wetland catchments;
  - current wetlands;
  - lakes;
  - high ecological value catchments; and
  - bores.
- Threats of development to water:
  - erosion risk to freshwater;
  - consented stream works; and
  - earthworks.
- Water based threats to development;
  - flood-risk; and
  - historical wetland.

With a growing population, Auckland must ensure values for water are upheld. The National Policy Statement for Freshwater (NPS: FW) states that we must “safeguard the life-supporting capacity of water and associated ecosystems; and sustain its potential to meet the reasonably foreseeable

needs of future generations” (New Zealand Government, 2011). Implementing growth scenarios needs to give effect to the NPS: FW. This means valuing the:

- interdependency of waters in the cycle;
- natural processes of water bodies including flows, levels, variability and connections;
- healthy ecosystem processes, allowing them to function naturally; and
- cultural and traditional relationships with water<sup>7</sup>.

The four development scenarios are also evaluated by their adherence to these values.

The NPS takes effect on the 1 July 2011, and sets national direction on the following national water issues;

- A. Water quality
- B. Water quantity
- C. Integrated Management
- D. Tangata whenua roles and interests (New Zealand Government, 2011).

## **Current Situation**

### Surface Water

Quality water is a critical economic asset that supports drinking supplies, irrigation, tourism, energy generation, biodiversity and cultural heritage (New Zealand Government, 2011). Conversion of land has severely reduced the water and habitat quality of many Auckland Region water bodies.

The Auckland region has over 16,500km of permanent rivers (generally small first or second order streams, less than a few metres wide). Most flow through non-forested rural land, 21% flow through native forest and 16% are predominately urban (Auckland Regional Council, 2005). The Auckland region has 72 lakes, most of which are relatively small. Many are threatened by nutrient enrichment and proliferation of exotic species (Auckland Regional Council, 2009). In addition, intermittent and ephemeral water bodies have similar values to permanent and implementing this science through setbacks and riparian management is a key policy directive (Parkyn et al. 2006). This has implications for the amount of available land for development in an area.

Urban stream quality has improved since 1995, mainly due to the control of point source pollution; however, urban waterways remain in a poor state. Primary concerns include sewage leakages, stormwater runoff, factory discharges and non-point discharges in general (Land and Water Forum, 2010). Auckland streams tend to have high levels of faecal coliform bacteria and suspended sediments. Urban streams with particularly poor water quality and/or poor habitats may only support five to nine different aquatic macroinvertebrate taxa. The regional average is 18 (Scarsbrook, 2007).

Macroinvertebrate community health is strongly related to the land cover of the surrounding catchment (Fig. 1). Rivers in forested catchments have higher ecological quality when compared to those with rural or urban catchments. Rivers in urban catchments had the lowest ecological quality. There is concern that with further land use change and urbanisation, macroinvertebrate communities will suffer. It is also very expensive to improve urban water quality once degraded, and trends to put funds into rural waterways are happening, as they provide significantly more improvement for investment.

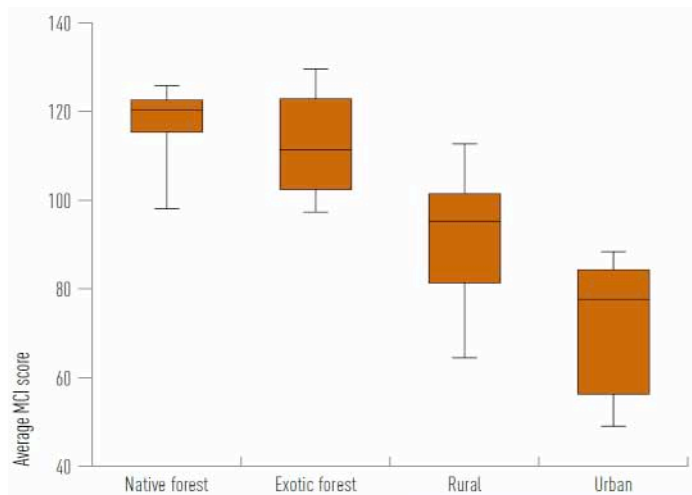
### Stormwater

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<sup>7</sup> For full list of values and uses of water see National Policy Statement for Freshwater 2011  
Auckland Plan Scenarios Evaluation Workstream  
Attachment 1, September 2011

Stormwater generally fluxes directly into drainage systems and is carried quickly to a watercourse or the marine receiving environment (Auckland Regional Council, 2005). It often contains metals, oil, grease, sediment, nutrients and litter that would otherwise be filtered or trapped by soils and vegetation.

Within 48 hours of heavy rainfall the levels of contaminants in stormwater and wastewater overflows exceed the MOE guidelines for safe swimming near many stormwater outlets.



**Figure 1:** Box plots showing the variation of MCI scores for each land use type (line = average, box = 25<sup>th</sup> to 75<sup>th</sup> percentiles, whiskers = 5<sup>th</sup> and 95<sup>th</sup> percentiles) (Auckland Regional Council, 2009).

### Groundwater

Groundwater sustains the region's rivers, wetlands, lakes and aquifers, with 75,000m<sup>2</sup> of water flowing through the aquifers daily (Auckland Regional Council, 2005). Pollution of groundwater is now a global issue. The Auckland region has six major aquifer types, two are typically unconfined and four are confined. The groundwater quality from the confined and semi-confined aquifer systems in the South Auckland Volcanics is classified as Excellent, but this system is 100 years old and contaminants may be moving into the system. In unconfined aquifers with residential or commercial overlying land-use, microbial contaminants can be ten times the guideline value. Contaminants from sewage overflows and leaking pipes easily migrate into these aquifers (Auckland Regional Council, 2009).

### Water Infrastructure

Over allocation of water is already occurring in the Auckland region. The next source of water favoured by Watercare is further extraction of water from the Waikato River. There are high infrastructure demands involved in getting water to the north of Auckland, and this will be a key water constraint for any development in the north.

Watercare received 16 rural water and 17 wastewater treatment plants at integration. Very few of these have adequate capacity for future growth in rural areas and two thirds are non-compliant to their consents.

### **Assumptions**

- This has primarily been a GIS based analysis, moderated with water policy expertise in the various topic areas.
- Some information describes issues to avoid (e.g. significant subcatchments, natural stream management areas, wetland management areas) – these are given higher weighting.

- Some information describe issues that can remedied or mitigated (flooding, erosion risk to freshwater) – medium weighting
- Some information is contextual (e.g. number of consents for water relevant activities, land use) – low weighting

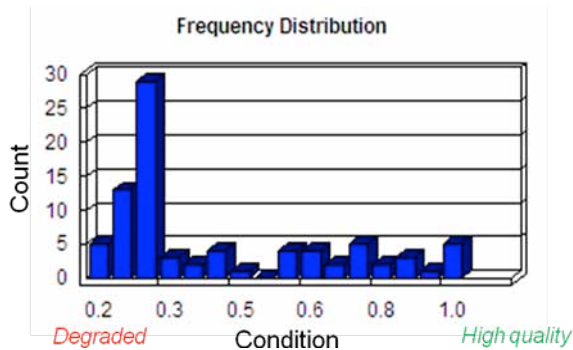
### **General Principles**

- Integrated catchment management (ICM) is critical in the long-term protection of waterways.
- All development and changes to land-use will have cumulative effects on water systems
- Many water bodies will continue to suffer from legacy contaminants, and are more sensitive than they appear
- Environmental monitoring repeatedly highlights catchment land-use type as the primary predictor of stream and water quality. Stress increases with intensity of land-use (Scarsbrook, 2007). Urban land cover is correlated with reduced water quality, including; higher temperatures, reduced dissolved oxygen and increased suspended solids, turbidity, conductivity, concentrations of faecal coliforms and nutrients (Scarsbrook, 2007).
- Development of greenfields will cause the greatest impacts on natural habitat, aquatic biodiversity and water quality.
- Urbanising catchments will always negatively impact freshwater ecologically, and the management of the waterways therefore become related to impacts to the coastal and social amenities or economic values.
- The available research supports long-standing observations that concentrated urban development is incompatible with safe, sustainable shellfish harvesting (Glasoe and Christy 2004). All scenarios increase the risk to human health of exposure to contaminated water at bathing beaches and shellfish collection areas, but scenarios B and D are likely to have the greatest effect.
- Shellfish are very susceptible to contamination from onsite and municipal sewage systems, animal waste and polluted stormwater runoff (Glasoe and Christy 2004). The declining condition of shellfish beds generally correlates with increases in adjacent land-use and population density.
- Most waterborne diseases originate in human effluent, and the transmittal of these diseases through the consumption of shellfish is a key health risk.

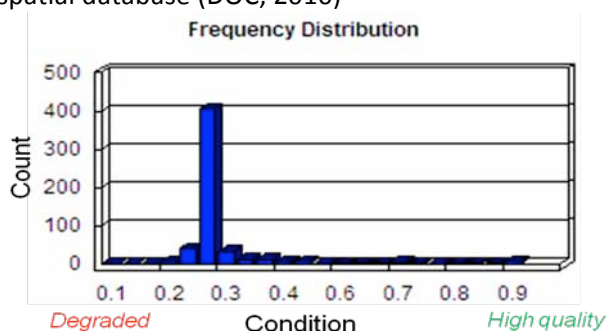
### Surface Water

- Reduced riparian vegetation leads to reduced bank stability, declining water quality, warming of streams and declines in macroinvertebrate communities
- Headwater streams are extremely vulnerable to urbanisation. Their degradation and elimination contributes significantly to declining quality downstream
- Lakes are sensitive to land use (Fig 2)
- Wetlands are both sensitive and rare in the Auckland region, and therefore at risk from any further urban development (Fig 3)
- Wetlands are an important economic resource, they improve water quality by filtering processes, store flood waters, and provide habitat and surge protection on coasts (EPA)
- Rivers have greater flushing capacity than lakes and wetlands, but only a finite capacity for carrying contaminants
- There is a strong relationship between historical wetlands, flooding risk and ground water levels
- Infill of existing urban areas has a relatively reduced effect on stream quality because streams are already degraded
- Development and initial surface disturbance leads to:

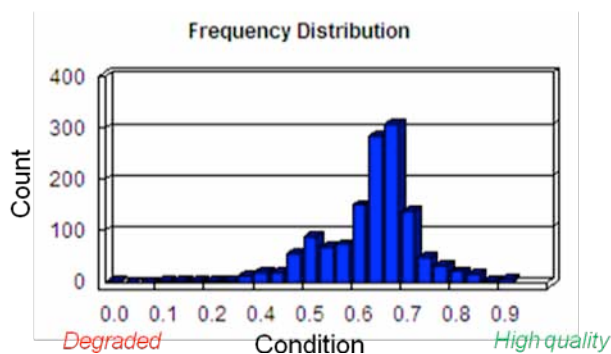
- Smothering of habitat with sediments
- Reduced habitat variety
- Increased contaminant flux to streams
- Further erosion due to loss of vegetation
- Changes in stream hydrology



**Figure 2:** Lake condition distribution derived from DOC’s Freshwater Environments New Zealand spatial database (DOC, 2010)



**Figure 3:** Wetland condition distribution derived from DOC’s Freshwater Environments New Zealand spatial database(DOC, 2010)



**Figure 4:** River condition distribution derived from DOC’s Freshwater Environments New Zealand spatial database derived(DOC, 2010)

*Protection or enhancement of stream corridors*

Increasing impervious surface area and contaminant runoff has significant impacts on stream corridors. With further development planned in the Auckland Region, these can be used as indicators to estimate the likely effects of proposals.

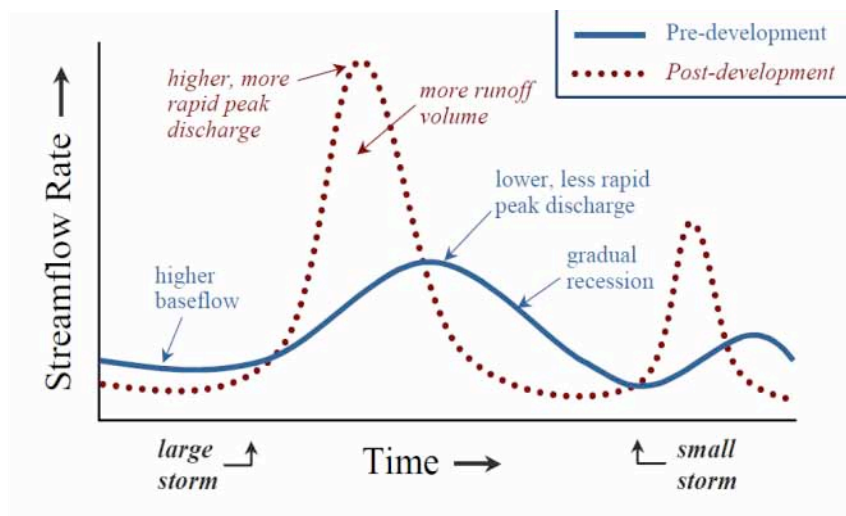
Current impervious surface cover is 42 percent of the urban region (Auckland Regional Council 2010). All scenarios will lead to increased impervious surface, thus water quality is expected to decline. The effects of this decline can be minimised based on where the development takes place, and how it is undertaken. Best practice incorporating low impact design would reduce the negative impacts; however they cannot be avoided altogether. Application of best practise would also mean a step wise change in current development practises.

The pressure on urban streams in scenarios A and C is likely to increase, although the impact is likely to be minimal as many urban streams are already in a degraded state. Under high intensification arguments will be made to further pipe urban streams, which would reduce the natural value of these waterways. Streams outside the existing urban area are protected under these scenarios by not allowing development to occur.

Scenarios B and D will increase the current urban area, with likely extensive increases in impervious surface area. A number of good quality streams currently in rural areas are likely to be affected. Scenario B places limits on the proposed expansion, while D allows for extensive growth. The impact of D is therefore likely to be higher than that of B. To effectively protect these streams unprecedented riparian set back would be needed, more expensive than has been planned for Flat Bush for example.

### Stormwater

- Impervious cover leads to increased runoff, flashy hydrology and wet weather flooding
- Impervious cover produces 16 times more runoff than forest (Millar)
- Wetlands and streams are natural drainage system and must be protected from inappropriate use as purely flood control and stormwater treatment systems (1 gm of organic material holds 1000 times its weight in water). Maintaining 15% of a catchment as wetland can decrease flooding peaks by 60% (Environmental Protection Agency, 2007)
- Groundwater quality usually reflects the surface they underlie. Urban and residential surfaces can lead to contamination of unconfined aquifers, and contaminate plumes within aquifers.
- Increasing the extent of impervious surfaces increases run-off of contaminants to streams and waterways.



**Figure 2:** Altered stream hydrograph in response to urbanization. (adapted from Schueler 2000a, 1987; CWP 2003, in Glasoe and Christy 2004)

### Groundwater

- Impervious surfaces can block surface water from reaching groundwater, reducing recharge rates.
- Groundwater is effected by the degree of confinement, age of the aquifer and overlying land-use
- Aquifers that have been identified at risk are identified as already being under management regimes and further take from these aquifers is considered a risk. These areas may not have the capacity to further support growth.

### Scenario A

#### **Discussion**

Scenario A reflects legacy policy as per the Regional Policy Statement Plan Change 6. Urban development is largely contained within the metropolitan urban limits (MUL), and focussed on a network of high density centres. Residential and employment growth is directed towards 'growth centres'. This scenario will result in concentrated growth, increasing the number of larger centres while reducing the number of centres overall. There is no provision for Greenfield development additional to area already identified as 'Future urban'.

This scenario is the best outcome for water, including focusing supply around a few growth nodes.

#### **Policy Issues**

As this is the status quo approach, the changes to policy at a high level will not need to be modified as much as with some of the more expanding scenarios. The policy issue becomes how the growth is done, rather than where.

#### **Greenfields**

No additional Greenfield sites are considered for development in this scenario, rather population density is increased within the MUL.

### Surface Water

- Water quality in existing urban areas will become more degraded
- Minimal impact on streams outside of urban area
- Rural streams are still subjected to pressures from agriculture and forestry
- Under high intensification streams may be piped, reducing 'natural' value

### Stormwater

- Increasing density within the MUL will result in increased stormwater discharges. There is the potential for these effects to be reduced through the use of low impact design

### Groundwater

- This scenario will have only a minimal effect of infiltration and recharge rates to groundwater outside of the urban area
- Increased intensity of land-use in the centre has the potential to reduce aquifer water quality, especially in unconfined aquifers in the Mt Eden area

### Water infrastructure

- This scenario contains water infrastructure within the MUL

## Scenario B

### Discussion

Scenario B directs the majority of growth to the current urban area, while allowing for some intensive Greenfield development at the peripheries and significant growth in satellite centres. Scenario B also allows for intensification in areas of high amenity, including ridgelines and coastal areas.

### Policy Issues

As this is departure from the status quo approach, significant changes to policy will need made. The policy issue becomes how the growth is done, rather than where, and what changes to policy are required to ensure water is looked after.

### Greenfields

Satellites		Score
Helensville (Appendix A, Figure 1).	<ul style="list-style-type: none"> <li>High slope instability, soil susceptible to degradation</li> <li>Entire area was historically a wetland, and the existing urban area covers most of the remaining highland.</li> <li>Fragments of historical wetlands associated with floodplains of lower Kaipara river</li> </ul>	XX
Kumeu/Huapai (Appendix A, Figure 2)	<ul style="list-style-type: none"> <li>High erosion risk on river banks downstream of urban area and in hills to the north</li> <li>Some of urban area built on rise above historical wetland, however, urban extent expanding into historical wetland area with significant flood risk</li> <li>ARP: ALWP High use stream management area, high use aquifer management area and natural stream management area on hills to the north.</li> </ul>	XX
Pukekohe (Appendix A, Figure 3)	<ul style="list-style-type: none"> <li>Existing groundwater quality good (based on two SOE sampling sites) which should be protected</li> <li>Urban area built on rise above historical wetland, however expansion is moving into historic wetland areas - flood risk areas and historical wetlands in alignment around existing streams</li> <li>Aquifer management area over entire area, natural stream management area 1km north downstream of river which flows through urban environment</li> </ul>	XX
Warkworth (Appendix A, Figure 4)	<ul style="list-style-type: none"> <li>Multiple areas of high erosion risk around urban centre</li> <li>No groundwater site in area but other sandstone/mudstone sites good</li> <li>Urban area built on rise above historical wetland, however expansion is now occurring in historic wetland areas. Flood risk exists around existing rivers.</li> <li>ARP: ALWP high use stream management area covering most of current and future urban area,</li> </ul>	XX



	<p>natural stream management areas upstream and downstream</p> <ul style="list-style-type: none"> <li>Entire urban area and future planned area is within high ranking catchment</li> </ul>	
Wellsford (Appendix A, Figure 5)	<ul style="list-style-type: none"> <li>Whole area at risk from erosion</li> <li>Significant wetland catchment to the south west and other small catchments to the north east</li> <li>Remnant wetlands remain downstream of urban area and could be affected, depending on development methods.</li> </ul>	XX
Wesley (Appendix A, Figure 6)	<ul style="list-style-type: none"> <li>Site for town centre in river flood plain and historical wetland</li> <li>ARP: ALWP Aquifer management area covering entire town centre and high use stream management area 1.5km east</li> </ul>	X
Dairy Flat (Appendix A, Figure 7)	<ul style="list-style-type: none"> <li>Surrounded by significant areas of erosion risk</li> <li>Area within historic wetland with flood risk around streams</li> <li>High ranking for a catchment on the existing MUL fringe</li> </ul>	XX
<b>Group 1 Industrial Greenfields</b>		<b>Score</b>
Whenuapai Business (Appendix A, Figure 8)	<ul style="list-style-type: none"> <li>Historic wetland mirroring largest flood risk areas</li> <li>ARP: ALWP high use aquifer management area</li> <li>High ranking for a subcatchment on the existing MUL fringe</li> </ul>	X
Drury Business (Appendix A, Figure 9)	<ul style="list-style-type: none"> <li>High erosion risk upstream of site, and some risk at downstream end of site</li> <li>Good existing groundwater quality that should be protected.</li> <li>Entire site was historically a wetland, presenting high risk of flood. ARP: ALWP high use aquifer management area, aquifer management area and adjacent to a high use stream aquifer management area</li> <li>The site is in the middle of a series of high value ecological areas in terms of representative ecosystems.</li> </ul>	XX
Airport Stage 2 (Appendix A, Figure 10)	<ul style="list-style-type: none"> <li>Nearby groundwater quality site good</li> </ul>	X
Paerata Business	<ul style="list-style-type: none"> <li>Existing groundwater quality good</li> <li>ARP: ALWP aquifer management area, natural stream management area 1km north downstream of river which flows through the urban environment and would be at risk to future development</li> </ul>	XX
Silverdale West Business	<ul style="list-style-type: none"> <li>High erosion risk throughout catchment</li> <li>Groundwater good quality nearby</li> </ul>	XX

(Appendix A, Figure 11)	<ul style="list-style-type: none"> <li>• ARP: ALWP aquifer management area and natural stream management area around Weiti river</li> <li>• Large historical wetland covers site and surrounds</li> <li>• Northern half of site in high value catchment</li> </ul>	
<b>Residential Expansion Areas</b>		<b>Score</b>
Brookby Valley		XX
Drury Residential (Appendix A, Figure 12)	<ul style="list-style-type: none"> <li>• Good groundwater quality</li> <li>• Historical wetland covers 40-50% of site presenting high flood risk</li> <li>• ARP: ALWP high use stream management area to the north, high use aquifer management area to the south</li> <li>• 50-60% of the southern area in high ranking catchment</li> </ul>	XX
Northwest Expansion Area (Appendix A, Figure 8)	<ul style="list-style-type: none"> <li>• Historic wetland covering large area presenting flood risk</li> <li>• ARP: ALWP high use aquifer management area</li> <li>• High ranking for a subcatchment on the existing MUL fringe</li> </ul>	X

## Scenario C

### Discussion

This scenario will result in a greater number of smaller growth centres, and lower densities in larger areas achieved through widespread suburban infill. There is no additional capacity for development of satellite towns outside the existing urban area.

### Policy Issues

As this is similar to the status quo approach, the changes to policy at a high level will not need to be modified as much as with some of the more expanding scenarios. The policy issue becomes how the growth is done, rather than where.

### Greenfields

Note: similar repercussions/benefits to scenario A.

## Scenario D

### Discussion

Scenario D encourages development to expand beyond the MUL. Conversion of Greenfield areas to residential and business land will considerably increase Auckland's urban area creating a more dispersed population. Extensive growth is to occur in coastal and rural towns with high amenity values and in satellite towns. Intensification in centres is to occur until they meet the capacity allowed for in district plans, although some additional capacity is to occur in market attractive centres and satellites. A number of new business centres are located within the existing MUL with others proposed in Greenfield areas where development is likely to occur.

This scenario would have the greatest impact on shellfish collection areas and water quality for recreation.

#### Surface Water

- Streams within current urban centres will be effected to a lesser degree due to the lower densities of population under this scenario
- Potential for extensive damage to rural streams, rivers, and wetlands
- Extensive development of green land, often in sensitive areas, will result in high initial sediment fluxing to streams and receiving environments.
- Streams that are currently of excellent or good quality (invertebrates and/or water quality) that could be affected by this scenario include (Council, 2010); Mahurangi, Puhoi, Waiwhiu, Hotoe, Awarere, West Hoe and Nukumea.

#### Stormwater

- Extensive conversion of surface to the impervious and loss of vegetation results in greater erosion and flooding potential.
- Residential developments in rural areas are usually low density single dwelling systems, and therefore roof and tar sealed area per person is higher.

#### Ground Water

- Many sites that have been proposed as growth areas have good groundwater quality. This is likely to be reduced by urbanisation of catchments.

#### Water Infrastructure

- Provision of wastewater and water piping in peripheral area is not limited to only the installation. They also require maintenance along the length and the likelihood of water losses and leakages will increase with length.
- This Scenario is not currently allowed for under Watercare's projections. For example the North Western, Dairy Flat and Warkworth expansion areas are likely to require the development of a Northern water source. The cost of developing an alternative supply to this area is an estimated minimum of \$615M (Council, 2010)
- Current planned water treatment infrastructure in the North Western Expansion Area is not sufficient to deal with projected growth and will be well below capacity. This will result in duplication of infrastructure at a cost of \$100M.
- There are no plans to provide wastewater treatment to the Dairy Flats or Warkworth areas; they will therefore be reliant on onsite treatment.
- Planned reticulated wastewater treatment is below capacity for the Karaka Ramarama, Drury and Takanini-Brookby, Whitford or Beachlands areas.
- Water infrastructure is required before new developments can occur, yet Watercare require a 10 year start on infrastructure construction. Therefore for expanding development may be hindered by the implementation of infrastructure.
- A very preliminary cost estimate for providing trunk wastewater infrastructure (>300 mm in diameter) in the expansion areas listed below (in 2009 dollars) is:
  - Dairy Flats - \$200-300M
  - Karaka-Ramarama - \$200-300M
  - Drury - \$200-300M
  - Takanini-Brookby - \$200-300M.

#### **Policy Issues**

As this is departure from the status quo approach, significant changes to policy will need made. The policy issue becomes how the growth is done, rather than where, and what changes to policy are required to ensure water is looked after.

### Greenfields

<b>Group 1 Industrial Greenfields</b>		<b>Score</b>
Whenuapai Business  (Appendix B, Figure 1)	<ul style="list-style-type: none"> <li>• Historic wetland mirroring significant flood risk areas</li> <li>• High ranking for a subcatchment on the existing MUL fringe</li> </ul>	X
Drury Business  (Appendix B, Figure 2)	<ul style="list-style-type: none"> <li>• High erosion risk upstream of site, and some risk at downstream end of site</li> <li>• Good groundwater quality</li> <li>• Entire site is in catchments of wetlands aligning with high flood risk</li> <li>• Historic wetland covering entire site</li> <li>• ARP: ALWP high use aquifer management area, aquifer management area and adjacent high use stream aquifer management area.</li> <li>• The site is in the middle of a series of high value ecological area with representative ecosystems.</li> </ul>	XXX
Airport Stage 2  (Appendix B, Figure 3)	<ul style="list-style-type: none"> <li>• High quality groundwater site nearby</li> </ul>	X
Paerata Business	<ul style="list-style-type: none"> <li>• Existing groundwater quality good based on two sites</li> <li>• ARP: ALWP aquifer management area over area for development, natural stream management area 1km north downstream of river flowing through urban environment</li> </ul>	X
Silverdale West Business  (Appendix B, Figure 4)	<ul style="list-style-type: none"> <li>• High erosion risk throughout catchment</li> <li>• Groundwater quality good at Orewa site</li> <li>• ARP: ALWP aquifer management area and natural stream management area around Weiti river</li> <li>• Large historical wetland covers site and surrounds</li> <li>• Northern half of site in high value catchment</li> </ul>	XX
<b>Residential Expansion Areas</b>		<b>Score</b>
Brookby Valley  (Appendix B, Figure 5)	<ul style="list-style-type: none"> <li>• High erosion risk in the north</li> <li>• Good quality groundwater</li> <li>• Large historical wetland covering mid half of area, indicating possible flooding risk over large area.</li> <li>• ARP: ALWP high use aquifer management area, small area of natural stream management area</li> <li>• Planned expansion subdivides a high ranking catchment</li> </ul>	XX
Dairy Flat Expansion Area	<ul style="list-style-type: none"> <li>• Entire expansion area at high risk from erosion</li> <li>• Water quality excellent in south based on 8</li> </ul>	XX

(Appendix B, Figure 6)	<ul style="list-style-type: none"> <li>monitoring sites</li> <li>Groundwater quality good</li> <li>Some significant catchments associated with coastal wetland</li> <li>ARP: ALWP high use aquifer management area in the north west, natural stream management areas by Okura estuary</li> <li>Various high value catchments in planned expansion area</li> </ul>	
Drury Residential (Appendix B, Figure 7)	<ul style="list-style-type: none"> <li>High erosion risk around edges of expansion area and in headwaters</li> <li>Good water quality, headwater streams with good ecological state</li> <li>Good groundwater quality</li> <li>Large wetland catchment draining to coast in southern area</li> <li>Expansion area on large historical wetland associated with high flood risk</li> <li>ARP: ALWP high use stream management area to north, high use aquifer management area to south, catchments with natural stream management areas in headwaters</li> <li>Lower four fifths in high quality catchment area</li> </ul>	XXX
Karaka Residential (Appendix B, Figure 8)	<ul style="list-style-type: none"> <li>Good groundwater quality</li> <li>ARP: ALWP aquifer management area and high use stream management area a part of expansion area and 3 wetland management areas. A number of other wetlands on coastal fringe</li> <li>Some small representative catchments of high value within expansion area</li> </ul>	XX
Leigh Expansion Area (Appendix B, Figure 9)	<ul style="list-style-type: none"> <li>High erosion risk to at least 50% of site, especially around coastal fringe</li> <li>Groundwater good quality</li> <li>ARP: ALWP natural stream management areas within site and in general area. High use aquifer management area to west just outside of site</li> </ul>	XX
Mahurangi East Expansion Area (Appendix B, Figure 10)	<ul style="list-style-type: none"> <li>Most of site at risk from erosion</li> <li>Top of catchment drains an area of high water quality</li> <li>Significant area of site is within wetland catchments, linked to stream network, and coastal fringe wetlands, most of site is historic wetlands</li> <li>North section drains into high value sub-catchment that includes natural stream management areas.</li> </ul>	XX
Martins Bay (Appendix B, Figure 11)	<ul style="list-style-type: none"> <li>Erosion risk high throughout site</li> <li>Large wetland catchment covering area, current extent limited to coastal fringe and small fragments</li> </ul>	XX
Northern Expansion Area	<ul style="list-style-type: none"> <li>High erosion risk in large proportion of area</li> <li>ARP: ALWP site drains into natural stream</li> </ul>	XXX

(Appendix B, Figure 12)	<p>management area, western area is a high use stream management area</p> <ul style="list-style-type: none"> <li>• High value ecological catchment covers most of the western area, and the eastern edge</li> <li>• High quality marine receiving environments at risk from degradation</li> </ul>	
Northwest Expansion Area (Appendix B, Figure 1)	<ul style="list-style-type: none"> <li>• Some areas of high erosion risk</li> <li>• Fair quality groundwater</li> <li>• Small but highly valued representative catchment by coastal inlet</li> </ul>	X
Omaha Expansion Area (Appendix B, Figure 13)	<ul style="list-style-type: none"> <li>• Entire site at risk from erosion</li> <li>• Good groundwater quality</li> <li>• High flood risk around existing river</li> <li>• 30% of site drains into lake and wetland catchments on coastal fringe</li> <li>• ARP: ALWP high use aquifer management area in northern part of site, natural stream management areas in the south</li> <li>• Southern area of site highly valued aligning with natural stream management areas</li> <li>• Catchment feeds semi-pristine Whangateau Harbour, sensitive to effects of sedimentation (in conflict with Whangateau Action Plan aiming to maintain the high quality of the Harbour)</li> </ul>	XX
Puhoi Residential (Appendix B, Figure 14)	<ul style="list-style-type: none"> <li>• High erosion risk throughout site</li> <li>• Excellent upstream water quality, tributaries with high quality ecological state</li> <li>• Most of area and surrounds in historical wetland</li> </ul>	XX
Ramarama Residential (Appendix B, Figure 15)		X
Takanini Stage 3 (Appendix B, Figure 16)	<ul style="list-style-type: none"> <li>• Large historical wetland covering most of area, indicating possible flooding risk.</li> <li>• Planned expansion divides a high ecological value catchment.</li> </ul>	XXX
Waiheke Expansion Zone (Appendix B, Figure 17)	<ul style="list-style-type: none"> <li>• High risk of erosion over expansion area</li> <li>• Multiple wetland catchments</li> <li>• ARP: ALWP high use aquifer management area, multiple natural stream management areas, 3 wetland management areas</li> <li>• Planned expansion area contains multiple high value catchments</li> </ul>	XX
Waiwera Expansion Area (Appendix B, Figure 18)	<ul style="list-style-type: none"> <li>• Entire site at risk from erosion</li> <li>• Most of site drains into lake or wetland catchment</li> <li>• Historic wetland covers much of the north of the area</li> <li>• ARP: ALWP high use aquifer management area, aquifer management area, natural stream</li> </ul>	XX

	<p>management area, wetland management area</p> <ul style="list-style-type: none"> <li>• High value ecological catchment covers most of area.</li> </ul>	
Whitford Beachlands  (Appendix B, Figure 19)	<ul style="list-style-type: none"> <li>• Current wetlands along coastal fringe</li> <li>• ARP: ALWP natural stream management areas within area and upstream, wetland management area</li> <li>• Some highly valued catchments especially in south west</li> </ul>	XX

See attached document containing maps showing risk areas of specific interest

### References

- AUCKLAND REGIONAL COUNCIL (2005) Water Resources. In *State of the Environment*. Auckland, Auckland Regional Council
- AUCKLAND REGIONAL COUNCIL (2009) Chapter 4: State of the Environment - Freshwater. In *State of the Environment*. Auckland, Auckland Regional Council.
- AUCKLAND REGIONAL COUNCIL (2010) Future Land Use and Transport Planning Project Evaluation of Future Land Use and Transport Scenarios: Attachments (1- 4): Key Information. DOC, 2010 - FENZ
- LAND AND WATER FORUM (2010) Report of the Land and Water Forum: A Fresh Start for Fresh Water. In Land and Water Forum.
- GLASOE, S., CHRISTY, A. (2004) Literature Review and Analysis: Coastal Urbanization and Microbial Contamination of Shellfish Growing Areas. Puget Sound Action Team, Washington.
- MILLAR, S. (2007) The Need to Reduce Impervious Cover to Prevent Flooding and Protect Water Quality. Centre for Watershed Protection, US Environmental Protection Agency.
- NEW ZEALAND GOVERNMENT (2011) National Policy Statement for Freshwater Management 2011.
- PARKYN, S., WILDING, TK., Croker, G. (2006) Small Headwater Streams of the Auckland Region Volume 4: Natural Values. Technical Publication No. 310, 2006. Prepared for the Auckland Regional Council by NIWA, Hamilton.
- SCARSBROOK, M. (2007) River Water Quality State and Trends in the Auckland Region. IN PREPARED FOR AUCKLAND REGIONAL COUNCIL (Ed). Auckland, NIWA.

Appendix 1: Scenario B

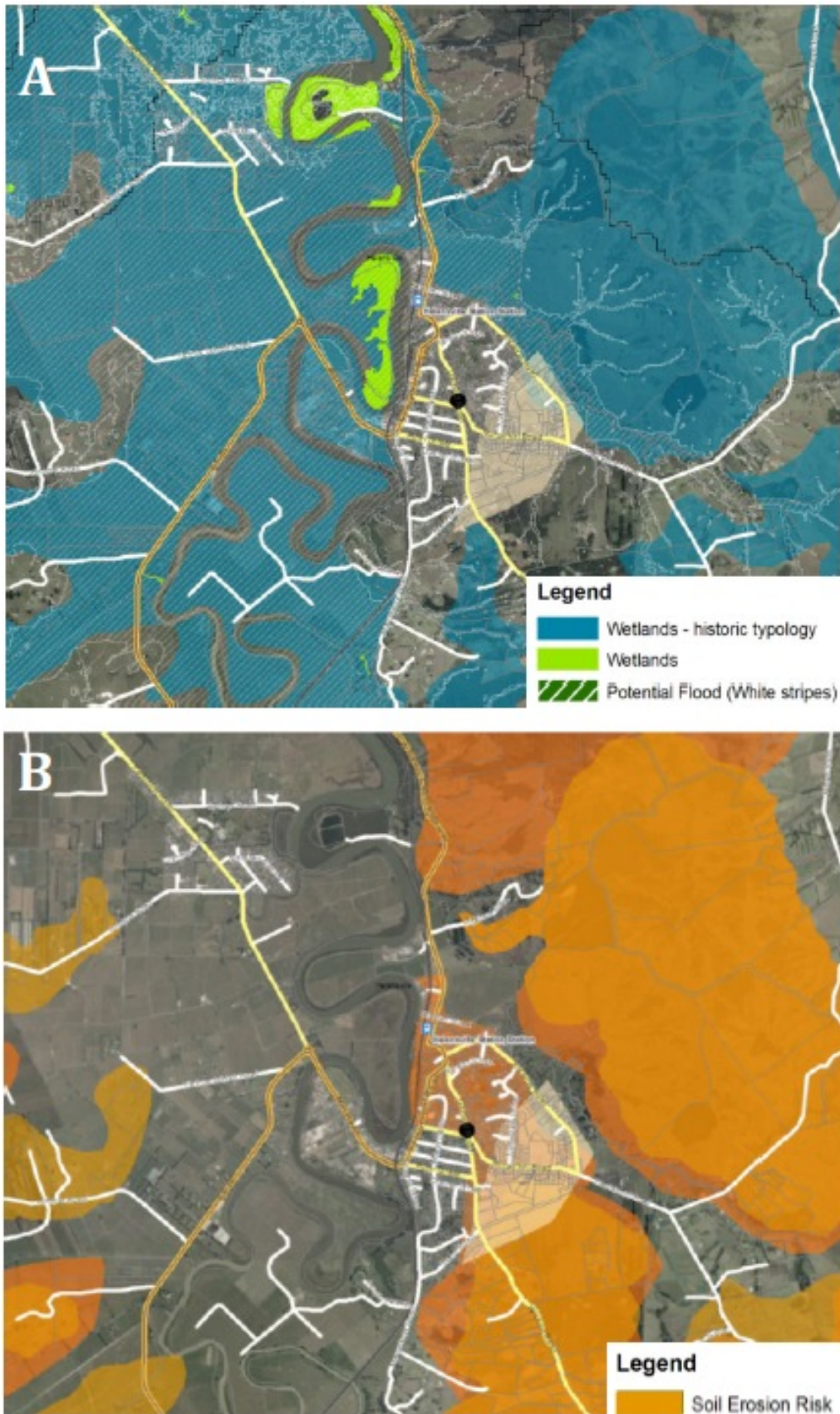


Figure 1: Helensville A) Flood risk, historic and current wetlands. B) Soil erosion risk.



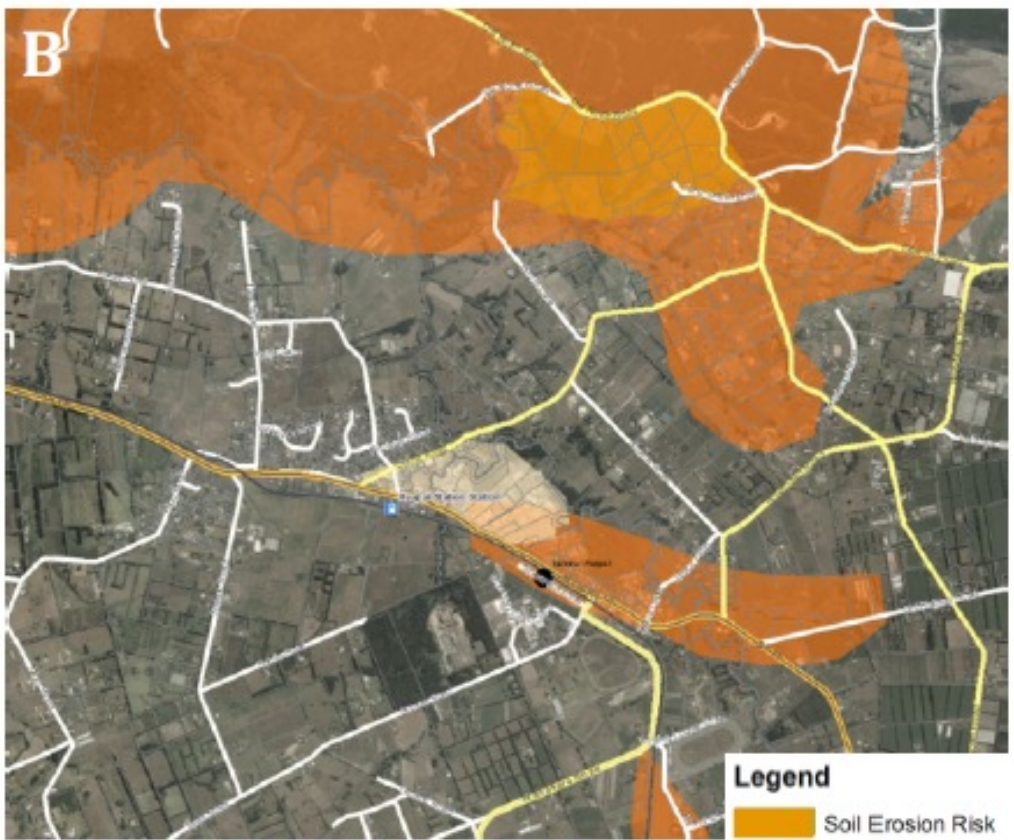
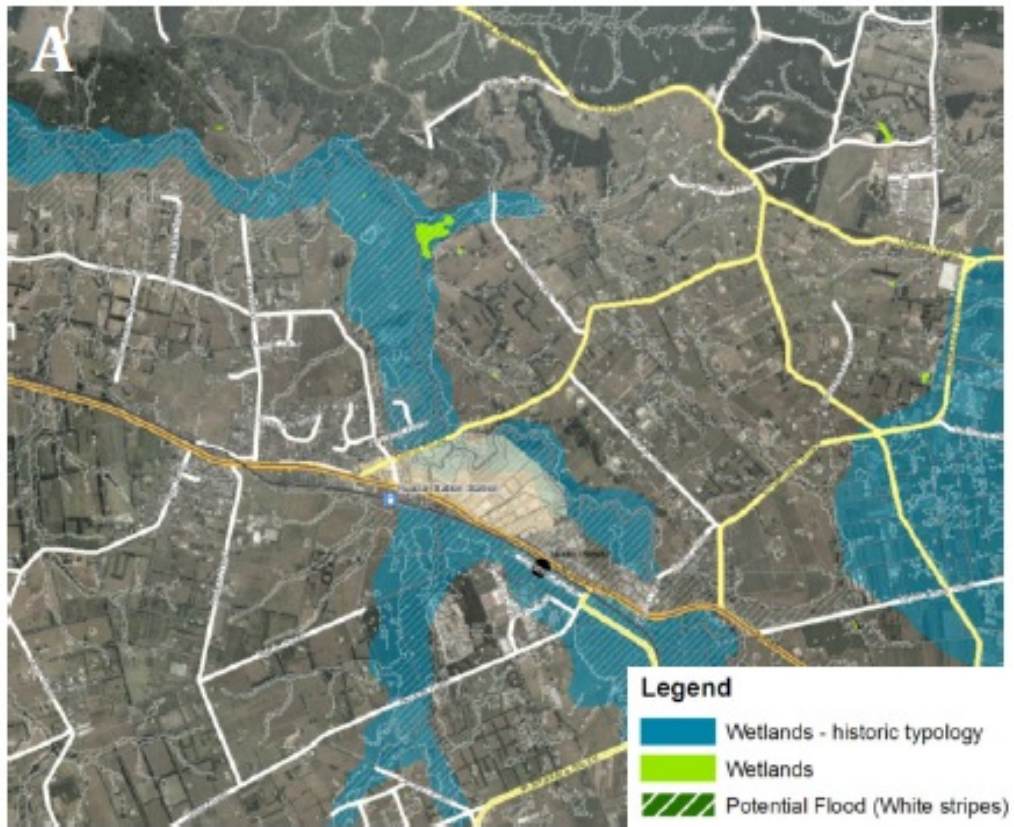


Figure 2: Kumeu A) Flood risk, historic and current wetlands. B) Soil erosion risk.

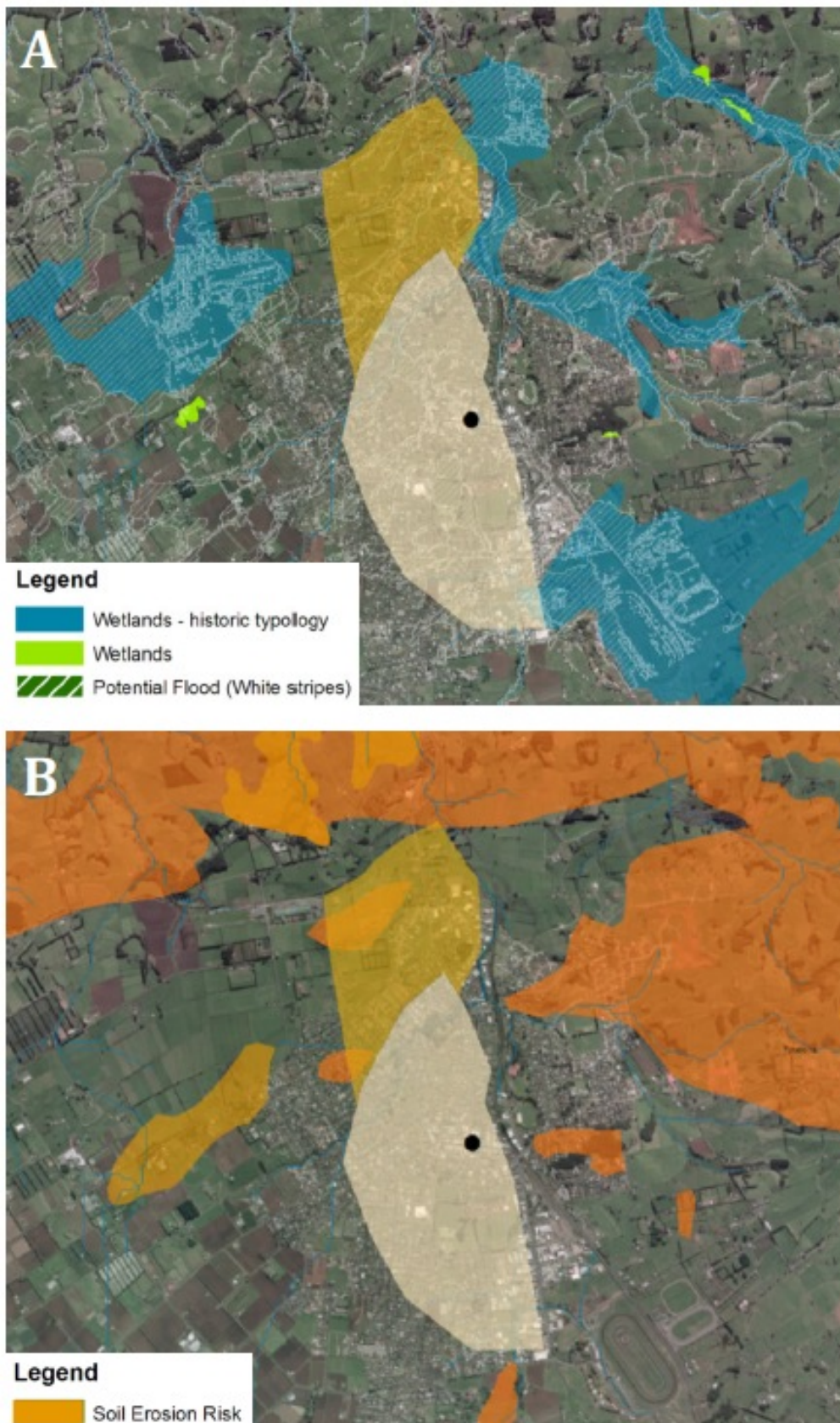
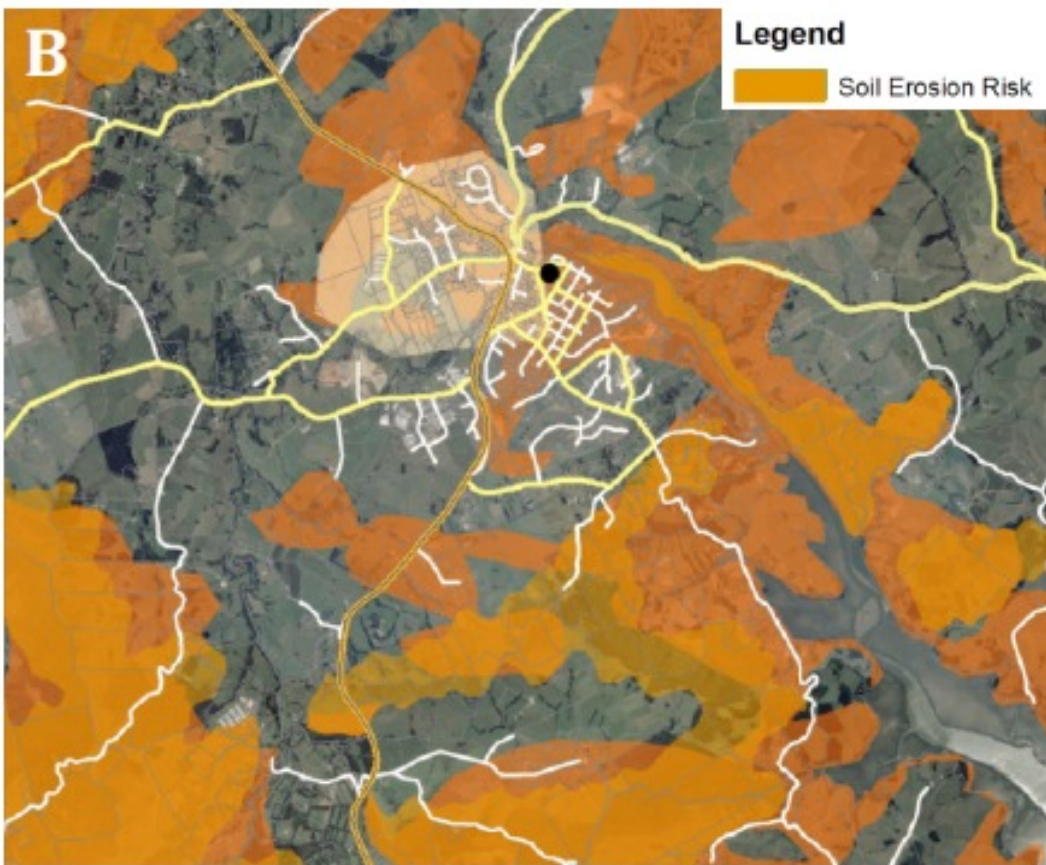
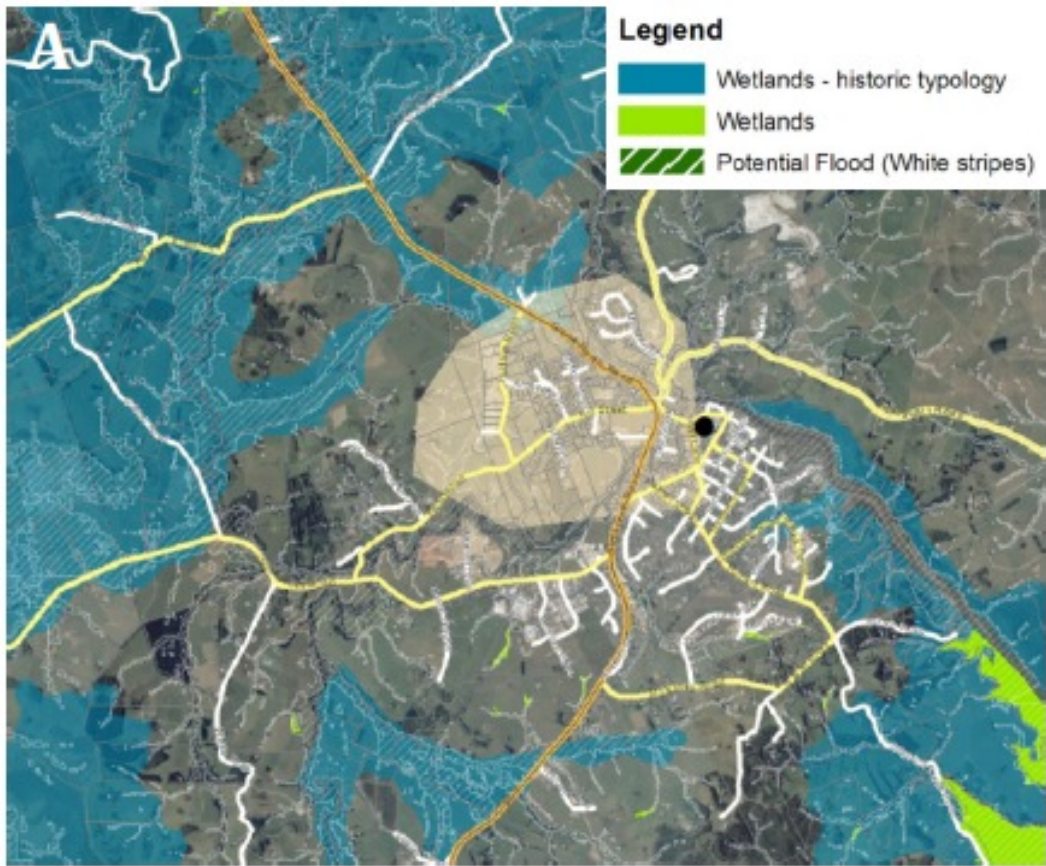


Figure 3: Pukekohe A) Flood risk, historic and current wetlands. B) Soil erosion risk.



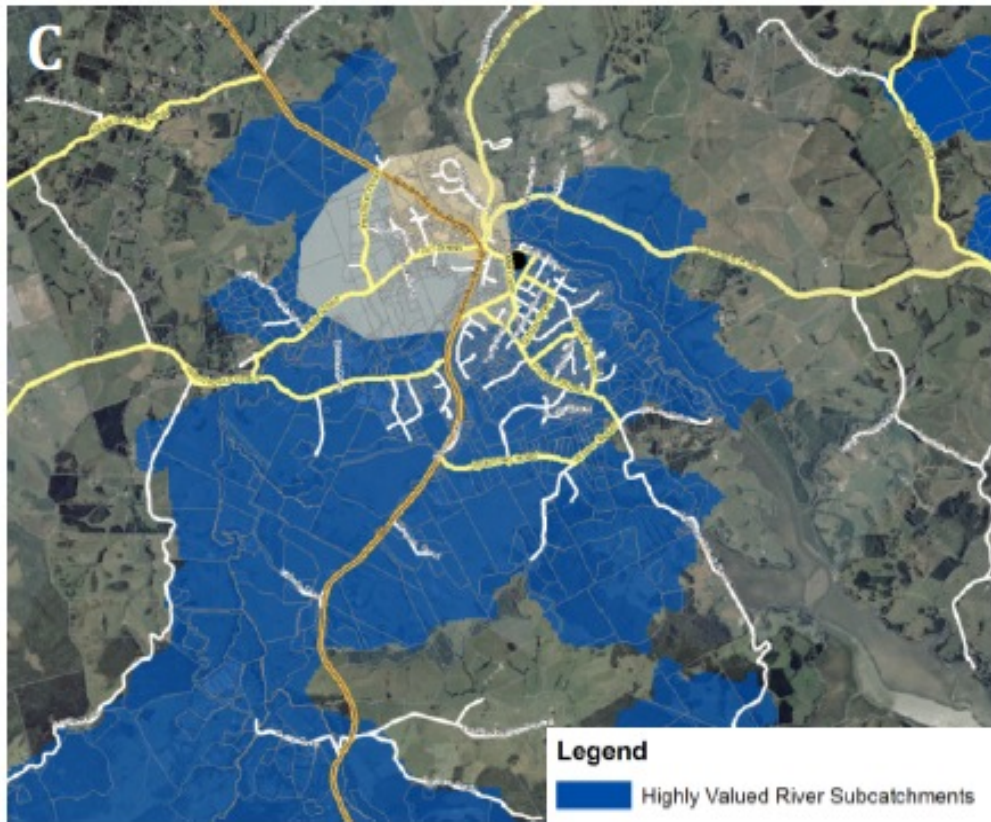


Figure 4: Warkworth A) Flood risk, historic and current wetlands. B) Soil erosion risk.  
C) Highly valued river catchments.

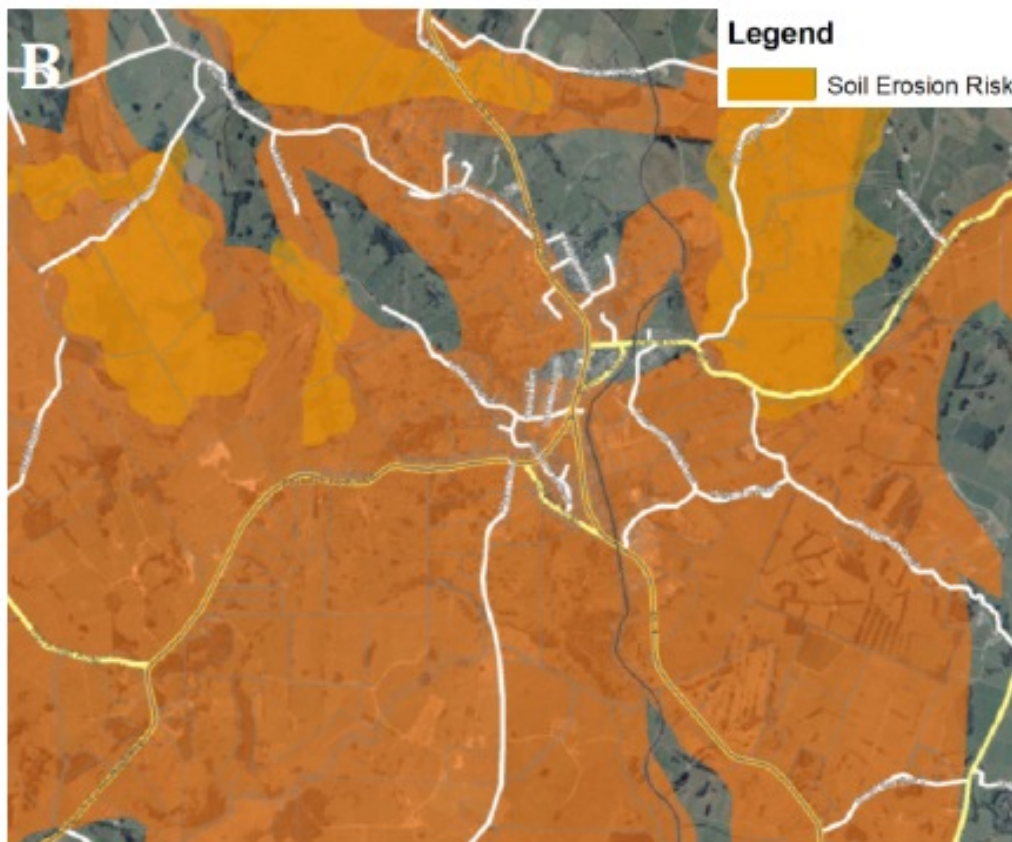
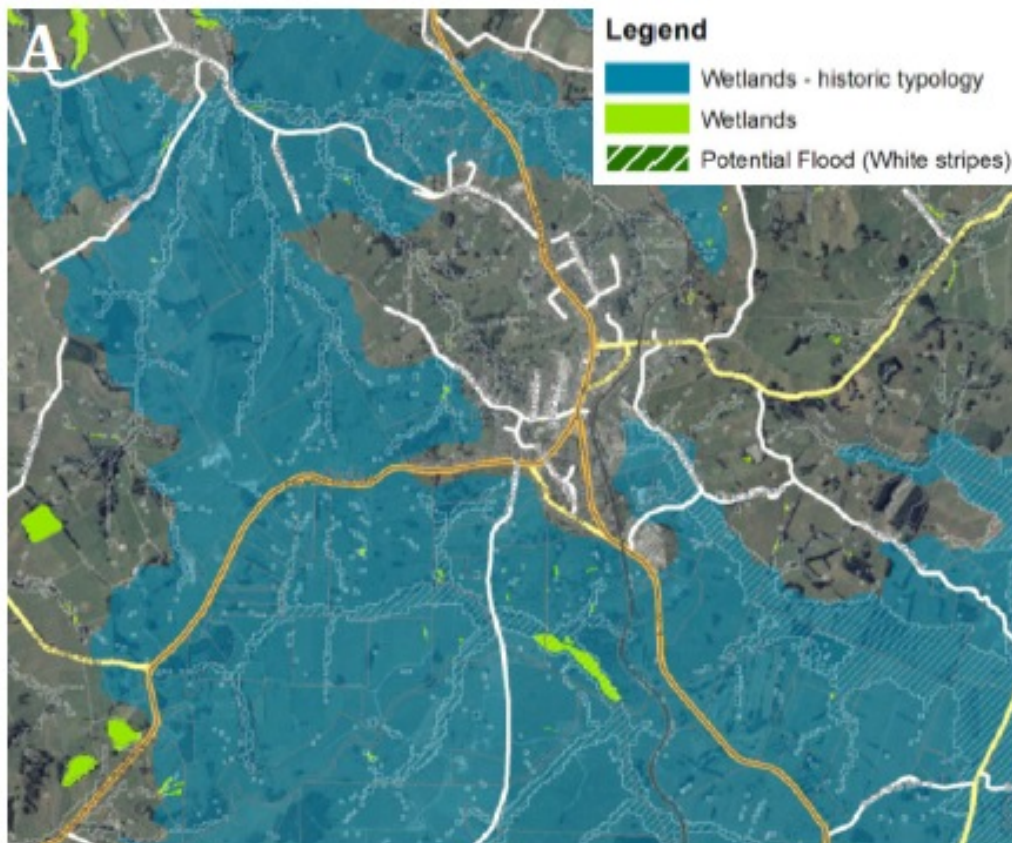


Figure 5: Wellsford A) Flood risk, historic and current wetlands. B) Soil erosion risk.

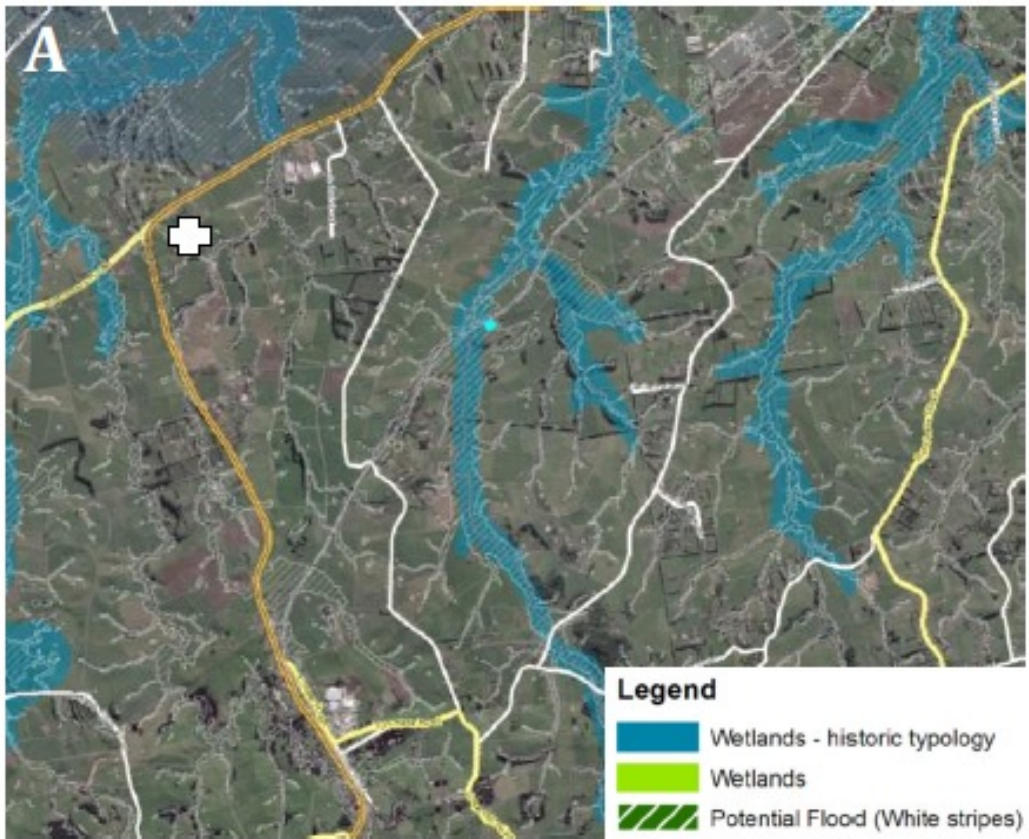


Figure 6: Wesley A) Flood risk, historic and current wetlands. B) Soil erosion risk.

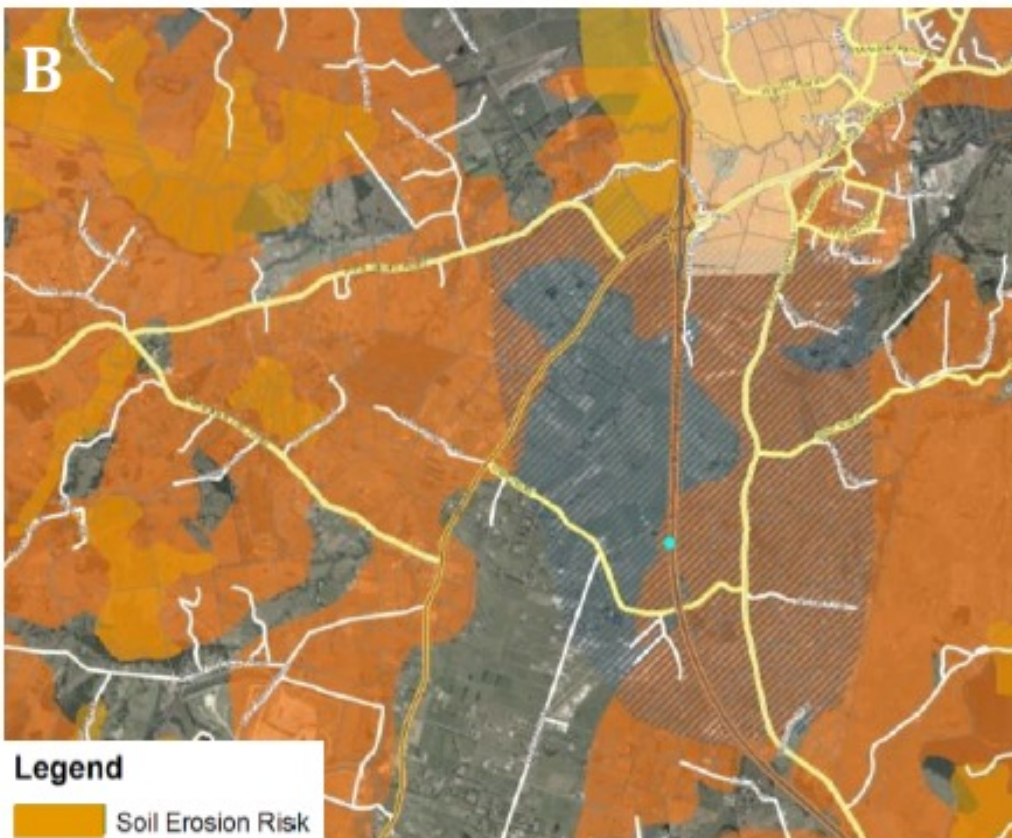
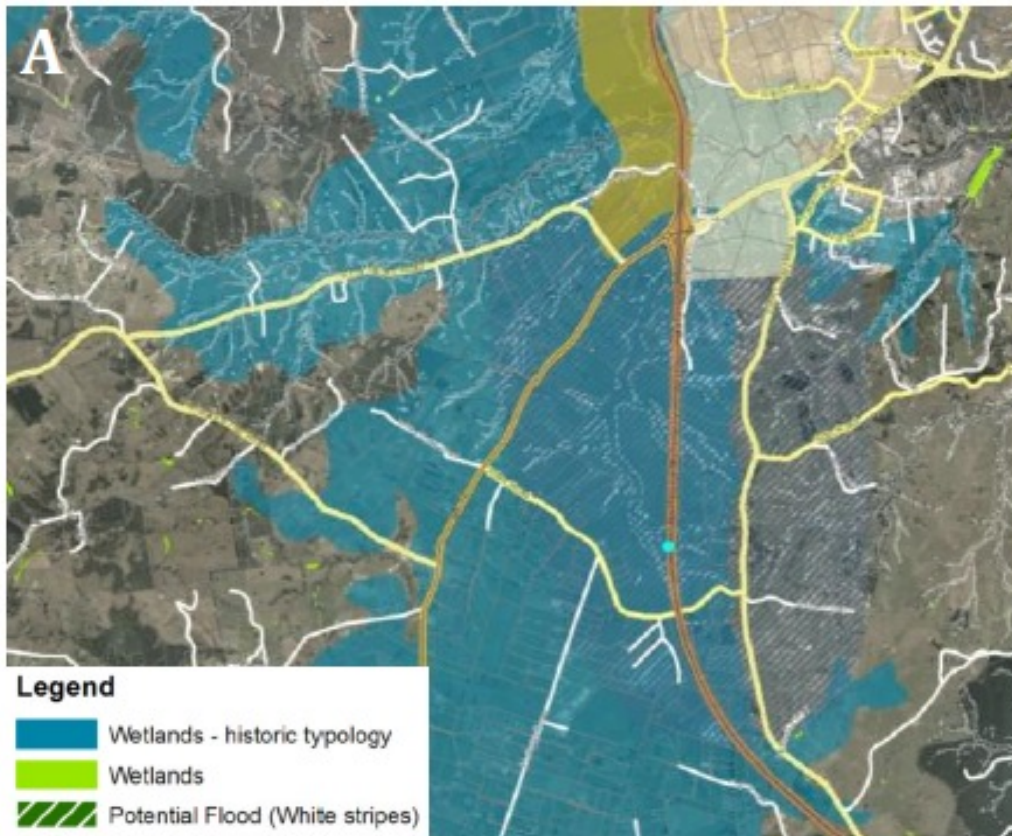


Figure 7: Dairy Flat A) Flood risk, historic and current wetlands. B) Soil erosion risk.

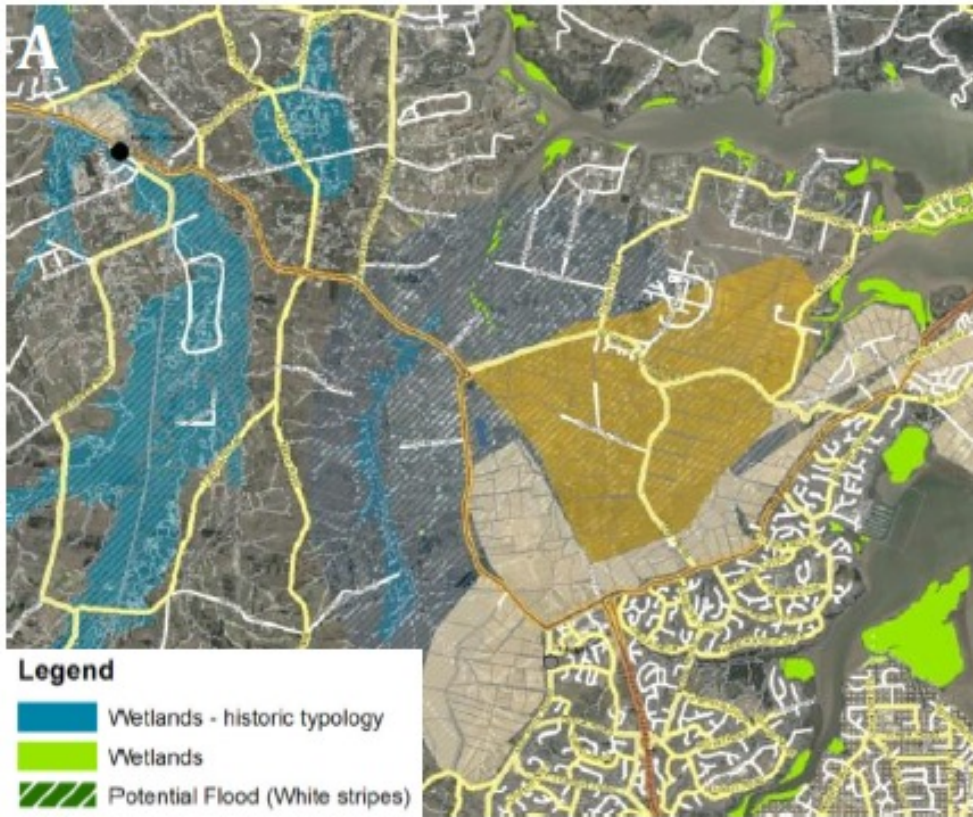
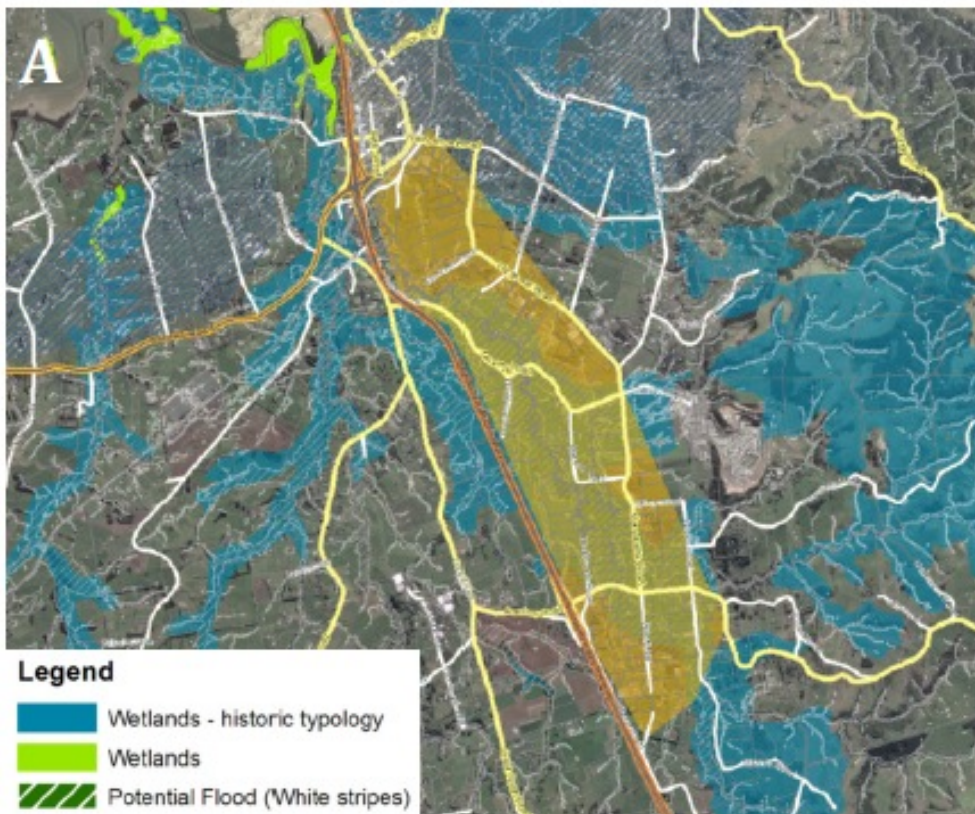


Figure 8: Whenuapai Business areas (orange polygon) and Northwest Expansion area (blue stripes) A) Flood risk, historic and current wetlands.





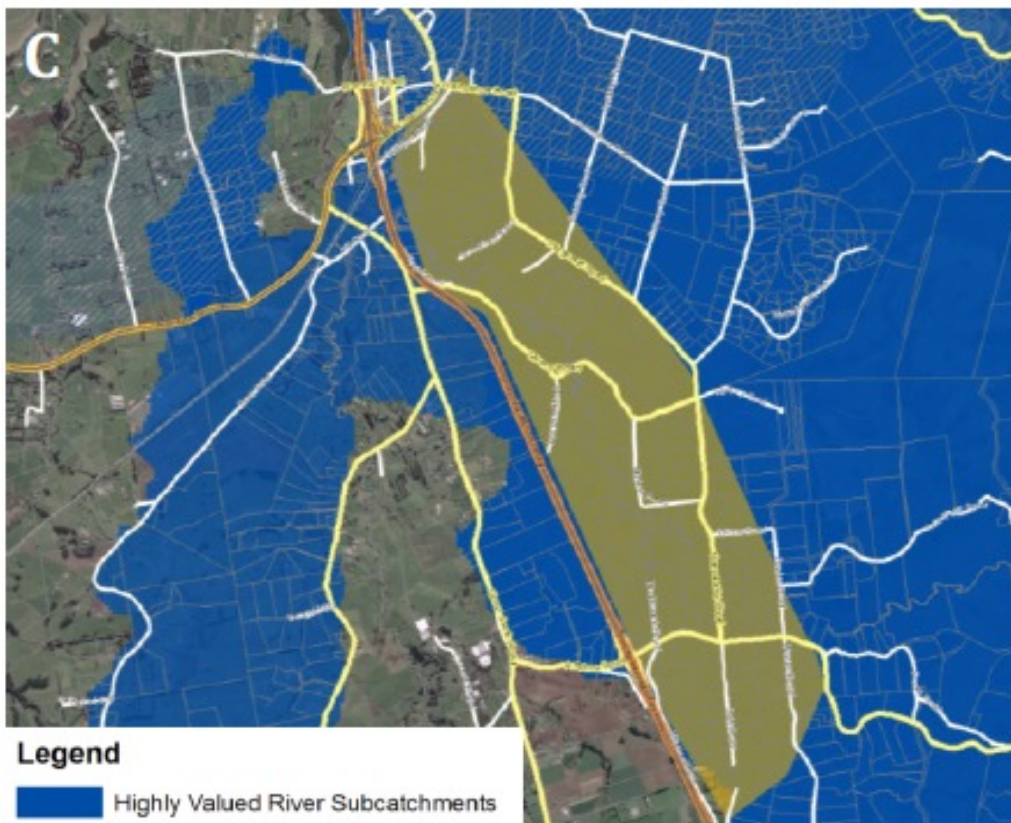
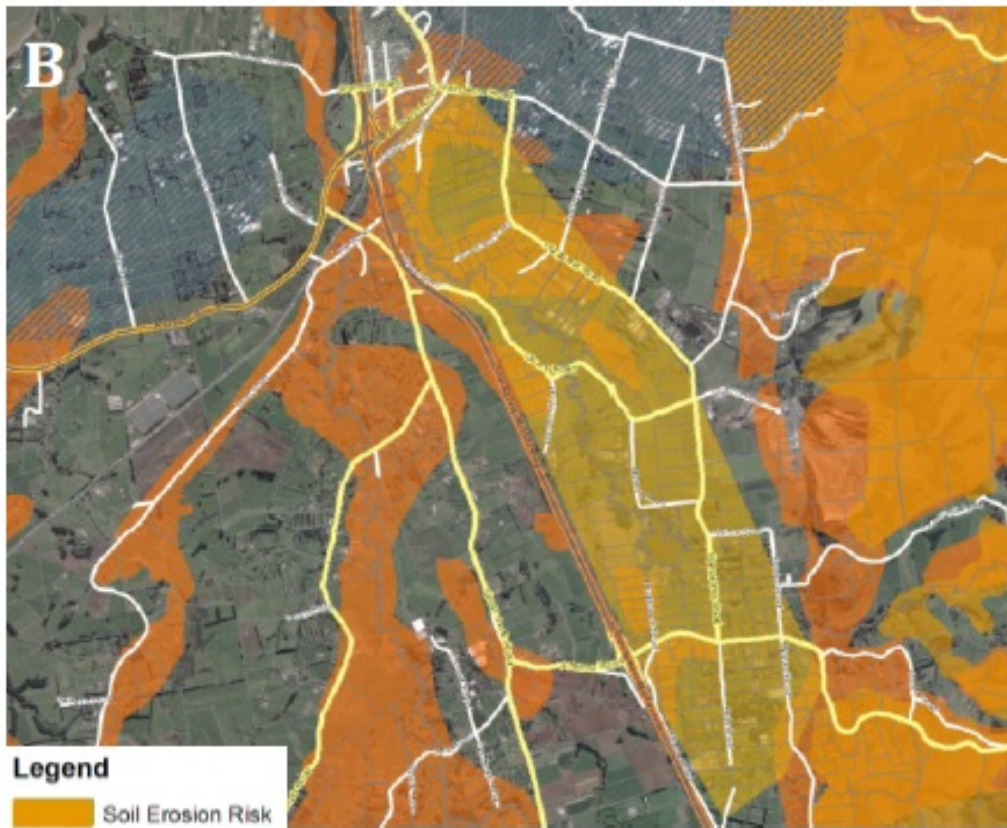
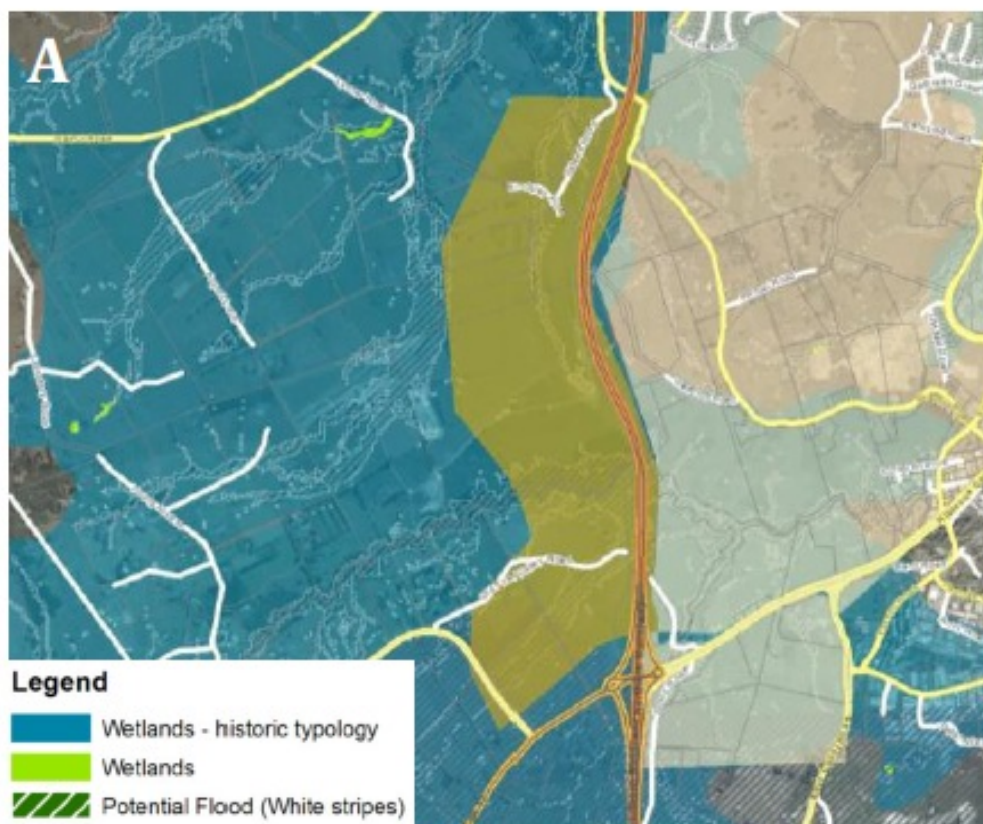


Figure 9: Drury Business Area A) Flood risk, historic and current wetlands. B) Soil erosion risk. C) Highly valued river catchments.



Figure 10: Airport Stage 2 A) Flood risk.



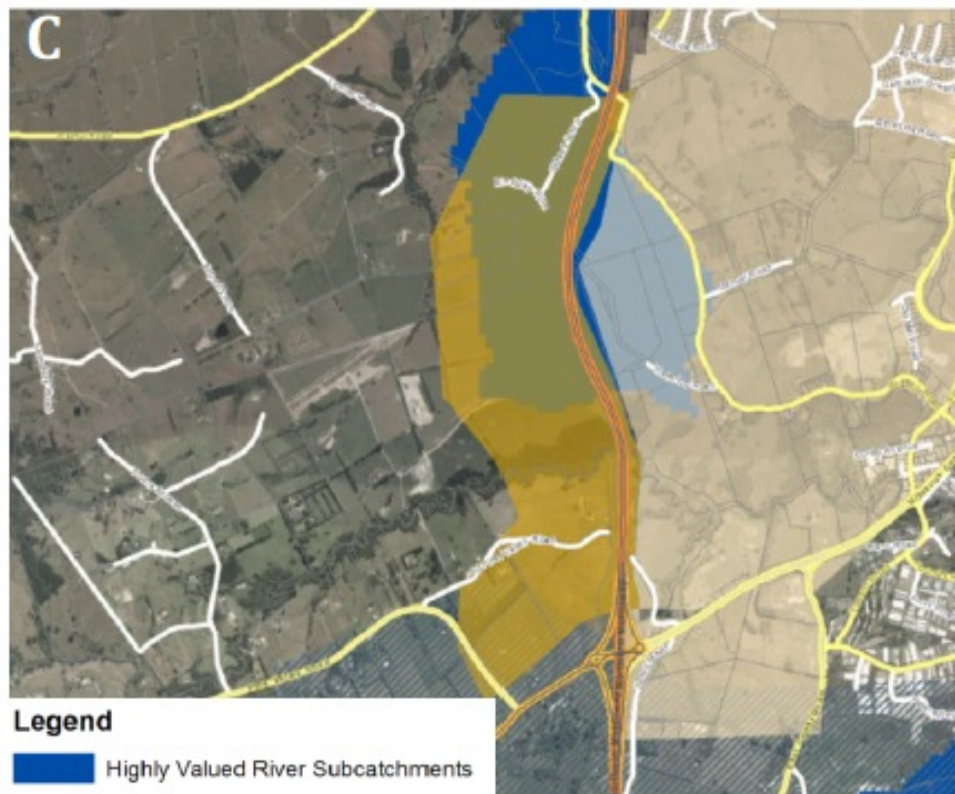
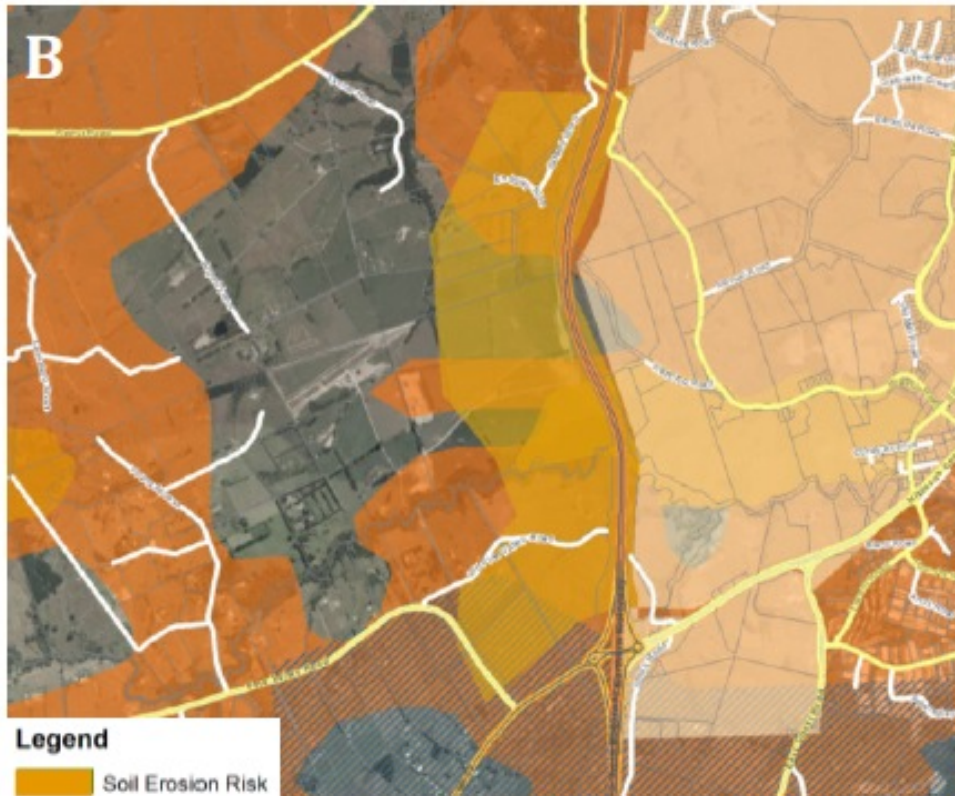
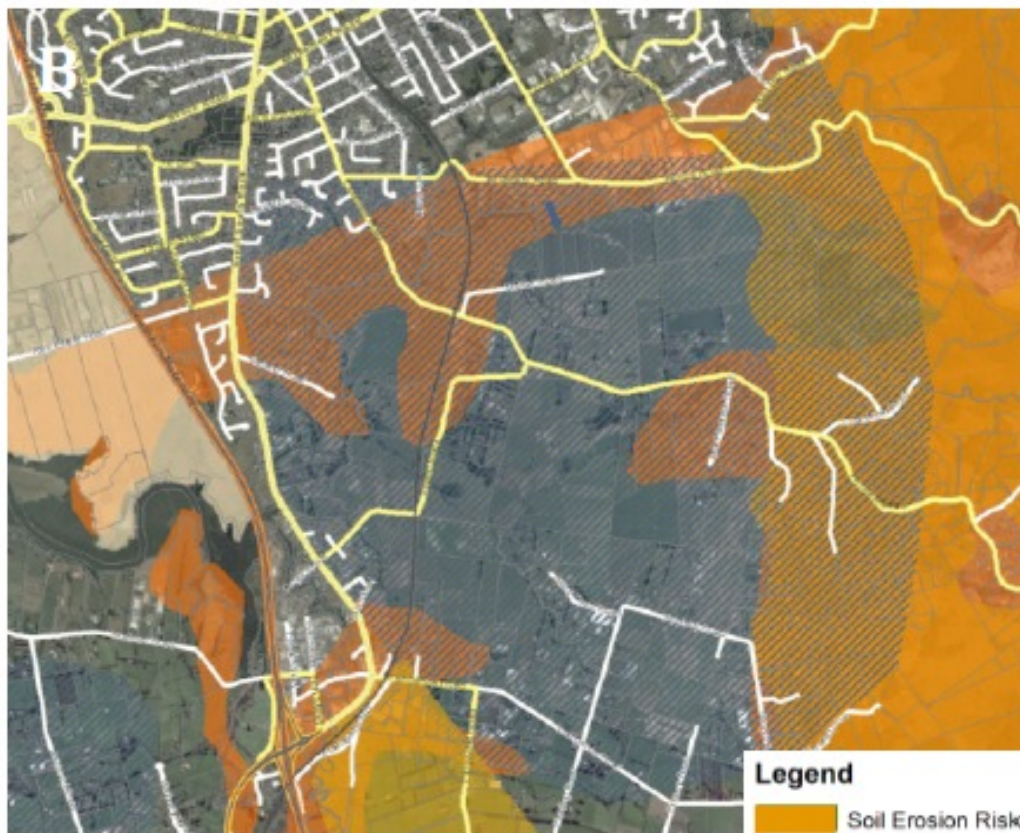
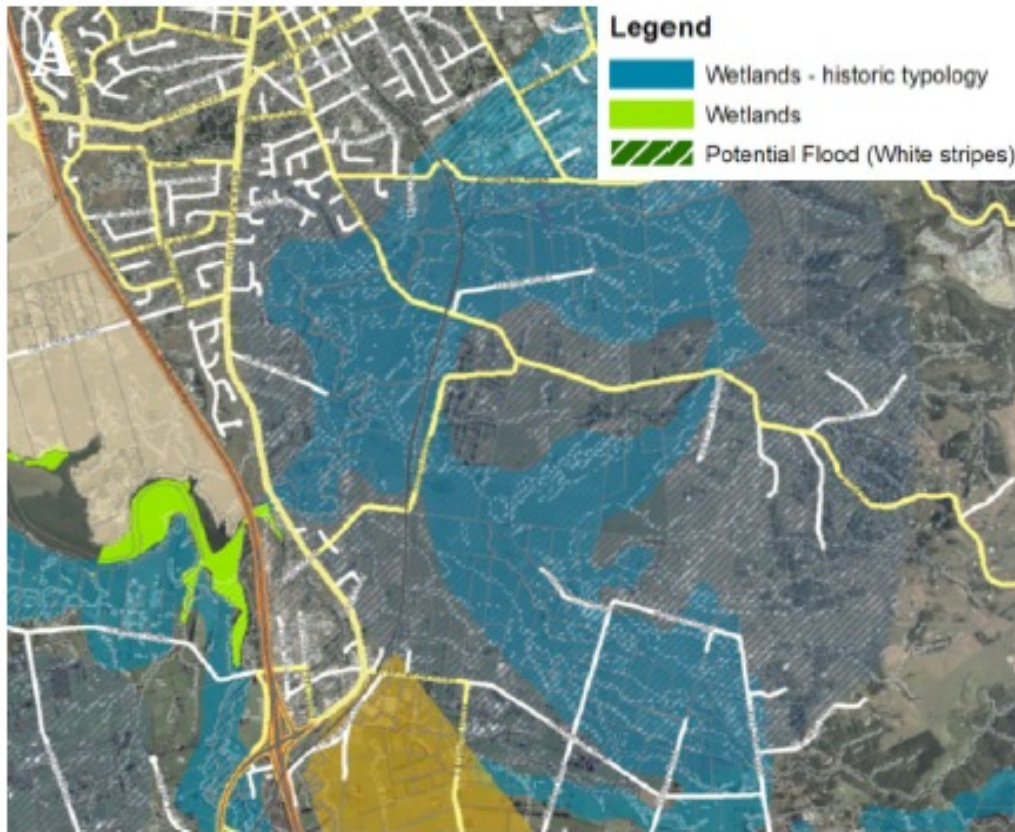


Figure 11: Silverdale industrial area A) Flood risk, historic and current wetlands. B) Soil erosion risk. C) Highly valued river catchments.



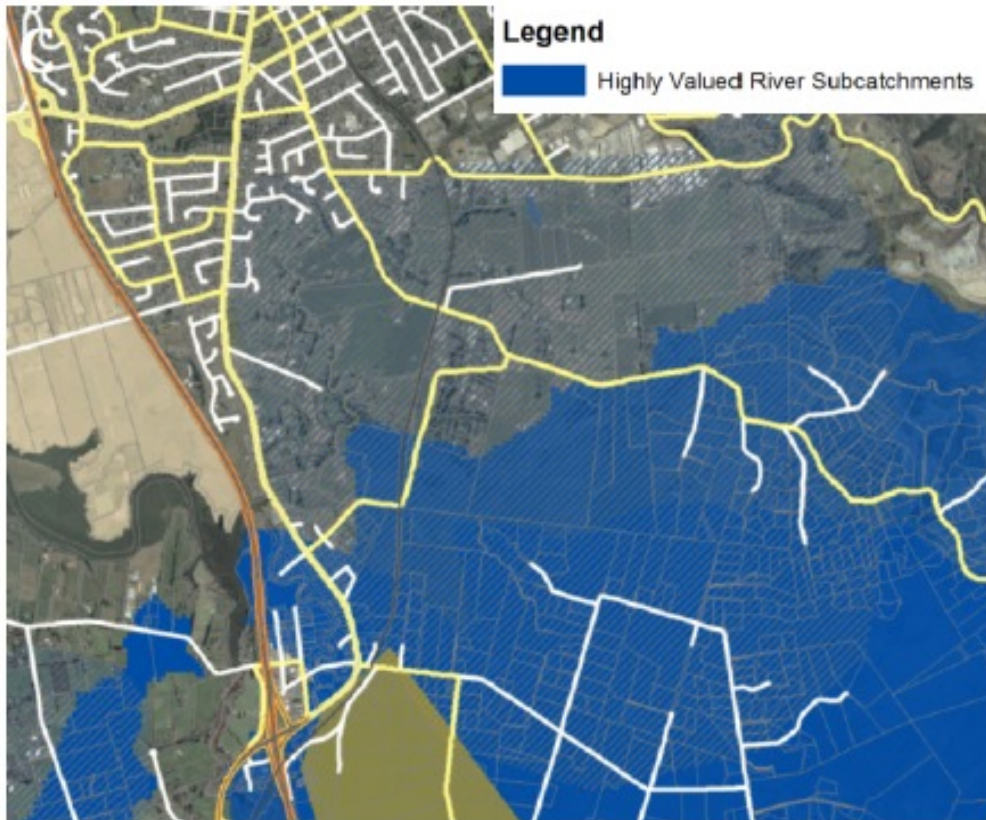


Figure 12: Drury Residential A) Flood risk, historic and current wetlands. B) Soil erosion risk. C) Highly valued river catchments.

Appendix B: Scenarios D

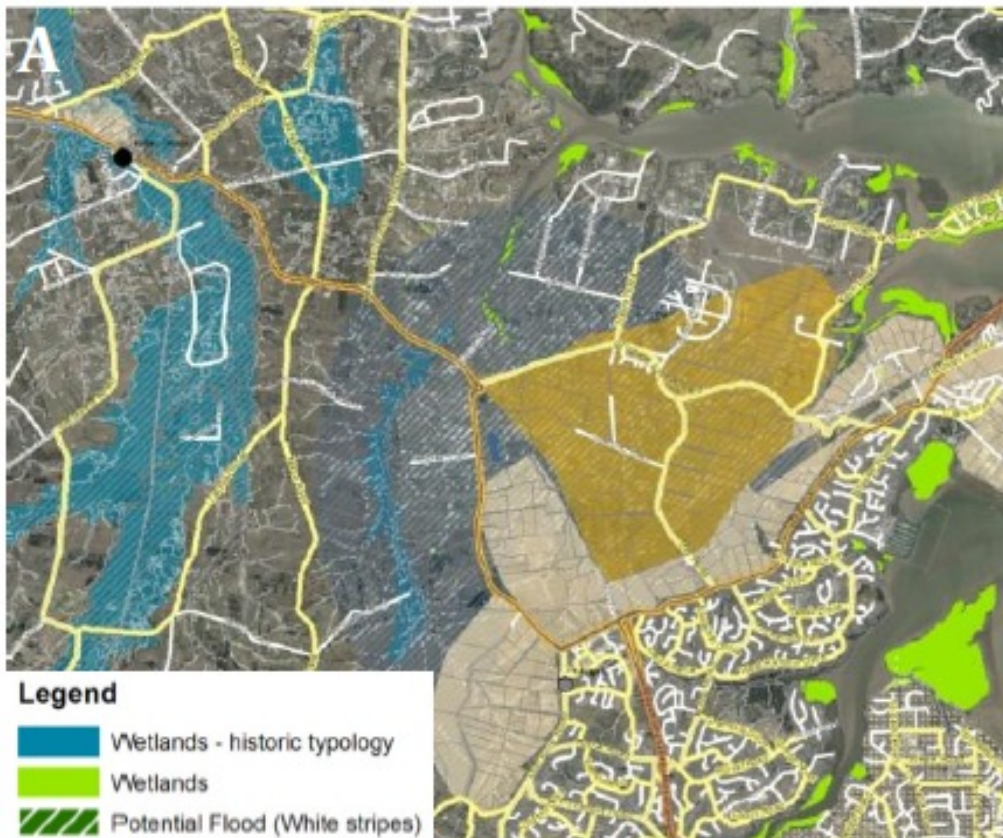
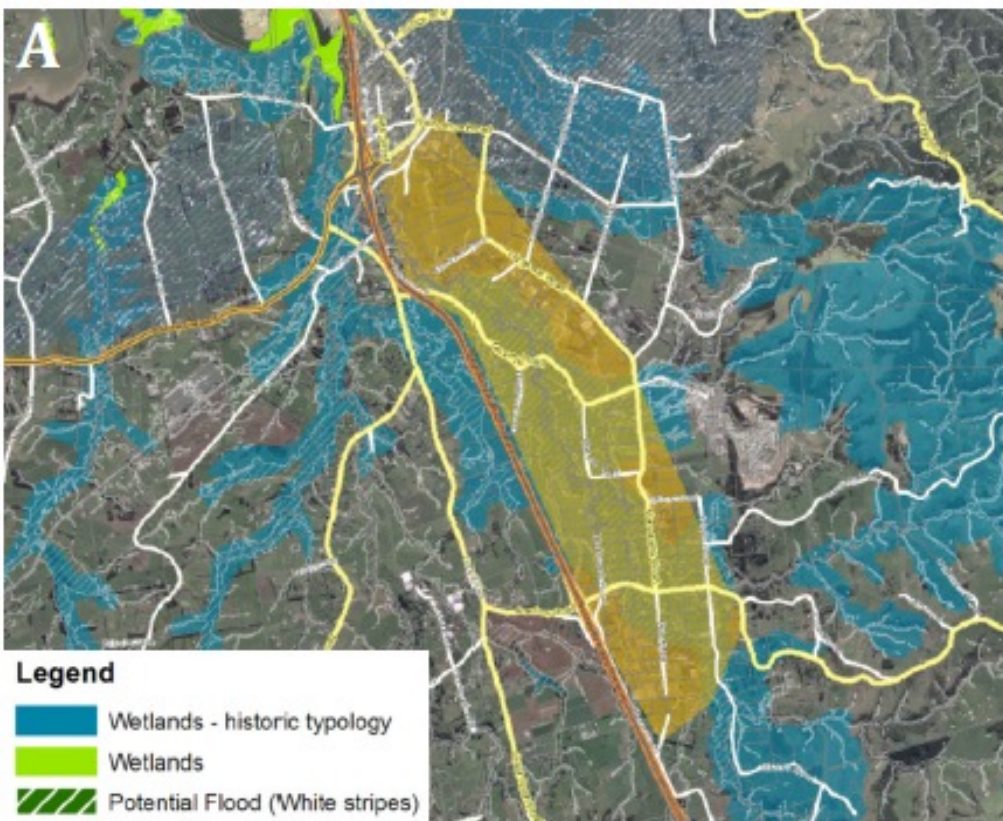


Figure 1: Whenuapai Business areas (orange polygon) and Northwest Expansion area (blue stripes) A) Flood risk, historic and current wetlands.



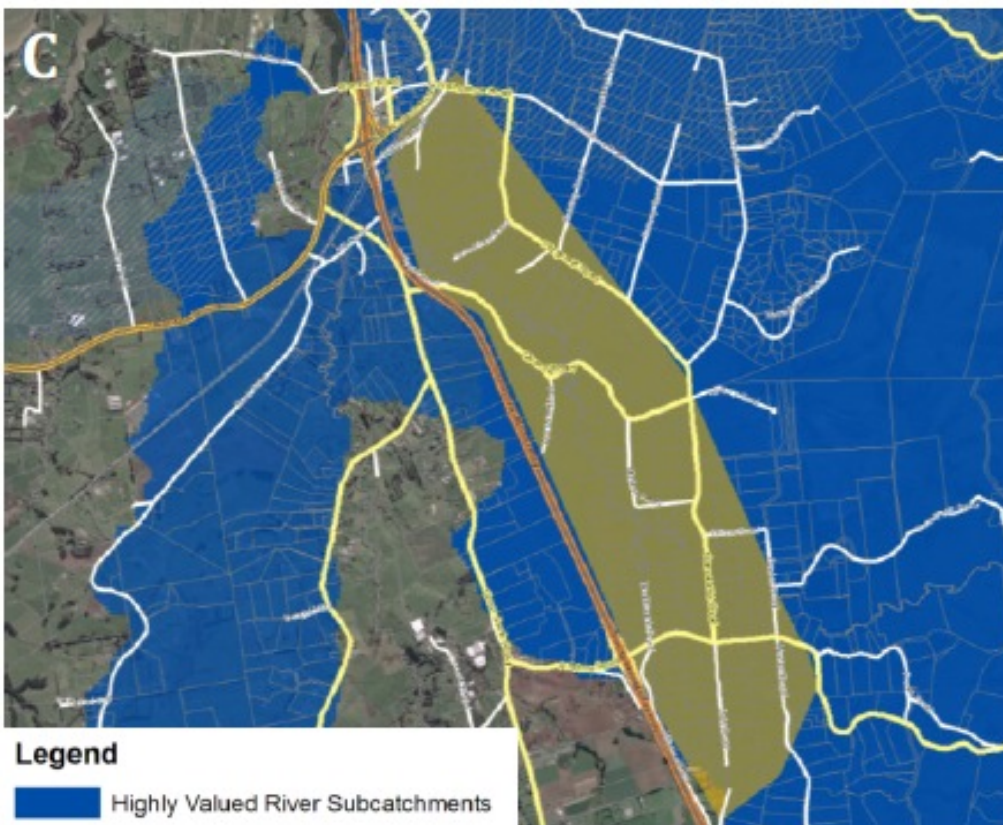
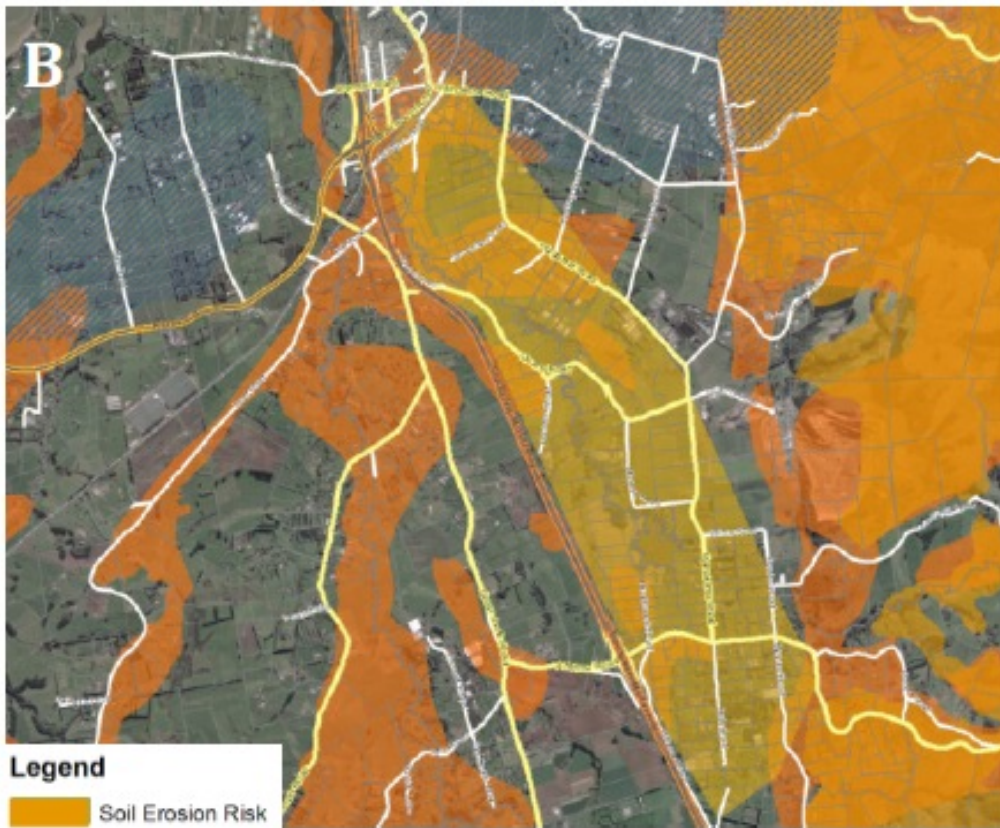
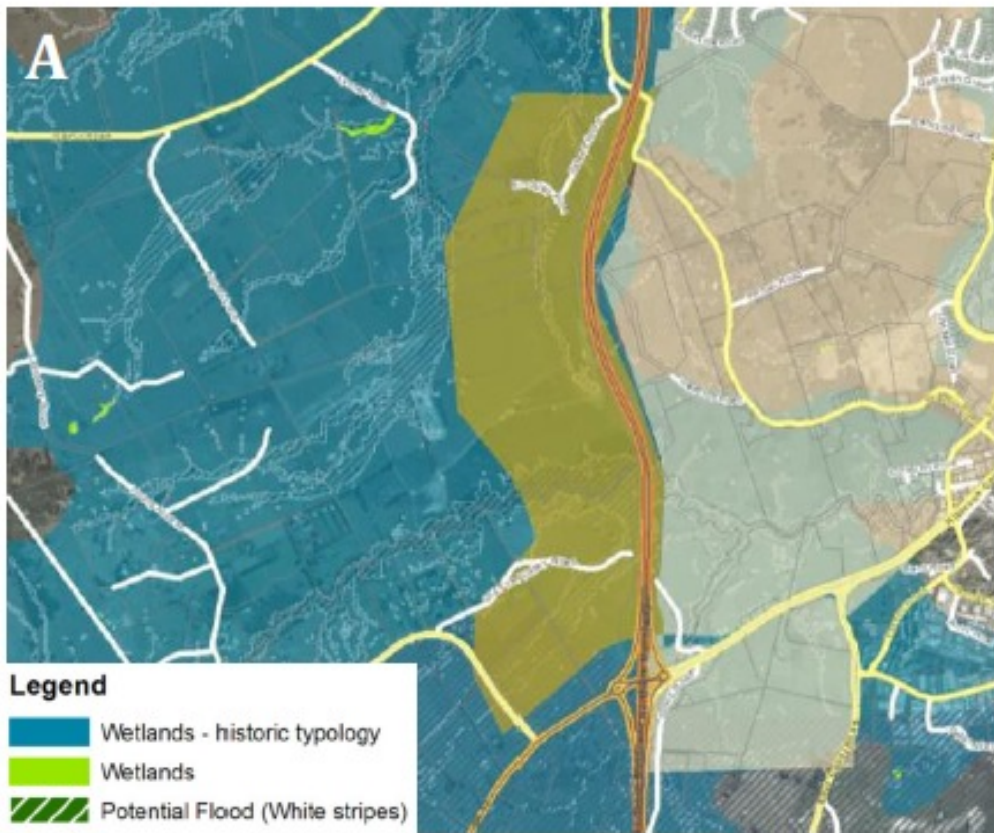


Figure 2: Drury Business Area A) Flood risk, historic and current wetlands. B) Soil erosion risk. C) Highly valued river catchments.



Figure 3: Airport Stage 2 A) Flood risk.





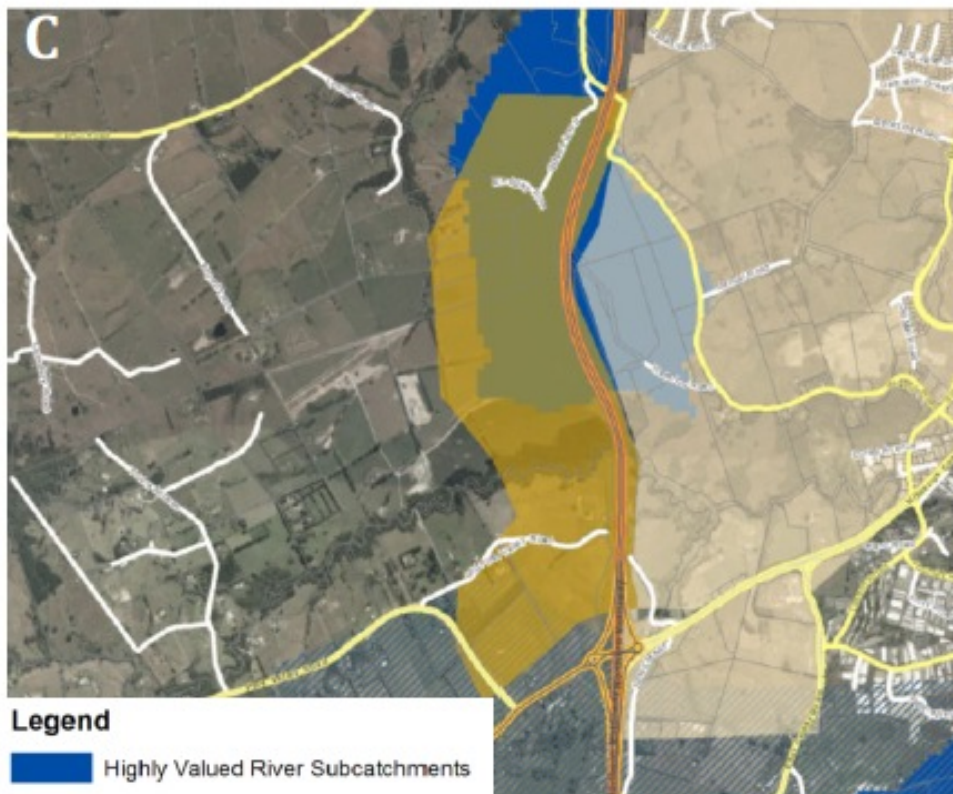
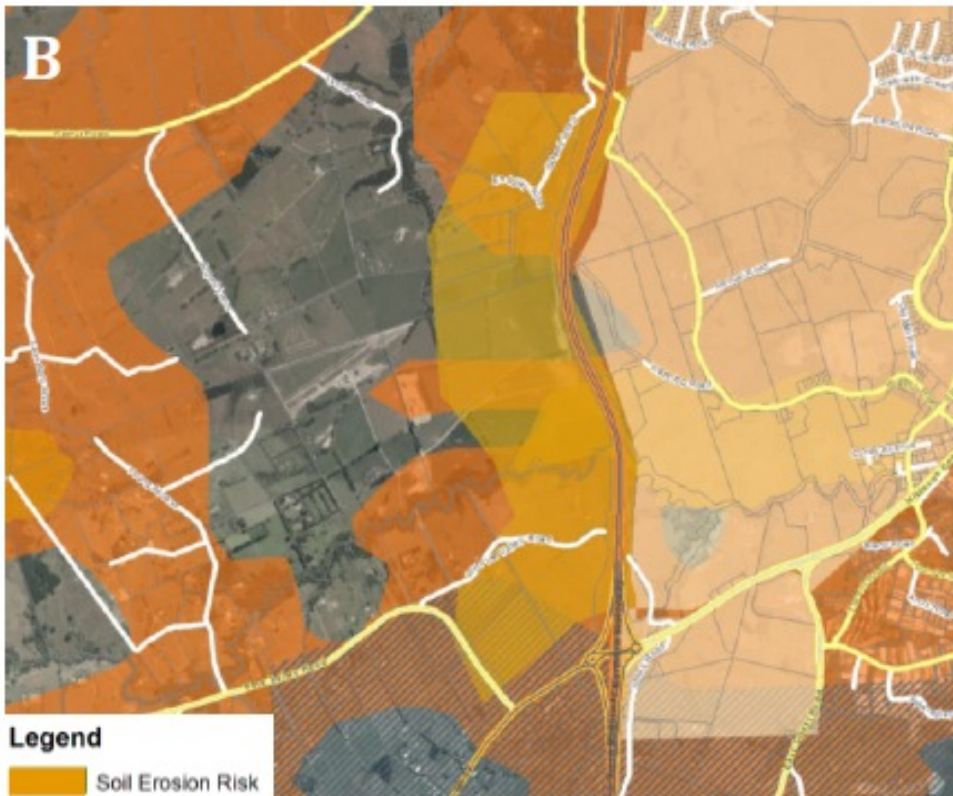


Figure 4: Silverdale industrial area A) Flood risk, historic and current wetlands. B) Soil erosion risk. C) Highly valued river catchments.

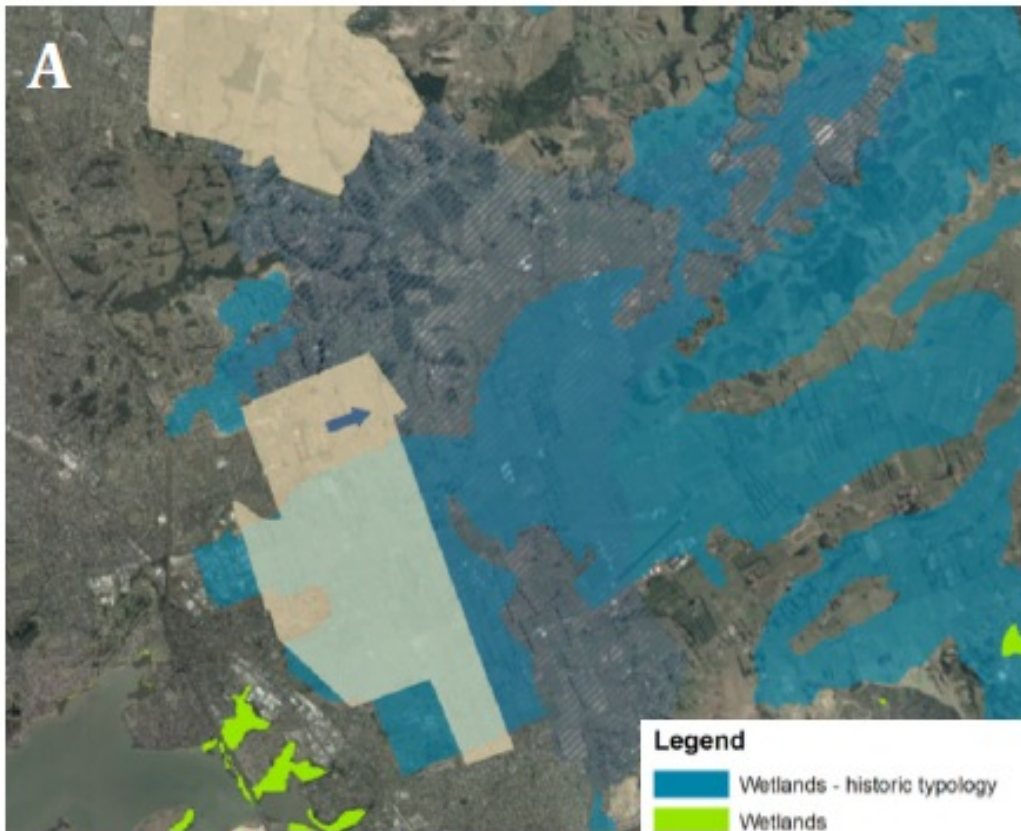
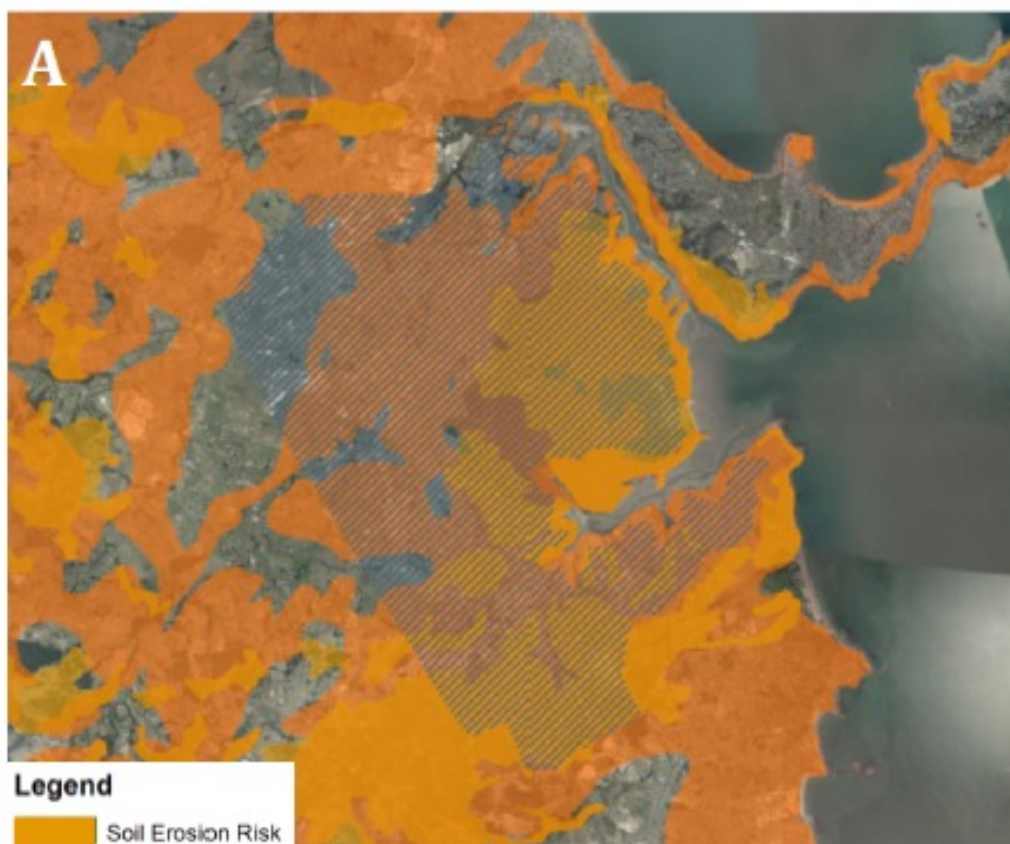


Figure 5: Brookby Valley A) Historic and current wetlands.



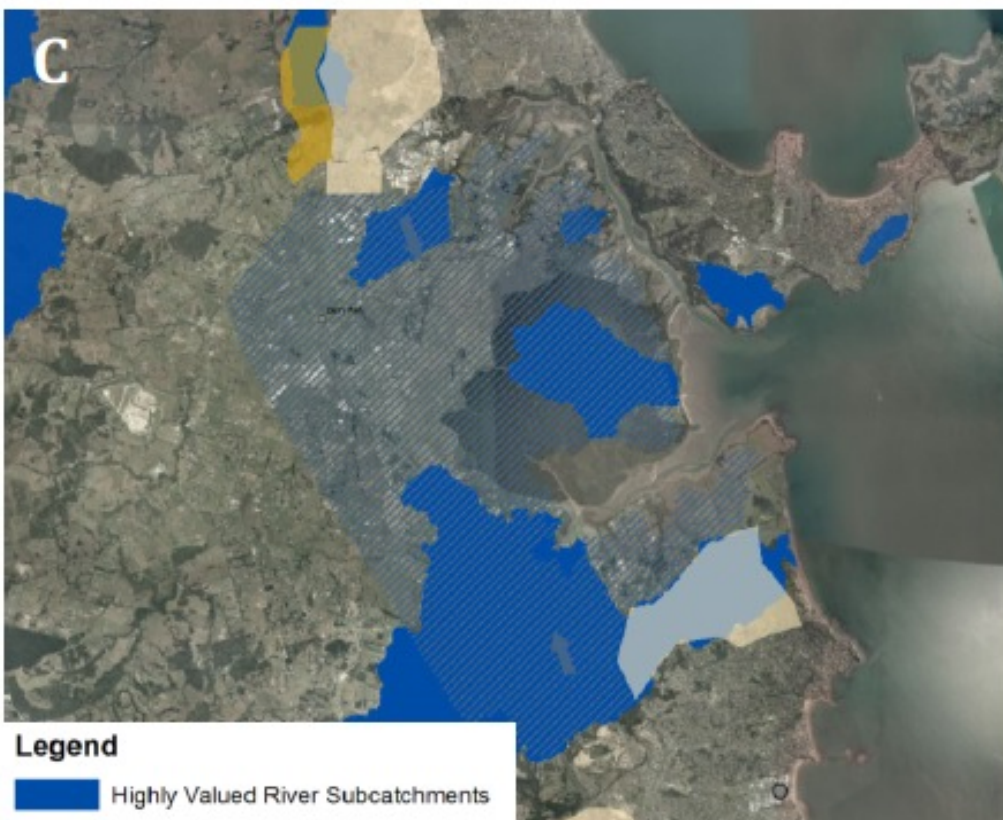
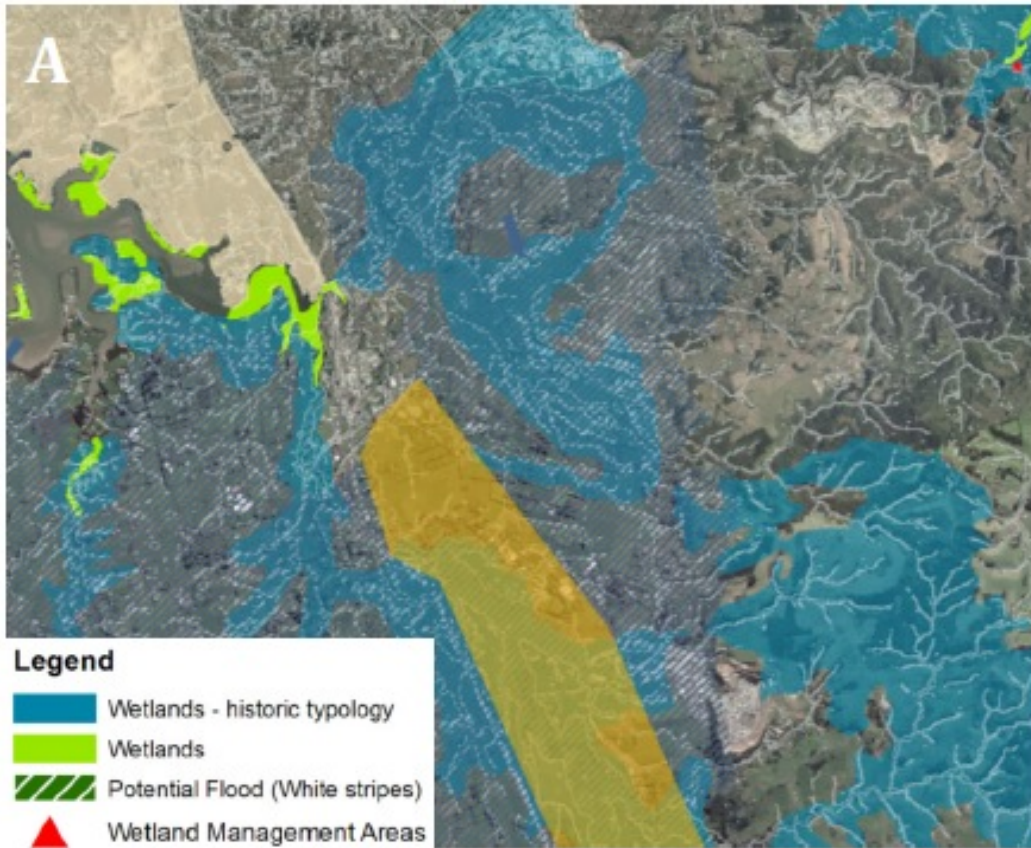


Figure 6: Dairy Flat A) Soil Erosion Risk. B) Lake and wetland catchments. C) Highly valued river catchments.



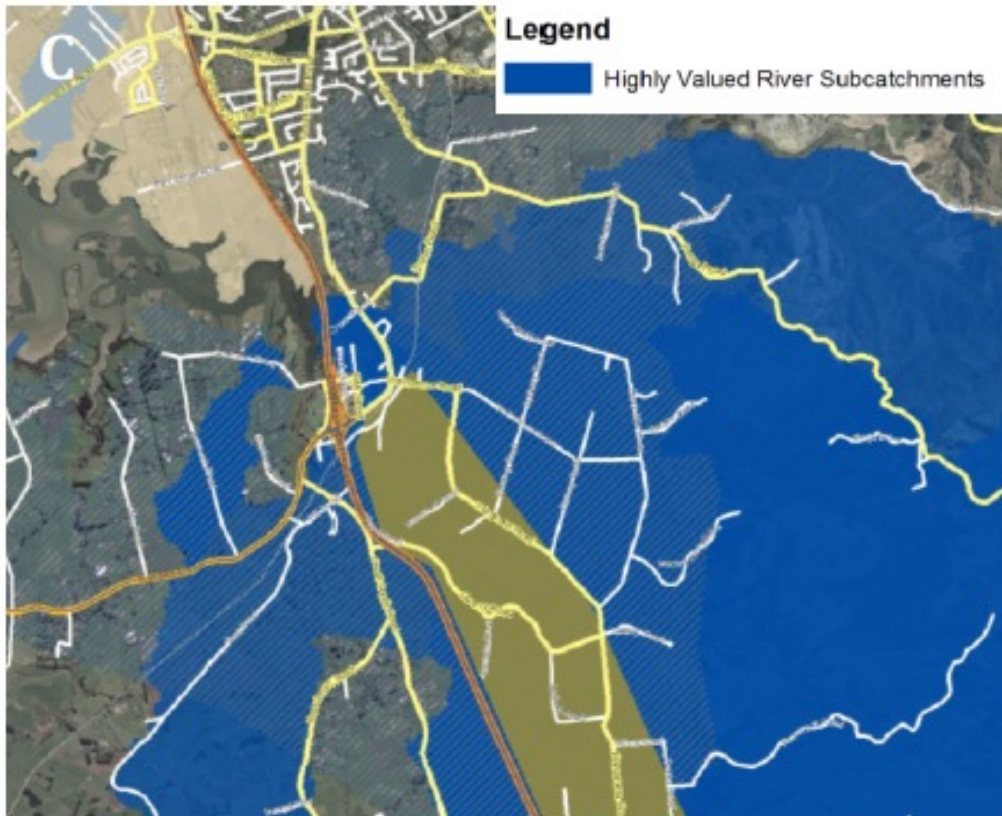


Figure 7: Drury residential A) Flood risk, historic and current wetlands, wetland management areas. B) Soil Erosion Risk. C) Highly valued river catchments.



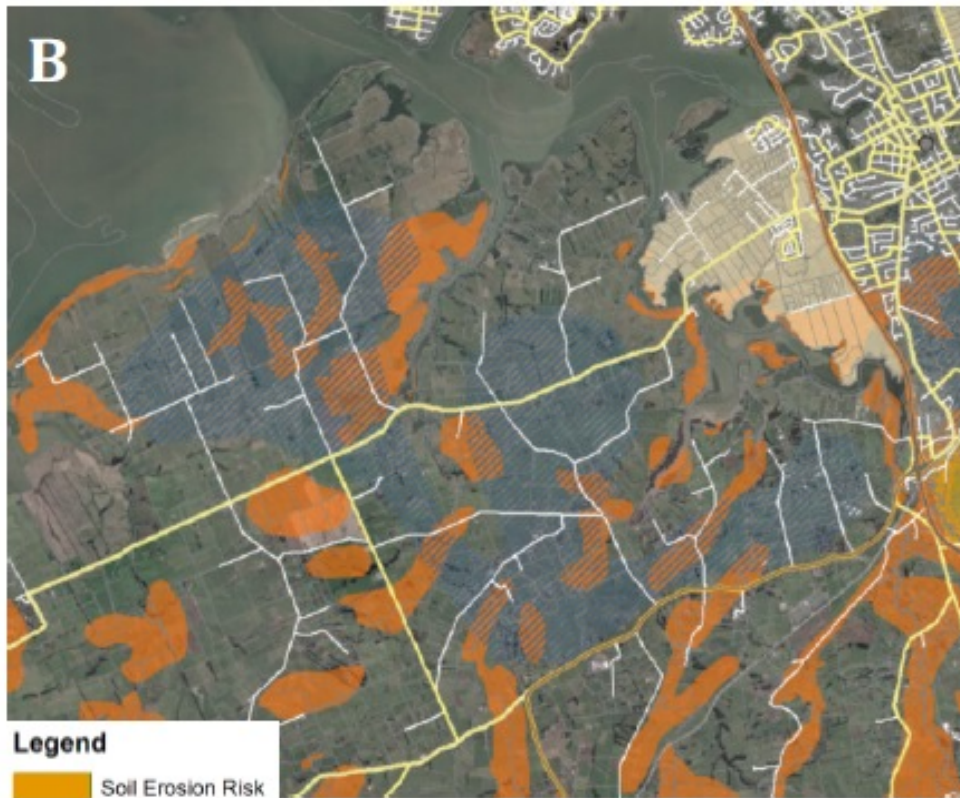


Figure 8: Karaka A) Flood risk, historic and current wetlands, wetland management areas. B) Soil Erosion Risk. C) Highly valued river catchments.

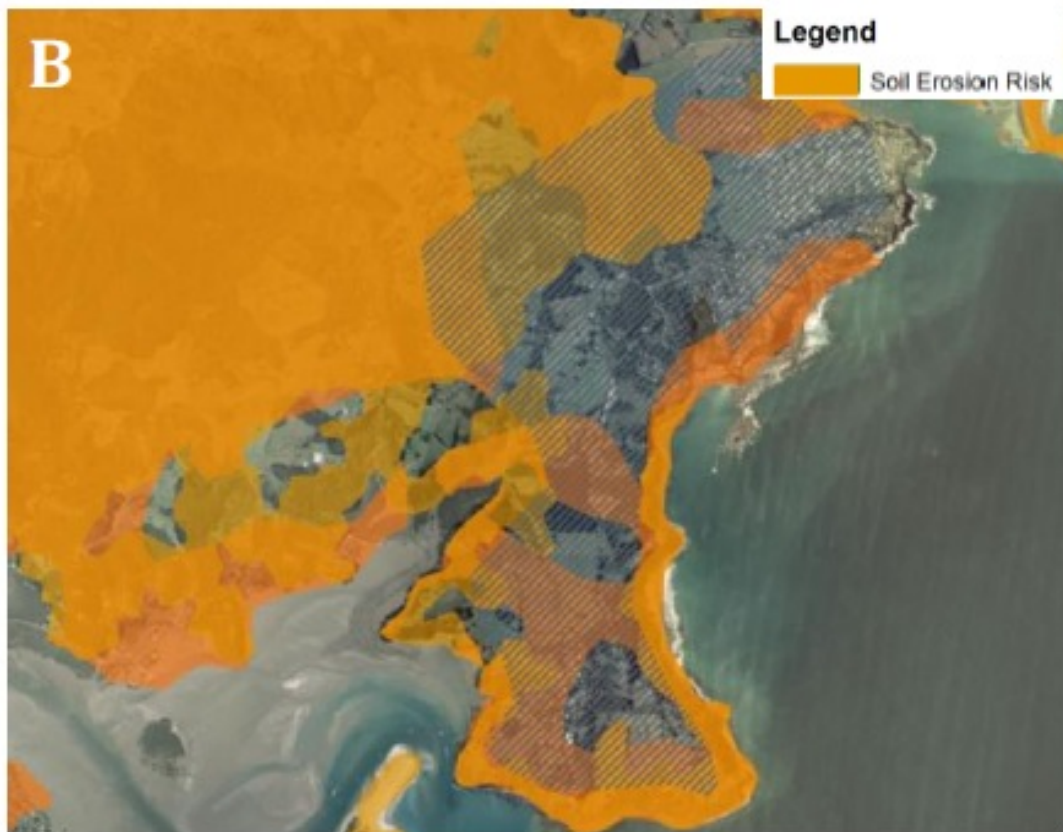
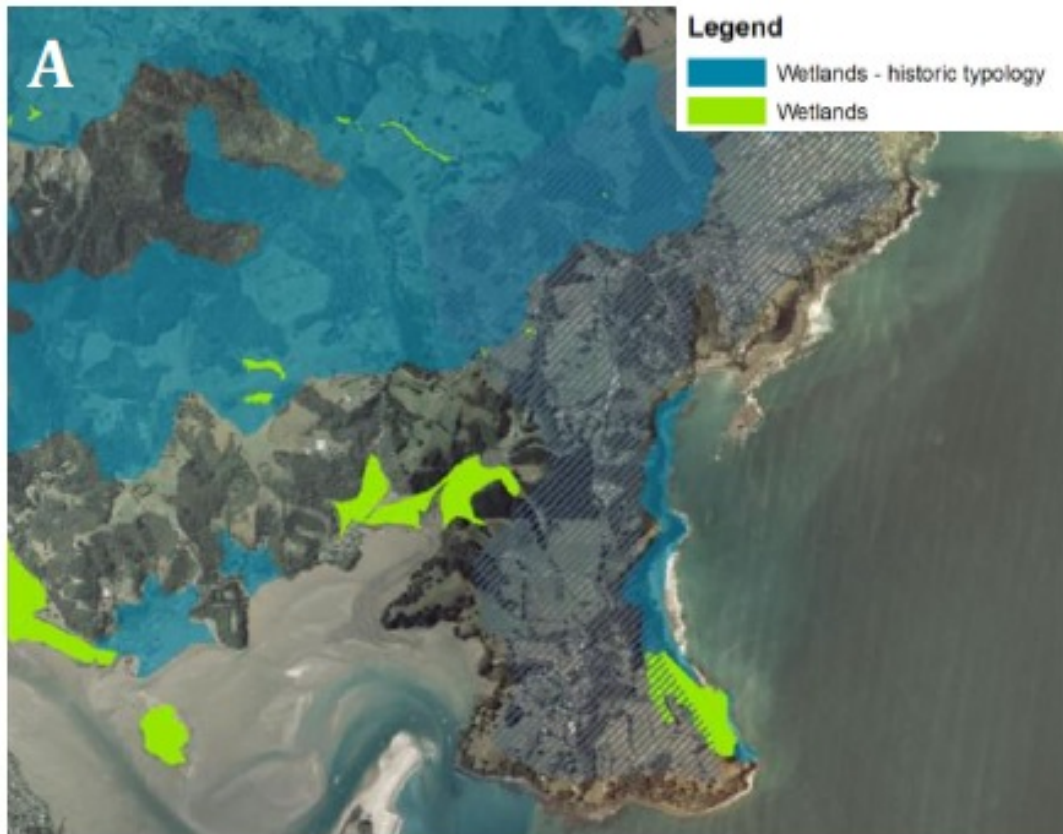


Figure 9: Leigh A) Historic and current wetlands. B) Soil erosion risk.

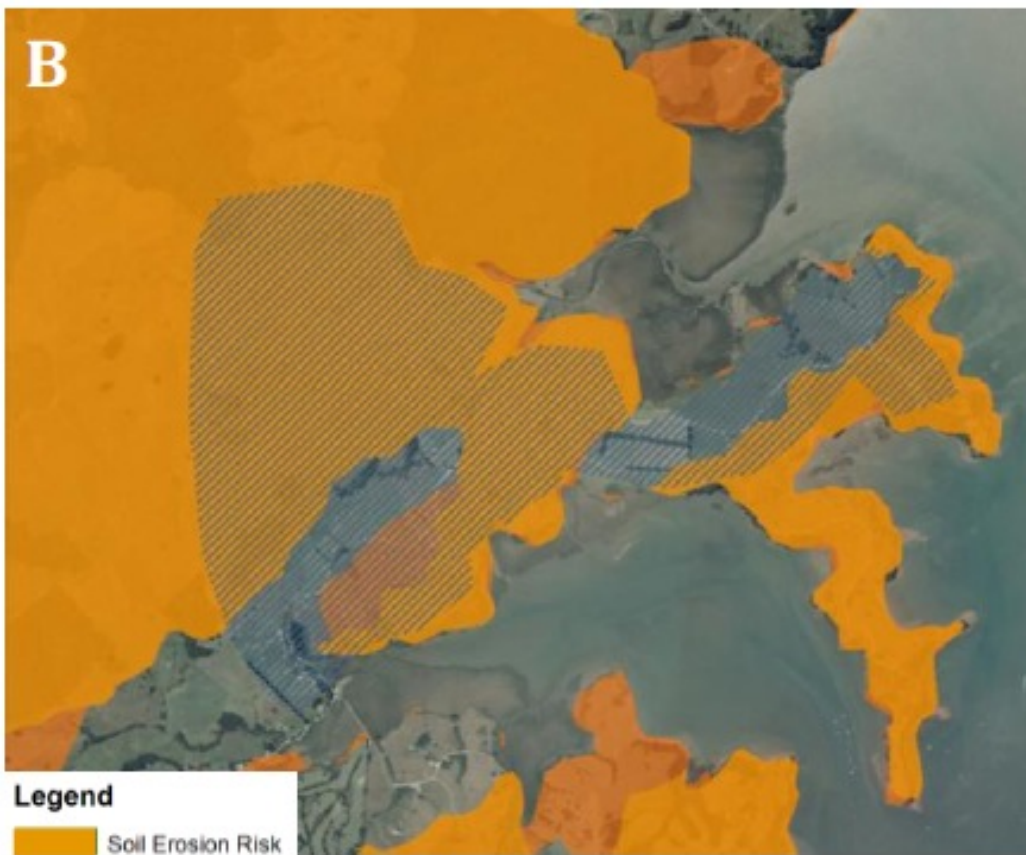
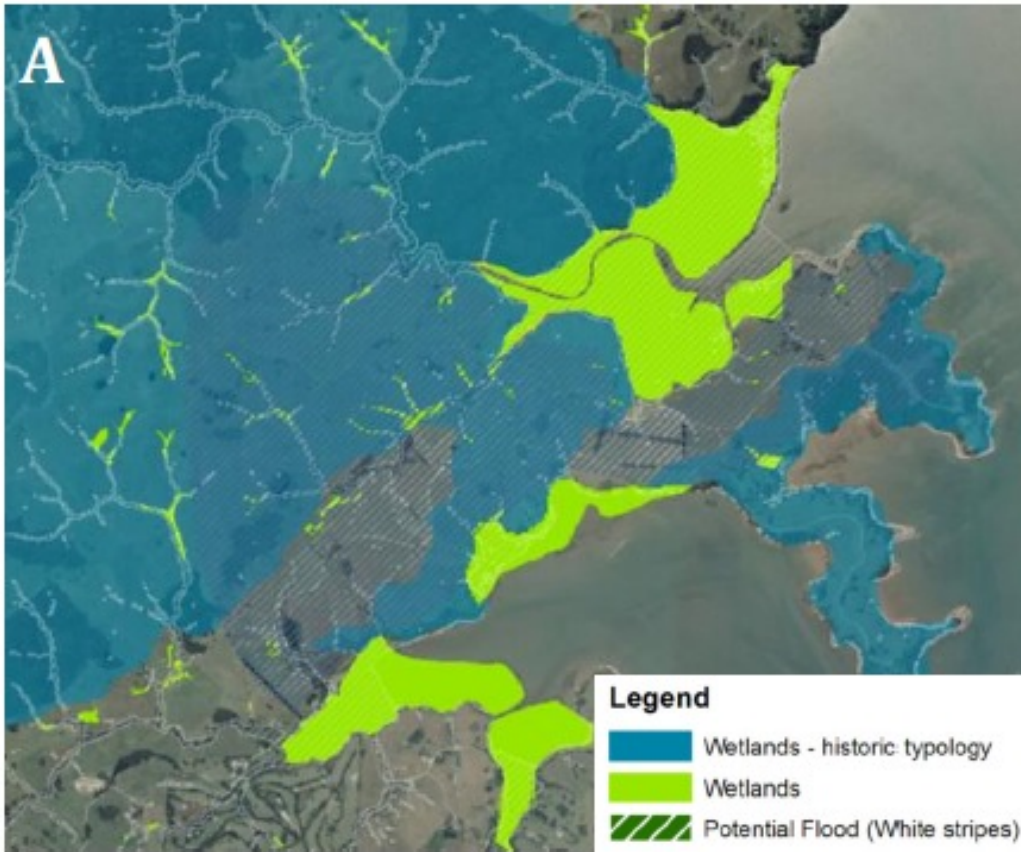






Figure 10: Mahurangi West expansion area A) Flood risk, historic and current wetlands. B) Soil erosion risk. C) Wetland catchments. D) Highly valued river catchments.

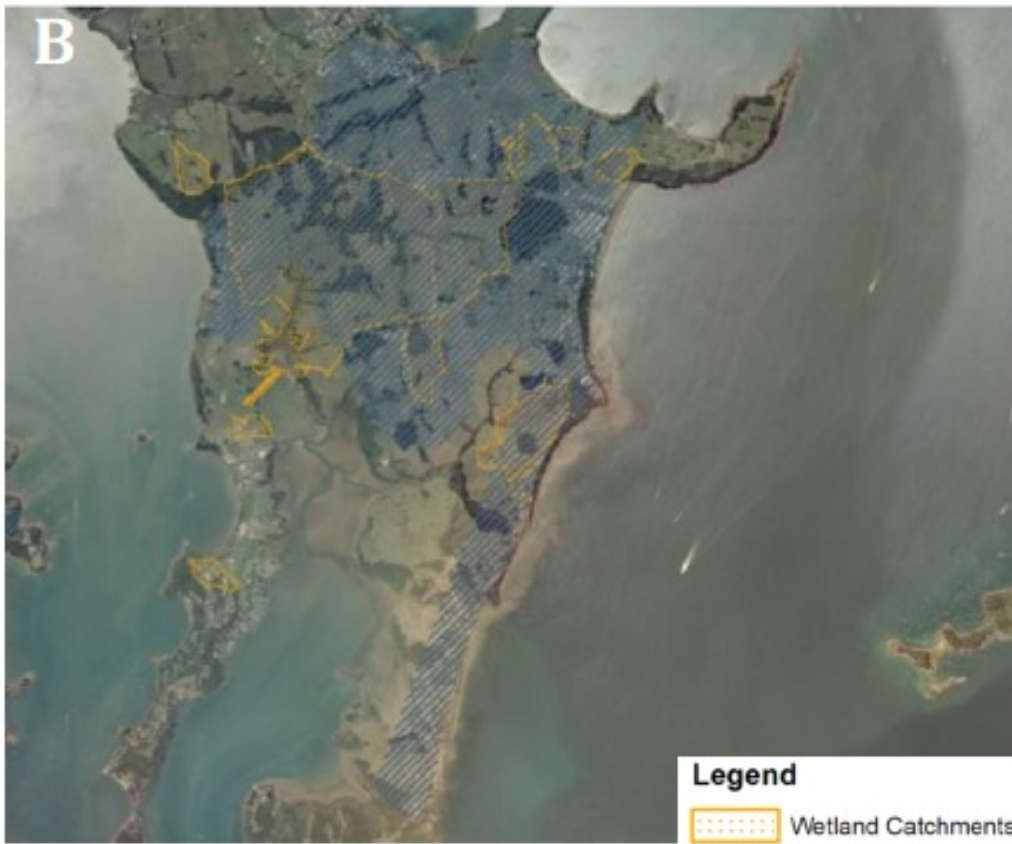
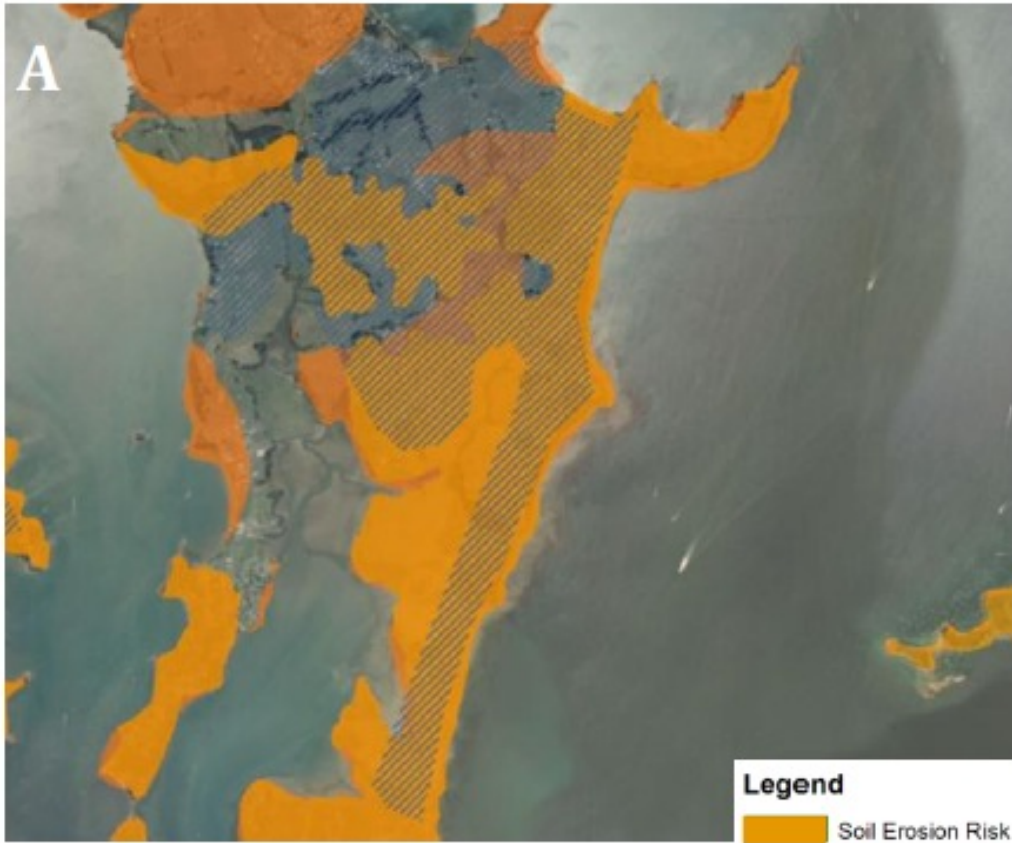
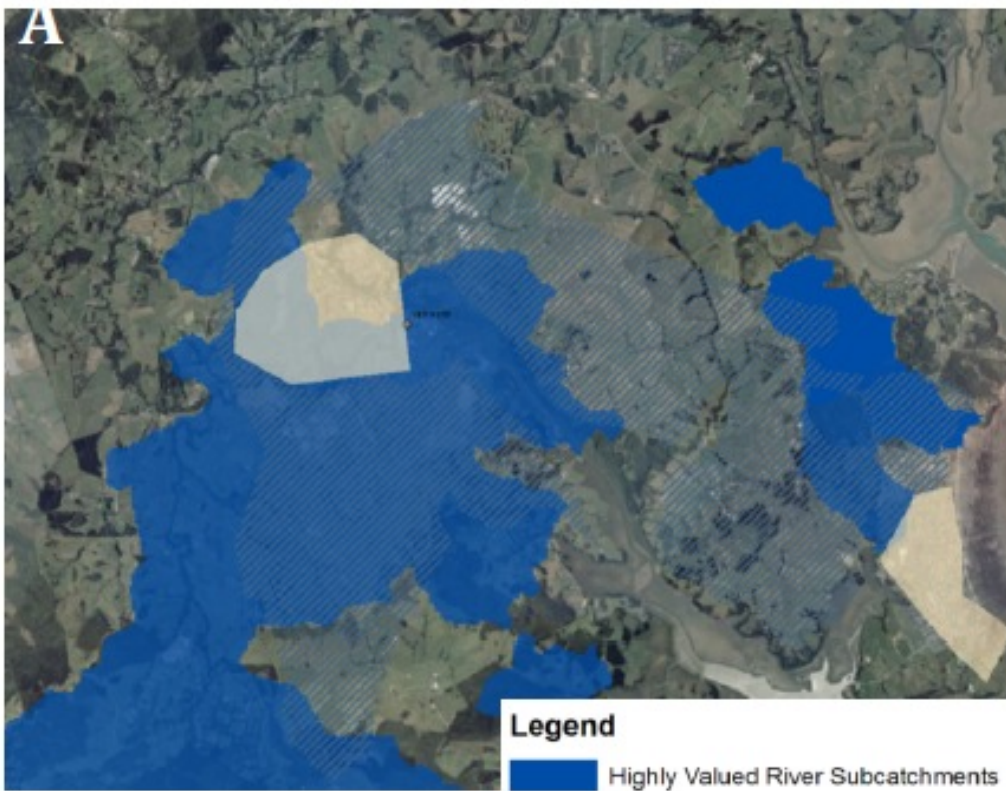




Figure 11: Martins Bay A) Historic and current wetlands. B) Wetland catchments. C) Highly valued river catchments.



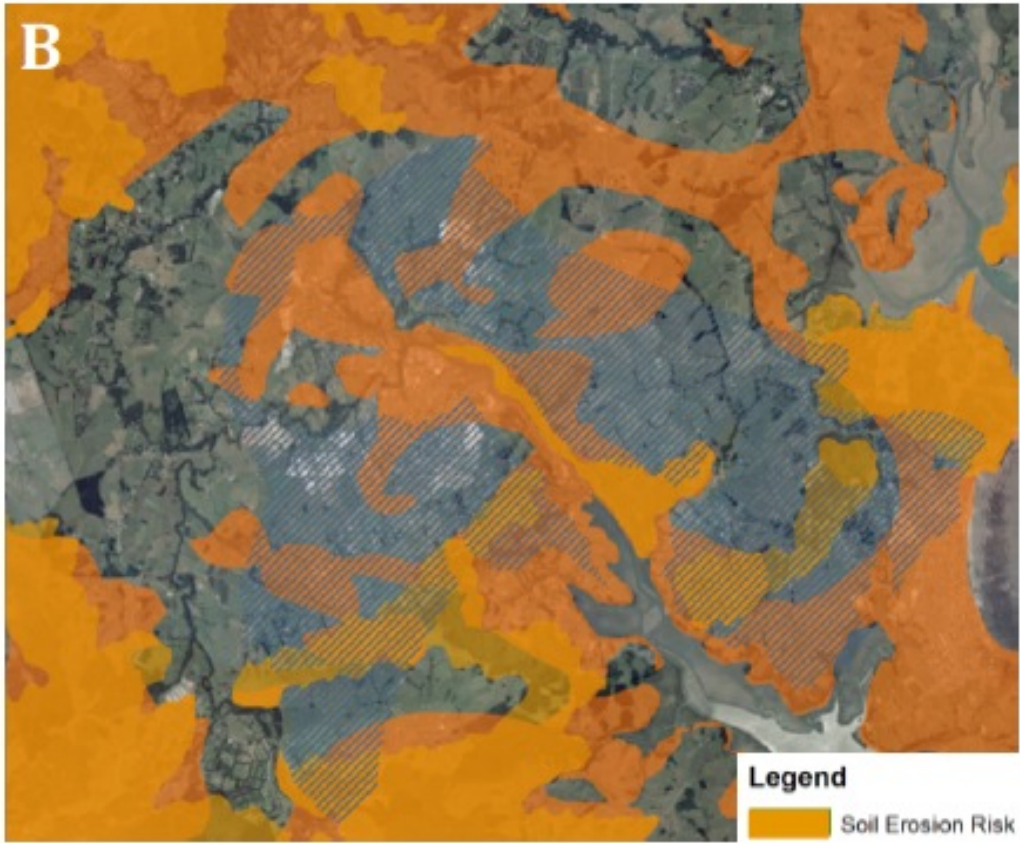
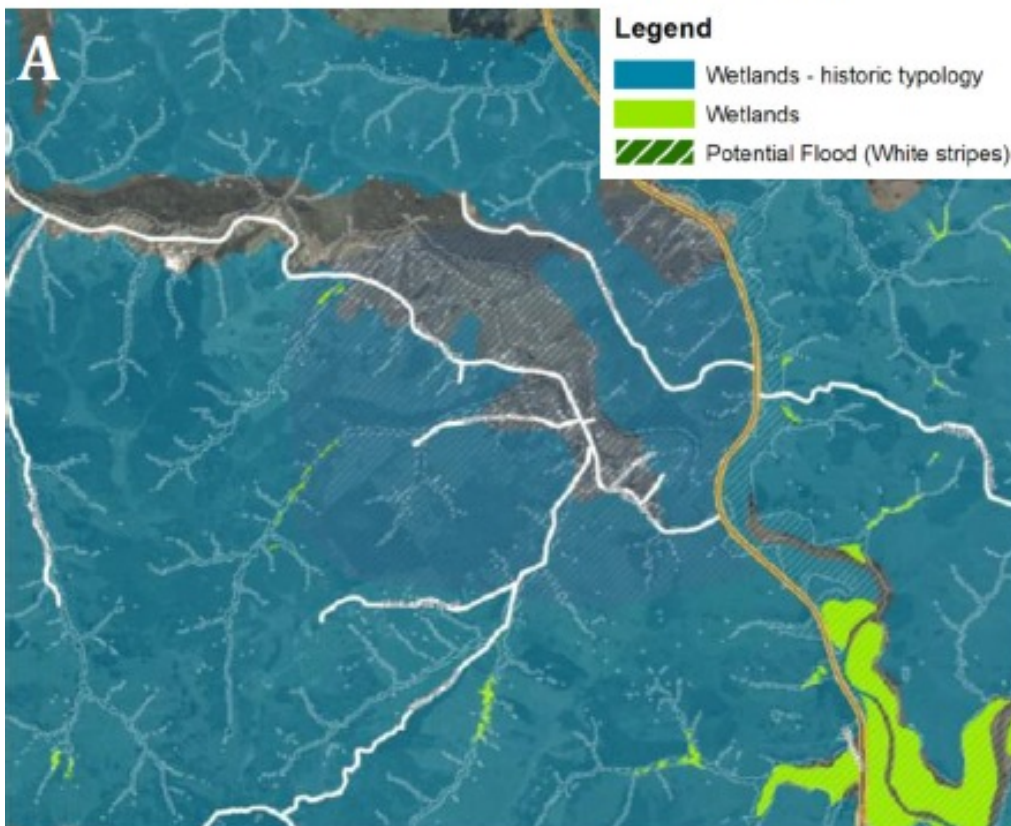


Figure 12: Northern Expansion area A) Highly valued river catchments. B) Soil erosion risk





Figure 13: Omaha A) Lake and Wetland Catchments. B) Soil erosion risk



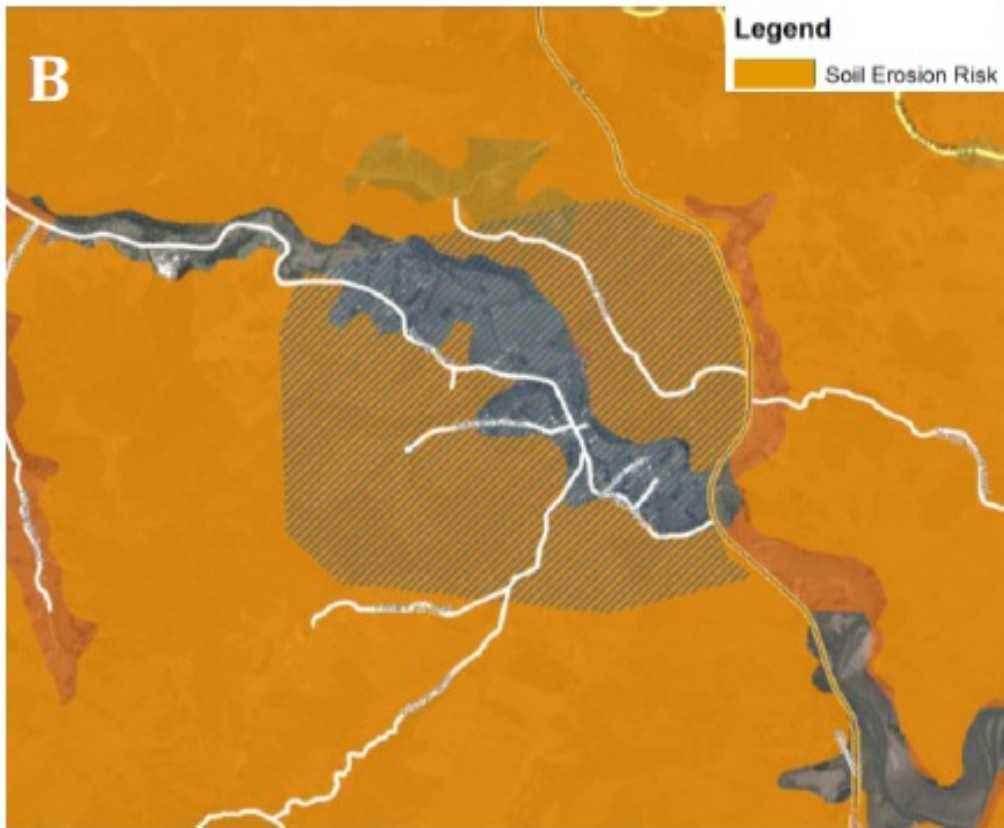


Figure 14: Puhoeh A) Flood risk, historic and current wetlands. B) Soil Erosion Risk.



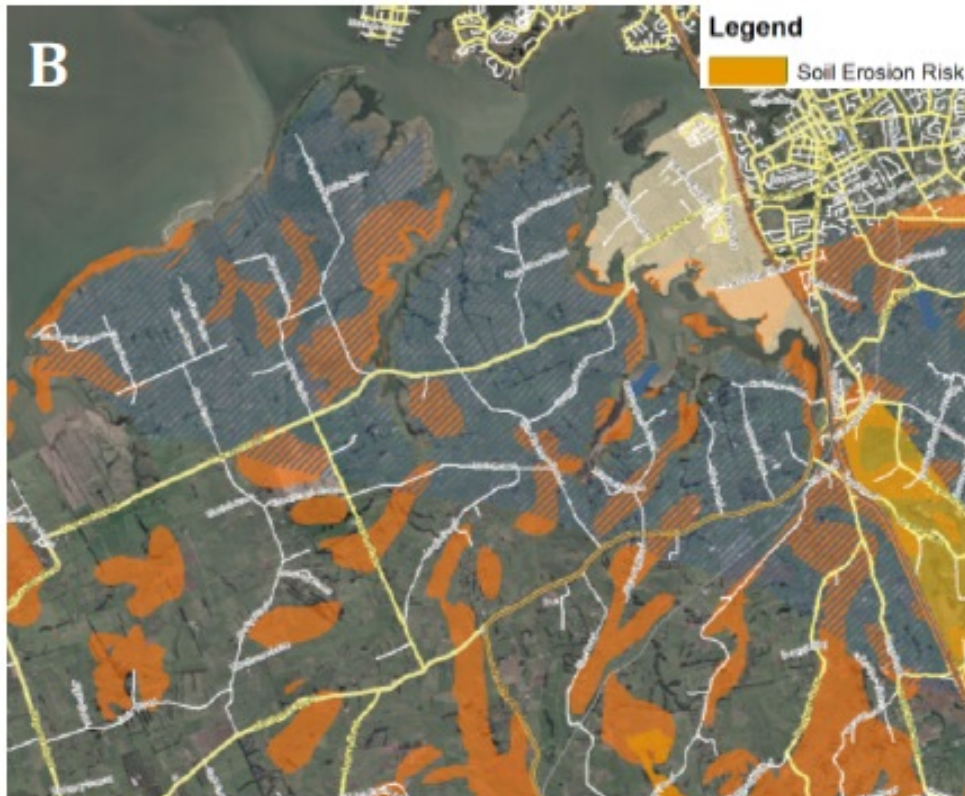
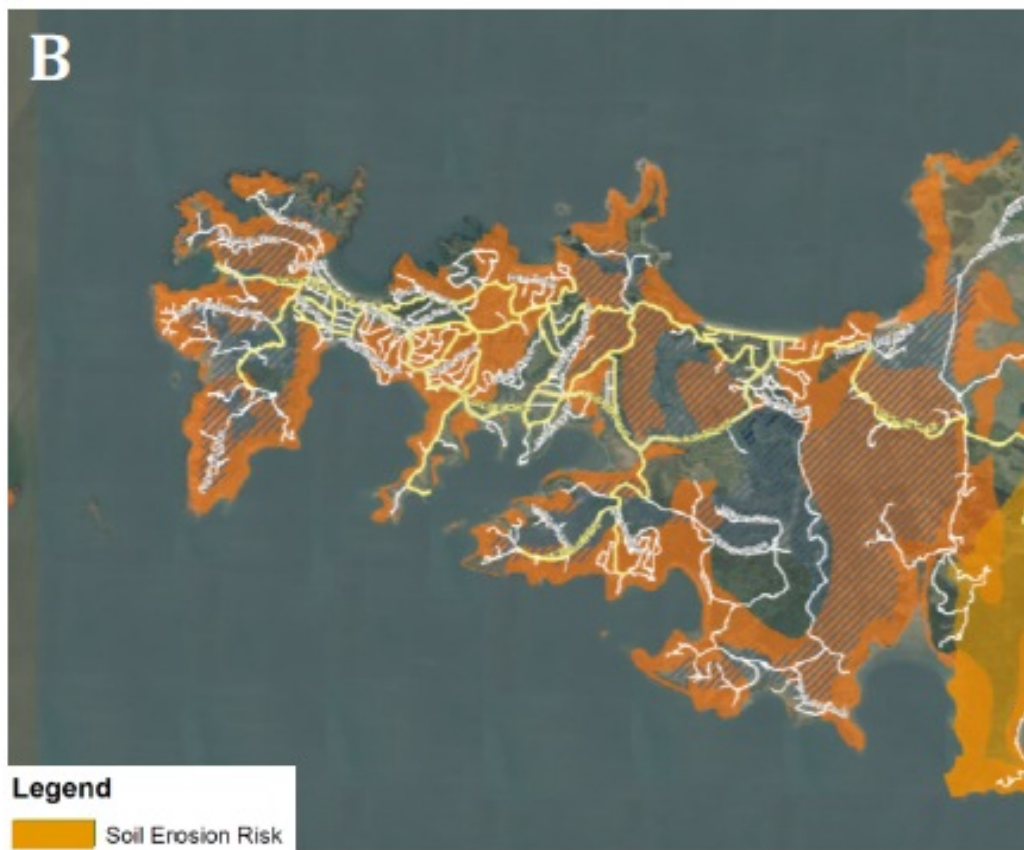
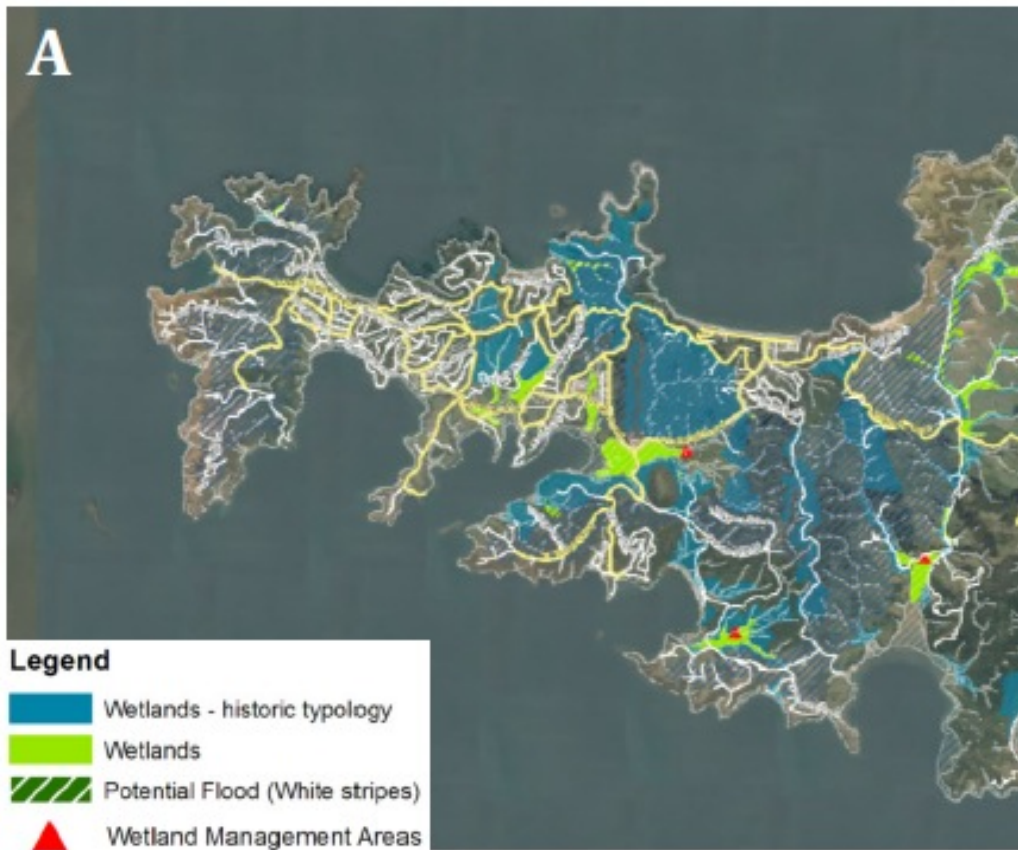


Figure 15: Karaka/Ramarama A) Flood risk, historic and current wetlands, wetland management areas. B) Soil Erosion Risk.



Figure 16: Takanini Stage 3 A) Historic and current wetlands.





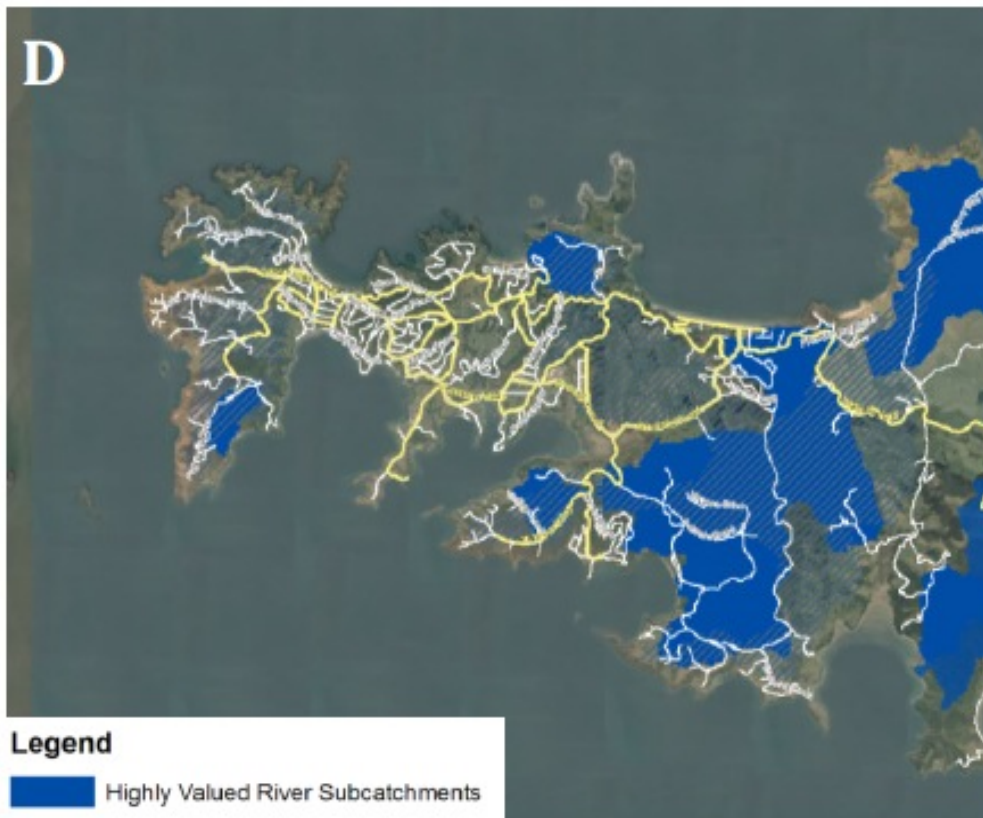
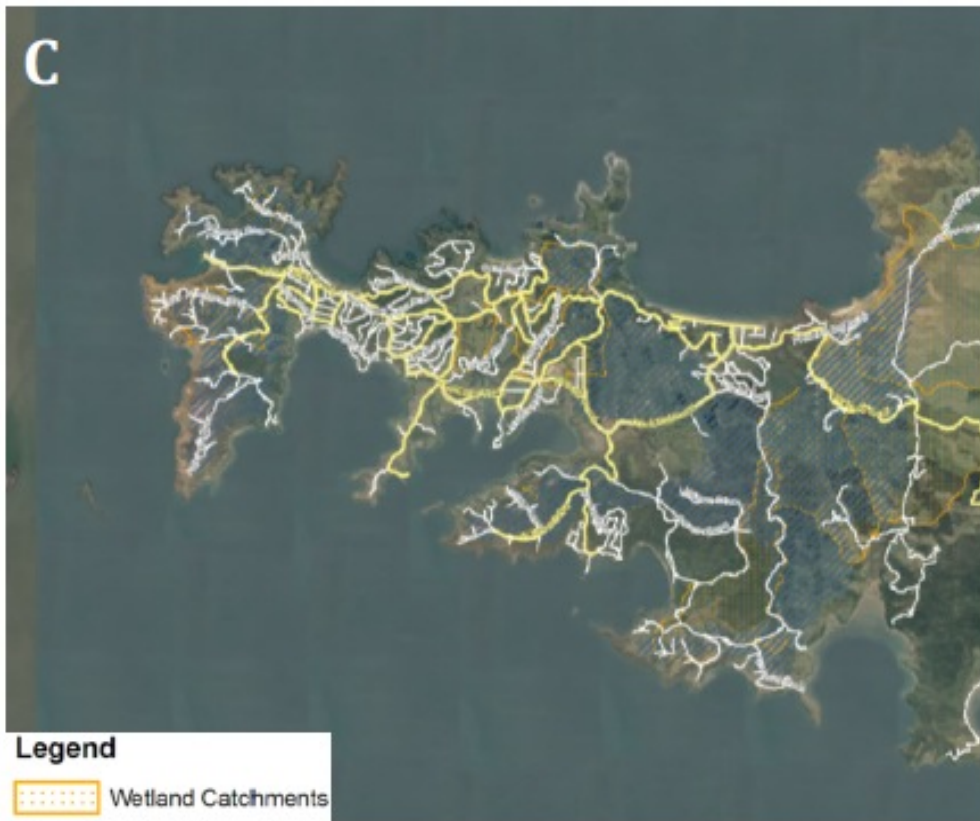
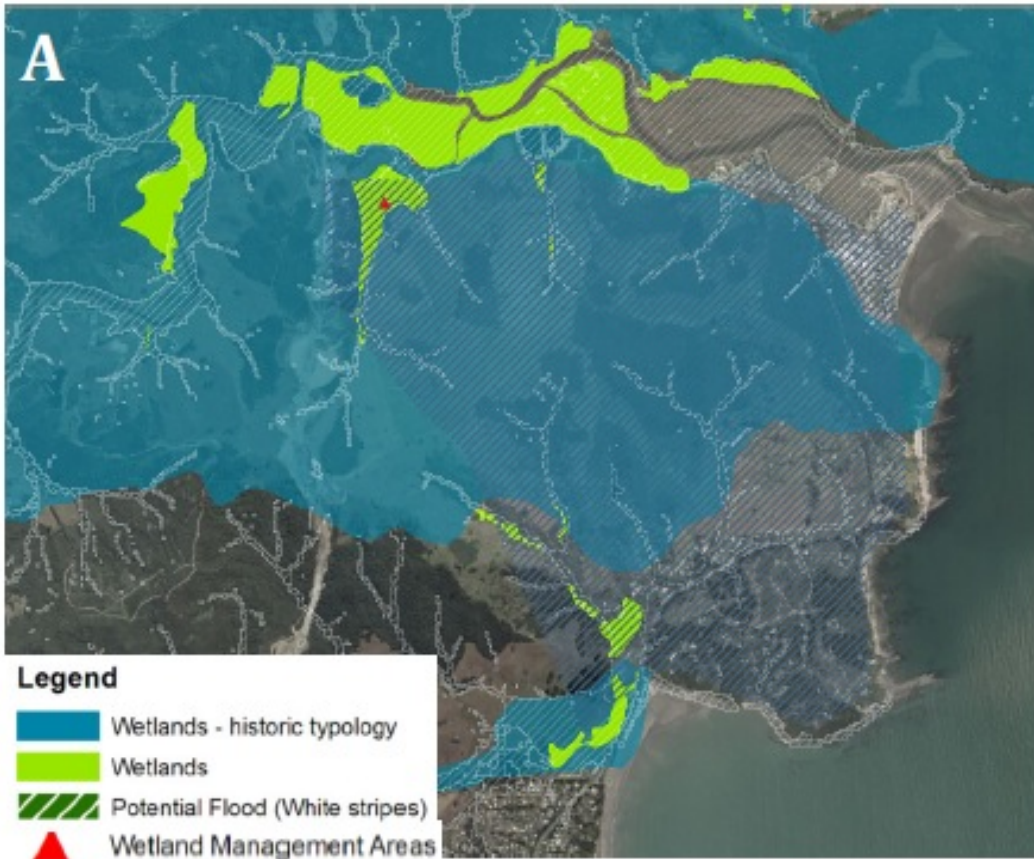


Figure 17: Waiheke A) Flood risk, historic and current wetlands, wetland management areas. B) Soil Erosion Risk. C) Wetland catchments. D) Highly valued river catchments.



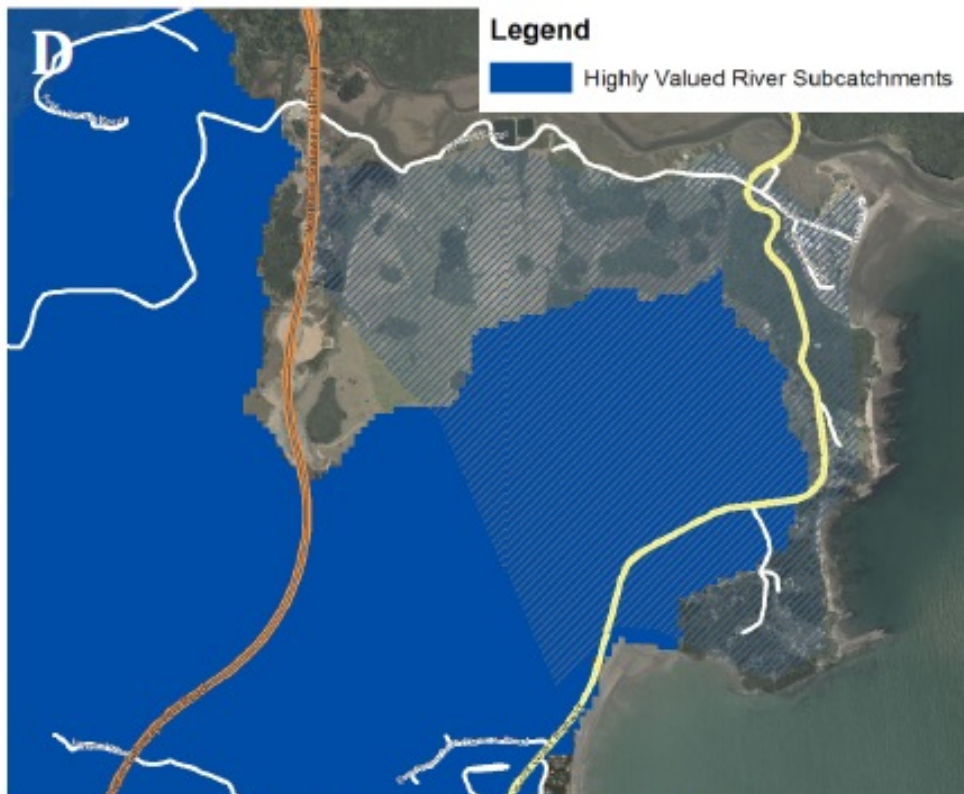


Figure 18: Waiwera A) Flood risk, historic and current wetlands, wetland management areas. B) Soil Erosion Risk. C) Lake and wetland catchments. D) Highly valued river catchments.

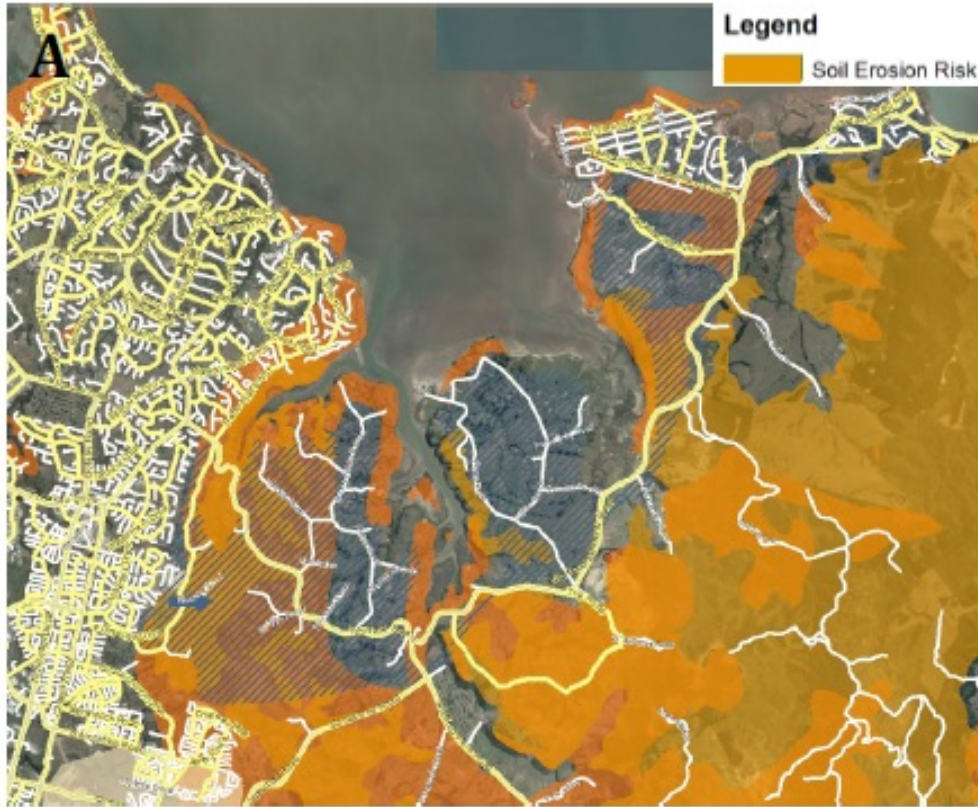


Figure 19: Whitford A) Soil Erosion Risk.

### Appendix 3: Summary of GIS analysis and calculation of ticks and crosses

#### Core Values

	Avoid	Remedy/Mitigate	Quality	Context
Mostly Green	10	7	4	3
Some not green	5	4	2	2
Average amber	0	0	0	0
Some red	-5	-3	-2	-2
Mostly red	-10	-7	-4	-3

#### Scenario B

	Avoid	Remedy/Mitigate	Quality	Context	Total
Helensville	-5	-7	2	-3	-13
Kumeu/Huapai	-5	-7	2	-3	-13
Pukekohe	-5	-3	-2	-3	-13
Warkworth	-10	-7	-2	-3	-22
Wellsford	-5	-7	2	0	-10
Wesley	-5	-7	2	-2	-12
Dairy Flat	-10	-7	2	2	-13
Whenuapai business	-10	-3	4	-2	-11
Drury	-10	-7	-2	2	-17
Airport stage II	0	0	0	0	0
Paerata business	-5	-3	0	-3	-11
Silverdale west business	-10	-7	-2	-2	-21
Drury residential	-10	-7	-4	-2	-23
Northwest expansion area	-10	-3	2	-2	-13
Flatbush	-5	-3	2	-2	-8
Karaka	-10	-3	-2	-3	-18
Albany	10	-3	2	-3	6

	Avoid	Remedy/Mitigate	Quality	Context
Mostly Green	10	7	4	3
Some not green	5	4	2	2
Average amber	0	0	0	0
Some red	-5	-3	-2	-2
Mostly red	-10	-7	-4	-3

## Scenario D

	Avoid	Remedy/Mitigate	Quality	Context	Total
Whenuapai business	-10	-7	0	0	-17
Drury	-10	-7	-2	2	-17
Airport stage II	-5	-3	-2	-2	-12
Paerata business	-5	-3	-2	-2	-12
Silverdale west business	-10	-7	-2	-3	-22
Brookby valley	-10	-7	-2	-3	-22
Dairy flat expansion area	-10	-7	-4	-3	-24
Drury residential	-10	-7	-4	-2	-23
Karaka/Ramarama residential	-10	-7	-2	-2	-21
Leigh expansion area	-5	-7	-2	0	-14
Mahurangi west expansion area	-10	-7	-2	2	-17
Martins bay	-5	-7	0	-2	-14
Northern expansion area	-10	-7	2	-3	-18
Northwest expansion area	-5	-3	2	-3	-9
Omaha expansion area	-10	-7	-2	0	-19
Puhoi residential	-5	-7	-4	0	-16
Takanini stage 3	-10	-3	-2	0	-15
Waiheke expansion zone	-10	-7	-4	-3	-24
Waiwera expansion zone	-10	-7	-2	-3	-22
Whitford beachlands	-10	-3	0	-2	-15

	Avoid	Remedy/Mitigate	Quality	Context
Mostly Green	10	7	4	3
Some not green	5	4	2	2
Average amber	0	0	0	0
Some red	-5	-3	-2	-2
Mostly red	-10	-7	-4	-3

## Summary

Senario B	Total	GIS Analysis Rating	Senario D	Total	
Helensville	-13	xx	Whenuapai business	-17	xx x
Kumeu/Huapai	-13	xx	Drury	-17	xx x
Pukekohe	-13	xx	Airport stage II	-12	xx
Warkworth	-22	xxx	Paerata business	-12	xx
Wellsford	-10	xx	Silverdale west business	-22	xx x
Wesley	-12	xx	Brookby valley	-22	xx x
Dairy Flat	-13	xx	Dairy flat expansion area	-24	xx x
Whenuapai business	-11	xx	Drury residential	-23	xx x
Drury	-17	xxx	Karaka/Ramarama residential	-21	xx x
Airport stage II	0	-	Leigh expansion area	-14	xx
Paerata business	-11	xx	Mahurangi west expansion area	-17	xx x
Silverdale west business	-21	xxx	Martins bay	-14	xx
Drury residential	-23	xxx	Northern expansion area	-18	xx x
Northwest expansion area	-13	xx	Northwest expansion area	-9	x
Flatbush	-8	x	Omaha expansion area	-19	xx x
Karaka	-18	xxx	Puhoi residential	-16	xx
Albany	6	ü	Takanini stage 3	-15	xx
			Waiheke expansion zone	-24	xx x
			Waiwera expansion zone	-22	xx x
			Whitford beachlands	-15	xx

üüü	17-25
üü	10-17
ü	3-10
-	-2-3
x	-3-10
xx	-10-17
xxx	-17-25

## 2.3 Identify, protect and enhance terrestrial ecosystems

### Scenario Score Summary

Natural heritage – which includes biodiversity (including species, habitats, and ecosystem process), landscape, landform, geology and geological features and natural character. These in part overlap with open space issues.

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Identify, protect and enhance terrestrial ecosystems</b>	✓	XX	✓	XXX

### Key Comments:

- As a general approach, a compact city growth model is better for natural heritage than any expansionist model, as this will tend to minimise the impact on natural heritage resources in rural environments.
- However, there are key natural heritage features in existing urban areas that should be protected, enhanced and celebrated as key determiners of urban character and quality.
- In most situations, the nature and quality of new development can significantly affect the long term effects on natural heritage. If protection and enhancement of natural heritage a starting point, then the outcomes will be better. All new development should be within such a framework. However, if natural heritage is seen only as a constraint and its values something to be ‘balanced’ against other aspirations then outcomes will be ‘business as usual’, which is natural heritage decline.
- If the southern shores of the Manukau (Hingaia to Kingseat and beyond) are identified for future urban, then it is very important that this development supports the critical sea bird habitat values in this area through generous setbacks, and continued screening at key sites.
- Places that should be seen as ‘no go’ areas because of the potential for highly significant natural heritage resources (including biodiversity, landscape and natural character) to be damaged or destroyed include:
  - The northern eastern beaches (Omaha expansion, Leigh expansion, Mahurangi East expansion)
  - The Waitakere Ranges Heritage Area, except that there is capacity for appropriate rural activities, mainly in the eastern foothills, to support rural character and the rural economy.
  - The HGI – these are not appropriate for further urban development, outside of the existing urban environments on Waiheke Island.
- Scenarios ‘B’ and ‘C’, although with less urban expansion than ‘D’, do envisage a type of intensification that could undermine existing natural heritage values in urban areas, with a consequent degradation of urban quality and character. Important that existing urban vistas – especially to and between the volcanic cones, need to be strongly protected.

### Measures for Assessment:

Location relative to significant geological sites; location and nature of development relative to outstanding natural landscapes; location and impact of development relative to priority sites for management; location & impact of development related to scheduled sites in council plans; location

Auckland Plan Scenarios Evaluation Workstream

Attachment 1, September 2011



and impact of development relative to threatened species habitats; location, impact and nature of development relative to ecotones, sequences and corridors; location of development relative to key community projects.

**Current Situation:**

Decline of biodiversity and the cumulative loss of natural heritage. Essentially people/development in conflict with natural heritage values and the spread and the development of Auckland to date has had adverse impacts on the environment which are in the main continuing to decline except in a few intensively managed areas. Growing expectation in the community that natural areas will be protected and enhanced, including in urban areas.

**Assumptions:**

In all scenarios we expect that existing values will be protected and enhanced. We expect no loss of significant sites and values, no insensitive development that adversely affect landscape values, that ridgeline development does not impact on views etc. Everywhere development is proposed in Auckland will have environmental constraints, and as a result Natural Heritage protection and restoration can be done everywhere to some degree. It is very difficult to comment on NH matters at a scale of the maps presented to us. Opportunities to enhance NH should be taken with every choice, and positive outcomes should be expected for existing areas and values with features. All scenarios envisage infill, and this should be predicated on protection of those places with high natural character, or with features and areas with natural values.

The underlying character of the land has not been used in these models and thus qualities and character which will result in how any of this is done it yet to be determined.

The spatial aspects of biodiversity are complex – biodiversity can be anywhere from threatened species in urban drains (e.g. a moss) to threatened international migratory birds roosting on the Manukau foreshore.

**Scenario A**

**Discussion**

We understand this to be the “business as usual” model reflecting ARPS change 6. The opportunities with this model are to use better more sustainable development principles to ensure intensification can enhance the values remaining in the urban area. Change 6 places emphasis on achieving intensification/compact urban form AND the protection and enhancement of natural heritage, including through the use of comprehensive development plans (structure plans/concept plans) and this approach is supported as appropriate for natural heritage..

Containing increase in density to existing areas limits impacts, generally, to natural character in terms of reducing impacts of expansion but intensification will also put pressure on local biodiversity and will need tight development controls e.g. for improvements to water quality and lower sedimentation. View-shafts e.g. to cones and islands will have to be managed and a clear emphasis placed on their protection.

**SCORE:** ✓ (dependent on Change 6 approach to protection of heritage AND accommodation of growth being used)

**Policy Issues/Implementation**

Challenge to retain liveability with increasing density. Natural Heritage is a component of liveability (experience, views and access of nature). Can these locations absorb density without affecting liveability? Challenge to increase public open space in this model within the MUL but options to improve this in regional sense and lack of expansion protects these regional parks from adverse impacts of intensification.

### **Greenfields**

No additional greenfields for this scenario, only those already identified Future Urban Areas. However, please make any commentary on the repercussions/benefits of providing no additional Greenfield areas.

Compared to "greenfields" e.g. rural land, natural habitats (such as forests, saltmarsh) that have never been developed—brownfields offer a more sustainable land development choice. [With the caveat that some brownfield sites do have high biodiversity value and some greenfield sites e.g. a dairy farm could be very low. However greenfield is more likely to be restored to a functioning system more than brownfields.]

**Greenfield Score:** ✓✓

### **Scenario B**

#### **Discussion**

This model suggests intensification in areas with high amenity as they are "market attractive". When this amenity is explicitly "natural" e.g. the coast, the bush, water etc this could put pressure on these values of that amenity which erodes their values – the reason it is market attractive. Intensification should not be "into" areas with existing natural character (e.g. forested parts of the Upper Waitemata and Titirangi), or in places which degrade existing urban vistas e.g. volcanic viewshafts.

People will also want pets such as cats which hunt native wildlife. Nationally threatened species such as Auckland Green geckoes live in Auckland resident's backyards and are likely to be in decline due to predation. More houses around these sites increases this pressure. Councils and communities would have to do pest control in this area using traps and poisons which can impact on the welfare of pets and create public concern.

The Council could be thinking about how to make less market attractive places into market attractive (e.g. if there is no park there now – establishing one); or by subsidies or other amenities which are not "natural" e.g. communities centres, exceptional urban design, efficient reliable transport etc.

More expansion is unlikely to take pressure off the natural heritage values of non-market-attractive areas as these places are already affected by pressures such as animal and plant pests, and incremental loss.

**SCORE: XX**

#### **Policy Issues/Implementation**

Natural market attractive amenity would need effective buffers (distance, restoration of forest, pest control, cat-free subdivision etc); development would have to be significantly more sustainable than it is now (e.g. using LIUDD) and recognising landscape principles e.g. by recognising the "amenity" has a larger landscape context. Landscape principles acknowledge that core areas of natural heritage value need to be buffered, linked and be supported by sustainable land use practice. This would include taking up opportunities to support restoration initiatives such as Project Twinstreams and NW wildlink.

Intensifying development at the coast has high environmental risks in terms of natural character of the coast, sedimentation, pollution etc

Satellites		Score
Helensville	Impacts downstream in the Kaipara, an internationally significant harbour with high biodiversity values e.g. seabirds	x
Kumeu/Huapai	[no particular impacts against the criteria being used here, but known issues with sediment impacts on Kaipara]	0
Pukekohe		0
Warkworth	Harbour impacts in Mahurangi	x
Wellsford		0
Wesley (new town)	Parts of this area is classified as LENZ <sup>8</sup> level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection.	x
Dairy Flat (new town)		0
Group 1 Industrial Greenfields		Score
Whenuapai Business	Upper harbour – impacts in terms of water quality/harbour sedimentation and effects on indigenous ecosystems. Almost all of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	xx
Drury Business	Landscape values (ONL)	x
Airport Stage 2	High geological values – stonefields, high biodiversity values e.g. birds	xx
Paerata Business	Almost all of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	x
Silverdale West Business		0
Residential Expansion Areas		Score
Brookby Valley	Harbour impacts	xx
Drury Residential	Volcanic landscape, open space, rural character	x
Northwest Expansion Area	Soils, impacts on upper harbour	xxx

## Scenario C

### Discussion

This model intensifies urban development everywhere urban development is now.

**SCORE:** ✓

### Policy Issues/Implementation

Ensure all existing values are protected and enhanced despite intensification. Restrictions required in terms of sightlines e.g. of volcanic cones as intensification implies high rise development would be necessary, and to protect existing natural areas.

<sup>8</sup> Land Environments NZ

## Greenfields

No Additional Greenfields for this Scenario, only those already identified Future Urban Areas. However, please make any commentary on the repercussions/benefits of providing no additional Greenfield areas.

Re-developing existing developed area in a more intelligent way in terms of space and land use is a more sustainable environmental option (most of the time) than "greenfields" e.g. rural land, natural habitats e.g. forests etc that have never been developed. However, possible that a more dispersed infill model will put extra pressure on those places with natural heritage values currently supported by larger urban lot sizes and other regulatory responses.

**Greenfields Score** ✓

## Scenario D

### Discussion

Coastal development in northern villages (Leigh, Omaha etc) is not preferred from a NH perspective. There are high biodiversity values including a marine reserve, several regional parks, islands, threatened plants and animals in these areas which are highly sensitive to pressure from development.

Significant increased urban development directly adjacent to the Manukau Harbour, which has significant ecological values for Maui dolphin and numerous international and local shorebirds. Development will impact on water quality and therefore habitat quality for these birds. It will also remove roosting sites and increase predator pressure.

**SCORE: XXX**

### Policy Issues/Implementation

Environmental issues high with greenfield development. Brownfields development would be more in-line with an eco-city approach and would ease pressure on Auckland's unique natural heritage.

## Greenfields

Group 1 Industrial Greenfields		Score
Whenuapai Business	Harbour impacts	X
Drury Business	Potential for eastern part of this development to impact on a regionally significant ecological area (although is partly protected by QEII covenant).	XX
Airport Stage 2	Stonefields – high natural heritage volcanic landscape, threatened plants, bird roosting and feeding, impacts on harbour. Much of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	X
Paerata Business	Almost all of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	X
Silverdale West Business		0
Residential Expansion Areas		Score

Brookby Valley		0
Dairy Flat Expansion Area	Significant potential for loss of locally and regionally significant ecological areas	Xx
Drury Residential	Almost all of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	X
Karaka Residential	High natural heritage values as bird roosting. . Almost all of this area is classified as LENZ level 4 which is <b>Would need wide buffers and limits on public access (e.g. dog walking), household pets etc</b> a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	XX
Leigh Expansion Area	Natural character of coast, adjacent to marine reserve (water quality essential), increased pressure on northern remote beaches (Pakiri/Te Arai) which have internationally significant biodiversity values e.g. fairy terns.	XXX
Mahurangi East Expansion Area	Impacts on Mahurangi Harbour– increase in sedimentation likely to have adverse effects on the marine ecosystem.	XXX
Martins Bay	Coastal natural character, proximity to parks and islands (pest & weed pressure)	XXX
Northern Expansion Area	Presume this means the harbour villages – and these are inappropriate for more development because of high natural heritage values e.g. the more remote the beaches for example the higher the biodiversity values.	XXX
Northwest Expansion Area		0
Omaha Expansion Area	Dunes and wetlands, proximity to Tawharanui Regional Park, natural character.	xxx
Puhoi Residential	Harbour impacts	xx
Ramarama Residential	Almost all of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	x
Takanini Stage 3	Most of this area is classified as LENZ level 4 which is a land classification system to indicate potential high ecological values. This means that any natural remaining vegetation in these areas is a national priority for protection (draft biodiversity NPS).	x
Waiheke Expansion Zone	Offshore island with less predators and therefore higher natural values, part of an interconnected habitat for birds	xxx
Waiwera Expansion Area	Proximity for regional parks	xx
Whitford Beachlands	Sea-bird roosting and feeding in estuary – development reduces water quality (habitat) and increases predator pressure.	xxx

### Additional Information

- This feedback was not prepared using GIS spatial layers. A more comprehensive analysis would be possible, with time and GIS input, by using overlays with your model maps with existing GIS information.
- Biodiversity is in decline and serious re-thinking of the way we have developed Auckland and where is required to address this.
- An eco-city approach needs to be grounded in environmental and ecological constraints and opportunities. The environment supports us and our lifestyles and perception of liveability.

How these proposed areas for development impact on natural heritage now and next in these scenarios should be the basis for modelling how many and where people go in this city

- Functioning ecosystems are the key to healthy landscapes and every part of the landscape has a role to play. The Core-buffer-linkage-matrix model where many protected cores, well buffered, with linkages to other cores sitting in a matrix of sustainable landuses & actions which support ecological function is required to support biodiversity.
- Green belts – essentially if used as a rural zone there is potential for this to be an MUL by another name. A green belt would be useful if it were a tool to:
  - Prevent unrestricted development or “expansion”
  - Act as a buffer to high value natural areas such as regional parks
  - Preserve natural and rural character
  - To promote brownfield development as a preference
- To ensure there is no further loss, and ideally an increase, in Auckland’s natural heritage we need:
  1. To use the environment and irreplaceable natural heritage values as a basis for if and where the city expands – and what type of development goes where.
  2. To input biodiversity and ecological information at the right time – before it is decided to spread to these places they should be assessed in detail.
  3. To protect key ecological sites including national priorities – dunes, wetlands, habitats of threatened species and threatened lowland sites (LENZ level IV). Can the model be tested with these maps – we have the data.
  4. Landscape level analysis – wider environmental effects of these models are not tested – and what the land is should inform what is put there. Core-buffer-linkage-matrix model – all parts of the landscape have a role to play.
  5. Green Infrastructure – the way we build infrastructure needs to be current best practice – e.g. LIUDD - green roofs etc. Development needs to address on-site rain water retention and treatment if we are to protect our marine area – a large part of Auckland’s natural character and natural value.
  6. Protect and enhance biodiversity wherever it occurs/ retain existing habitats
  7. Incorporate new biodiversity features: The design of new development on should incorporate new habitats and features of value through innovative habitat creation within landscaping and built structures (such as living roofs and green walls). Mitigation/off-setting.

## 2.4 Avoidance of hazards

### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
<b>Avoidance of existing hazards</b>	<b>X</b>	<b>XX</b>	<b>X</b>	<b>XX</b>
<b>Avoidance of new hazards</b>	<b>0</b>	<b>X</b>	<b>0</b>	<b>XX</b>
<b>Exposure to existing hazards</b>	<b>XX</b>	<b>X</b>	<b>XX</b>	<b>X</b>

### Key comments

- Intensification of development within the current urban limits will increase vulnerability, particularly for low frequency hazard events. For example, in an earthquake people living in high rise buildings will be more vulnerable than those in low level structures.
- The expansive scenarios (B and D) will disperse risk from both low frequency hazard events and localised frequent events (e.g. flooding).
- Greenfield developments provide greater opportunities for best practice mitigation techniques (e.g. low impact design). Opportunities are less likely when intensifying growth within the current urban limits.
- Expansion north of Auckland will increase risk due to increased exposure of people and property to land instability and coastal hazards.
- Expansion south of Auckland will increase risk due to increased exposure of people and property to earthquake hazards (liquefaction and fault rupture) and flooding in low lying areas.
- Dispersion of people and property decreases vulnerability in regard to regionally significant infrastructure as it allows for greater spatial separation (increased redundancy capacity).

### Measures for assessment

This evaluation examined a number of natural hazards in the Auckland Region (flooding, land instability, coastal erosion, coastal inundation, earthquake, volcanism and drought). When assessing the scenarios the level of risk posed by each of these hazards contributed to the overall score. The effects of climate change on some natural hazards were taken into account when assessing the level of risk. The greater the risk to people and property, the lower the score (note: greater number of crosses = lower score).

### Current Situation

Significant areas of Auckland's urban and rural land are at risk to natural hazards which can occur with varying severity, at various locations and at any time. The Auckland region is exposed to a wide range of natural hazards, with the most frequent hazards being flooding and land instability. People and property are also particularly susceptible to coastal hazards due to extensive development along Auckland's coastline. Hazards arising from coastal processes include erosion, inundation of low lying areas, land instability and tsunamis. Coastal hazards in the Auckland region are further complicated by the uncertainty of climate change which may change the frequency and intensity of events. Less frequently occurring natural hazards include earthquakes, volcanism, tsunamis, various meteorological effects (cyclones, tornadoes, and drought) and wildfire. Although of a low occurrence the consequences of such events could impact large areas of the region. The uncertainty of these events makes the reduction of risk through land use planning difficult. Potential impacts are

currently dealt with by contingency controls such as Civil Defence and Emergency Management and insurance mechanisms. Natural hazards act as an environmental constraint to the future development of the Auckland region and if the goals of the Auckland Plan are to be met (for example, safe and secure communities) it is crucial that risk to people, development and infrastructure from natural hazards is reduced.

### **Assumptions**

The appropriateness of each scenario has been based on the assumption that development occurs with no regulatory invention. Although this is unlikely given the resource management methods used in the region, it allows for the potential implications of a location with respect to the hazards present to be highlighted. Locations identified as medium to high (xx-xxx) hazard risk would need careful consideration and assessment of hazards and their consequences should development take place.

Should a particular scenario be chosen the Auckland Council has a number of legislative requirements which will have to be adhered to in order to reduce risk from natural hazards in the region. The legislative requirements are consistent for all four scenarios and are summarised in the policy/implementation section.

### **Scenario A**

#### **Discussion**

Scenario A will increase growth in a network of regional centres, corridors and future urban areas within the existing Metropolitan Urban Limits (MUL). Focus is on a greater number of large centres but less centres overall. There will be a small extension of the MUL in some areas and residential and business growth within a limited number of corridors.

The implications from this scenario are:

Increased growth within current regional centres will not create new natural hazards. However, the likelihood of populations and development being affected by hazards will increase as more people and property are exposed to existing hazards.

- Increasing the density of buildings and infrastructure (e.g. CBD) to accommodate greater populations in growth centres will significantly increase the consequences of a hazard event as more people will be affected. Also smaller hazard events may cause greater consequences. For instance, power cuts during storm events will have greater implications for residents in apartment buildings than those in small residential buildings.
- Having enlarged regional centres and an enlarged CBD may reduce the interruption caused by hazard events that create road closures as more people may live and work within the same location. Travel corridors linking centres that become blocked during a hazard event may cause less of a problem to each community.
- Increased development on the coast (e.g. Orewa, Long Bay) will result in an increased number of people at risk from coastal flooding and coastal erosion. Increases in population will require measures to be undertaken to increase community resilience\*. Mitigation measures will have to be put in place if development is to take place in these areas. Future sea level rise may exacerbate the effects of coastal hazards (potential for increased frequency and magnitude).



- Increased development in identified growth areas will exacerbate existing flooding issues and increase the exposure of development and people to flooding events. For example, Pukekohe has existing flooding issues which will be exacerbated if development increases within the floodplain. Some of these issues can be alleviated through planning regulations, however areas will remain vulnerable to hazardous events which exceed design conditions. Intensification of areas prone to flooding e.g. CBD will be more vulnerable to flood hazard consequences e.g. power failures, road closures. Development in areas prone to flooding should avoid floodplains or put in place mitigation practices to avoid flood risk. If there is an increased frequency of storm events due to climate change the frequency and magnitude of flooding hazards may increase.
- Development of future urban areas on steep hills which are prone to rainfall induced land instability will increase risk to people and development, (e.g. Long Bay, Flatbush, Takanini). If there is an increased frequency of storm events due to climate change the frequency and magnitude of land instability hazards may increase.
- A greater number of people will be exposed to earthquake hazards if development within the current metropolitan urban area is intensified. Earthquake hazards (ground shaking and liquefaction) depend on a number of factors including soil and rock type. Areas of soft, unconsolidated sediments or reclaimed land are where amplified ground shaking and liquefaction are most likely to occur. New developments should take into account earthquake hazards, and where necessary specific mitigation measures should be implemented to reduce risk.
- Areas proposed for increased development lie within the Auckland Volcanic Field which may increase the potential risk associated with a future eruption.

### **Policy Issues**

In regard to natural hazards the overarching objective of the RPS is *“to avoid, remedy, or mitigate the adverse effects of natural hazards on human life, property and the environment, while minimising the adverse effects of measures implemented to reduce the risks of natural hazards.”*

To give effect to the RPS and other legislative requirements, if this scenario were to be chosen several measures could be put in place by the Auckland Council to reduce risk from natural hazards. These include:

- Ensuring that subdivision, use and development of land does not create or exacerbate natural hazards on both the area being developed and neighbouring areas.
- Development of land prone to natural hazards should only be undertaken if the adverse effects are avoided or mitigated, for example if building in a 1% AEP flooding zone development should not be permitted unless the flooding hazard can be avoided or adverse effects mitigated.
- Identifying appropriate land use for land prone to natural hazards through risk based decision making.
- Low impact design in new developments to reduce surface flooding issues.
- Emergency management including increased community awareness and preparedness (provided for under the Civil Defence Emergency Management Act 2002).
- Providing lifeline utilities for the region which function to the fullest possible extent during and after an emergency (CDEMA) for existing and Greenfield sites.

### **Greenfields**

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With no additional Greenfields the population is intensified within the existing MUL resulting in greater exposure to existing hazards. Risk is not dispersed outside the MUL. Intensification within the MUL will result in increased building density (additional levels) to accommodate growth which will significantly increase the consequences of a localised hazard event.

Concentration of the population within the MUL may increase the disruption to social and economic activities in the event of a hazard. For instance, spatial separation for businesses will be reduced for businesses affected by hazard consequences.

Larger population within the MUL and therefore increased pressure placed on the current transport corridors out of Auckland in the event of a large scale evacuation.

Intensification within the current MUL limits the opportunity to put in place best practice mitigation techniques. In Greenfield locations there is the opportunity to put in place techniques such as Low Impact Design or increase minimum property sizes which reduce stormwater runoff and as a result flooding hazards.

Intensification of growth and infilling may result in land use solutions becoming less feasible as there will be a reduced amount of available space for growth and development. For example, it may be more likely that areas delineated as no-go zones due to natural hazard constraints are ignored to make way for new development. Score for the greenfields: XXX

## **Scenario B**

### **Discussion**

Scenario B focuses the majority of growth within the current urban area with the provision for intensive Greenfield development at the urban peripheries, significant growth in satellite centres and intensification in areas of high amenity (ridgelines and coastal areas).

The implications from this scenario are:

- Increased growth within the current urban area and intensification of areas of high amenity will not create new hazards but will increase exposure to existing hazards. Expansion of the MUL for Greenfield development and growth in satellite centres may increase exposure to new hazards.
- An increase in business centres and business land can disperse risk and improve business resilience to hazard events. For instance, a business with branches in two or more business centres can move staff between branches should one be affected by a hazard event and lessen the economic consequences as business is able to continue.
- Development in Greenfield locations allows for an opportunity to mitigate the effects of natural hazards. If the level of risk posed by natural hazards is identified appropriate mitigation techniques can be put in place from the start to reduce the risk. For example, in areas prone to flooding low impact design measures can be put in place and floor levels can be raised to reduce the risk from flooding hazards. It is important to note that mitigation measures can be costly if developing in an area which is at a high risk from natural hazard effects (cost-benefit analysis may be needed).

- Intensification of areas of high amenity on the coast will significantly increase the risk of populations, buildings and infrastructure to coastal hazards. Infilling of coastal cliff land on the eastern coastline will increase exposure to cliff erosion and instability. Infilling of low-lying coastal land will increase exposure to coastal erosion and coastal inundation (for example CBD). Future sea level rise will further exacerbate the effects of coastal hazards. Tsunami risk could be increased along low-lying eastern shorelines, particularly around estuaries (e.g. Orewa).
- Creation of satellite towns and expansion of the MUL in locations where land is steep (e.g. Warkworth, Brookby Valley) will increase risk from rain induced land instability. Additionally there is an identifiable risk, in terms of resilience, of increasing households in the Warkworth area but not increasing commercial/business zoning. This will result in the majority of residents commuting to targeted business areas, resulting in a reliance on the transport network, consequently decreasing the resilience of the community. The location of the stretch of SH1 between Dome Valley and Pohuehue is prone to rainfall induced land instability. In the past high levels of rainfall have brought about landslides that have blocked SH1. If numerous slips were to occur on this stretch of road the only alternative route for residents would be the Woodcocks Road link to SH16 which may not be suitable for use during heavy rainfall, essentially blocking the north to critical lifelines and key services provided by central Auckland. If growth were to take place in the area risk assessments would need to be undertaken to establish the ability of alternate routes to handle increased capacity.
- Increased development in identified growth areas will increase exposure to flooding events. For example, intensification in the CBD will increase risk to surface flooding and storm surges. The increase in population will result in greater vulnerability to hazard consequences e.g. power failures, road closures.
- Satellite towns marked for significant growth lie outside the Auckland Volcanic Field which may lessen the potential risk associated with a future eruption.
- Expansion of the metropolitan urban area will result in a dispersion of risk if an earthquake were to take place. Earthquake hazards (ground shaking and liquefaction) depend on a number of factors including soil and rock type. Areas of soft, unconsolidated sediments or reclaimed land are where amplified ground shaking and liquefaction are most likely to occur. New developments should take into account earthquake hazards, and where necessary specific mitigation measures should be implemented to reduce risk.
- Expansion of MUL into Drury would coincide with the active Drury fault line. As the reoccurrence of this faultline is infrequent some development could take place within the vicinity of this active fault. Development that has special post- disasters functions should not be located in the vicinity of the fault line (Ministry for the Environment guidelines).

### **Policy issues**

In regard to natural hazards the overarching objective of the RPS is *“to avoid, remedy, or mitigate the adverse effects of natural hazards on human life, property and the environment, while minimising the adverse effects of measures implemented to reduce the risks of natural hazards.”*

To give effect to the RPS and other legislative requirements, if this scenario were to be chosen several measures could be put in place by the Auckland Council to reduce risk from natural hazards. These include:

- Ensuring that subdivision, use and development of land does not create or exacerbate natural hazards on both the area being developed and neighbouring areas.
- Avoidance of large scale development in Greenfield locations that are at a high risk to 1 % AEP flood events – e.g. Drury.
- Development of land prone to natural hazards should only be undertaken if the adverse effects are avoided or mitigated, for example if building in a 1% AEP flooding zone development should not be permitted unless the flooding hazard can be avoided or adverse effects mitigated.
- Identifying appropriate land use for land prone to natural hazards through risk based decision making.
- Low impact design in new developments to reduce surface flooding issues.
- Emergency management including increased community awareness and preparedness (provided for under the Civil Defence Emergency Management Act (CDEMA) 2002).
- Providing lifeline utilities for the region which function to the fullest possible extent during and after an emergency (CDEMA) for existing and Greenfield sites.

### Greenfields

Satellites		Score
Helensville	Extensive flooding in northern Helensville, if development is to take place it should be outside of floodplain (to the south east). Main access route to town in the floodplain – if town is to become satellite town access should be improved.	XX
Kumeu/Huapai	Same floodplain as Helensville and therefore exposed to extensive flooding, development should take place outside of floodplain.	XX
Pukekohe	Extensive surface flooding issues, development will exacerbate current flooding issues. If development is to take place it should be concentrated in the north as the catchment drains south creating greater flooding.	XX
Warkworth	Surface and river flooding issues for low-lying areas and floodplains. Steeper hills are prone to land instability under high rainfall conditions. Coastal erosion and flooding issues at Snells beach could be exacerbated by sea level rise.	XX
Wellsford	Some surface flooding, steeper hills more prone to land instability issues.	XX
Wesley (new town)	Flooding issues.	XX
Dairy Flat (new town)	Expansion will lead to an increased number of people exposed to coastal flooding and erosion, some flooding. Steep land prone to rain induced instability.	XX
Group 1 Industrial Greenfields		Score
Whenuapai Business	Some surface flooding. Effects can be largely alleviated through regulatory planning,	X
Drury Business	Extensive flooding issues, steeper hills prone to land instability issues. High ground shaking amplification. Expansion of Drury on active fault line – development should avoid active fault.	XX

Airport Stage 2	Some coastal inundation and flooding issues.	X
Paerata Business	Steeper hills prone to land instability issues	XX
Silverdale West Business	Surface flooding issues, steeper hills more prone to land instability issues.	XX
<b>Residential Expansion Areas</b>		<b>Score</b>
Brookby Valley	Some flooding issues. Expansion area sits at the intersection of several catchments – development may exacerbate flooding downstream – land use planning can help mitigate these effects. Steeper hills prone to land instability issues.	XX
Drury Residential	Extensive surface flooding issues, steeper hills prone to land instability issues. Zone of greatest ground shaking amplification – can be largely alleviated through building design. Expansion of Drury on active fault line – development should avoid active fault.	XX
Northwest Expansion Area	Some surface flooding (development should avoid floodplain), inundation and erosion near the coast.	X

### Scenario C

#### **Discussion**

Scenario C will intensify growth within the current MUL but disperse this growth across many centres at lower densities than in Scenario A. Increased capacity will be provided in numerous local and neighbourhood centres and by general infill throughout suburban areas. This will result in a greater number of smaller growth centres and lower densities in larger areas.

The implications of this are:

Increased growth within the existing MUL will not create new hazards but the likelihood of populations and development being affected by hazards will increase due to a greater number of people being exposed to existing hazards.

- Intensification and infill of the coastal margins will significantly increase the risk of populations, buildings and infrastructure to coastal hazards. Infilling of coastal cliff land will lead to greater number of people being exposed to cliff erosion and land instability. Infilling of low-lying coastal land will increase the number of people exposed to coastal erosion and coastal inundation (for example CBD). Future sea level rise may lead to increased frequency and magnitude of coastal hazards. Tsunami risk will be increased as populations increase along low-lying eastern shorelines, particularly around estuaries.
- Increased development in some identified growth areas (e.g. Pukekohe, CBD) will exacerbate existing flooding issues and increase the number of people exposed to flooding events. Intensification and infill of areas prone to flooding will increase vulnerability to flood hazard consequences e.g. power failures, road closures. If there is an increased frequency of storm events due to climate change the frequency and magnitude of flooding hazards may increase.

- Development of future urban areas on steep hills which are prone to rainfall induced land instability will increase risk to people and development, (e.g. Long Bay, Flatbush, Takanini). If there is an increased frequency of storm events due to climate change the frequency and magnitude of land instability hazards may increase.
- A greater number of people will be exposed to earthquake hazards if land within the current metropolitan urban area is infilled and subdivided. Earthquake hazards (ground shaking and liquefaction) depend on a number of factors including soil and rock type. Areas of soft, unconsolidated sediments or reclaimed land are where amplified ground shaking and liquefaction are most likely to occur. New developments should take into account earthquake hazards, and where necessary specific mitigation measures should be implemented to reduce risk.
- Areas proposed for increased development lie within the Auckland Volcanic Field. This may increase the potential risks associated with a future eruption due to a greater number of people being exposed to the impacts.
- When this scenario is compared to Scenario A, the number of people exposed to localised hazards will be lower as the population is spread across the region with lower densities in local areas.

### **Policy issues**

In regard to natural hazards the overarching objective of the RPS is *“to avoid, remedy, or mitigate the adverse effects of natural hazards on human life, property and the environment, while minimising the adverse effects of measures implemented to reduce the risks of natural hazards.”*

To give effect to the RPS and other legislative requirements, if this scenario were to be chosen several measures could be put in place by the Auckland Council to reduce risk from natural hazards. These include:

- Ensuring that subdivision, use and development of land does not create or exacerbate natural hazards on both the area being developed and neighbouring areas.
- Development of land prone to natural hazards should only be undertaken if the adverse effects are avoided or mitigated, for example if building in a 1% AEP flooding zone development should not be permitted unless the flooding hazard can be avoided or adverse effects mitigated.
- Identifying appropriate land use for land prone to natural hazards through risk based decision making.
- Low impact design in new developments to reduce surface flooding issues.
- Emergency management including increased community awareness and preparedness (provided for under the Civil Defence Emergency Management Act 2002).
- Providing lifeline utilities for the region which function to the fullest possible extent during and after an emergency (CDEMA) for existing and Greenfield sites.

### **Greenfields**

Note: similar repercussions/benefits to scenario A.

With no additional Greenfields the population is intensified within the existing MUL resulting in a greater number of people exposed to existing hazards. Risk is not dispersed outside the MUL. Intensification within the MUL will result in increased building density (additional levels) to accommodate growth which will significantly increase the consequences of a hazard event.

Concentration of the population within the MUL may increase the disruption to social and economic activities in the event of a hazard. For instance, spatial separation for businesses will be reduced for businesses affected by hazard consequences.

Intensification within the current MUL limits the opportunity to put in place best practice mitigation techniques. In Greenfield locations there is the opportunity to put in place techniques such as Low Impact Design or increase minimum property sizes which reduce stormwater runoff and as a result flooding hazards.

Increased pressure placed on the current transport corridors out of Auckland in the event of a large scale evacuation.

Intensification of growth and infilling may result in land use solutions becoming less feasible as there will be a reduced amount of available space for growth and development. For example, it may be more likely that areas delineated as no-go zones due to natural hazard constraints are ignored to make way for new development.

Score for having no greenfields: XXX

## **Scenario D**

### **Discussion**

Scenario D encourages development to expand beyond the MUL. Conversion of Greenfield areas to residential and business land will considerably increase Auckland's urban area creating a more dispersed population. Extensive growth is to occur in coastal and rural towns with high amenity values and in satellite towns. Intensification in centres is to occur until they meet the capacity allowed for in district plans, although some additional capacity is to occur in market attractive centres and satellites. A number of new business centres are located within the existing MUL with others proposed in Greenfield areas where development is likely to occur.

The implications for this scenario are:

- Expansion of the existing MUL will increase exposure of residential development, infrastructure and people to new hazard threats. Higher population outside the MUL will disperse risk as many of Auckland's hazards are derived from localised events (e.g. flooding, landsliding).
- Urban intensification and infrastructural development in the CBD and fringing suburbs will significantly increase the consequences of a hazard event. Also smaller hazard events may cause greater consequences. For instance, power cuts during storm events will have greater implications for residents in apartment buildings than those in small residential buildings.
- An increase in business centres and business land can disperse risk and improve business resilience to hazard events. For instance, a business with branches in two or more business centres can move staff between branches should one be affected by a hazard event and lessen the economic and social consequences as trade can be maintained.
- Development in Greenfield locations allows for an opportunity to mitigate the effects of natural hazards. If the level of risk posed by natural hazards is identified appropriate

mitigation techniques can be put in place from the start to reduce the risk. For example, in areas prone to flooding low impact design measures can be put in place and floor levels can be raised to reduce the risk from flooding hazards. It is important to note that mitigation measures can be costly if developing in an area which is at a high risk from natural hazard effects (cost-benefit analysis may be needed).

- Increased residential development on Waiheke Island is likely to increase population exposure to drought as groundwater is the primary source for domestic water use. Increased population pressure on this resource will exacerbate the severity of drought events as the island has limited other water sources. Climate change impacts may exacerbate droughts in the future, for example if mean rainfall decreases.
- Intensification and infill of the coastal margins will significantly increase the risk of populations, buildings and infrastructure to coastal hazards. Infilling of coastal cliff land will lead to increased exposure to cliff erosion and land instability. Infilling of low-lying coastal land will increase exposure to coastal erosion and coastal inundation (for example CBD). Development of coastal land outside the existing MUL will increase exposure to new coastal hazard threats if development is not planned appropriately. Future sea level rise will further exacerbate the effects of coastal hazards and any new coastal development should consider the Ministry for the Environment guidelines for sea level rise (a minimum of 0.5m). Tsunami risk could be increased along low-lying eastern shorelines, particularly around estuaries.
- Increased development in identified growth areas will increase exposure and vulnerability to flooding events. For example, intensification of the CBD will increase community vulnerability in response to flooding hazard consequences e.g. road closures. Expansion outside of the MUL will increase exposure to new flooding hazard threats.
- Development of land on steep hills which are prone to rainfall induced land instability will increase risk to people and property, (e.g. Warkworth, Flatbush, Takanini). In particular, land north of Auckland is highly susceptible to land instability due to both the geology and the slope. Development on this land will require costly mitigation to reduce risk to people and property. If there is an increased frequency of storm events due to climate change the frequency and magnitude of land instability hazards may increase.
- Expansion of the metropolitan urban area will result in a dispersion of risk if an earthquake were to take place. Earthquake hazards (ground shaking and liquefaction) depend on a number of factors including soil and rock type. Areas of soft, unconsolidated sediments or reclaimed land are where amplified ground shaking and liquefaction are most likely to occur. New developments should take into account earthquake hazards, and where necessary specific mitigation measures should be implemented to reduce risk.
- Expansion of MUL into Drury would coincide with the active Drury fault line. As the reoccurrence of this faultline is infrequent some development could take place within the vicinity of this active fault. Development that has special post- disasters functions should not be located in the vicinity of the fault line (Ministry for the Environment guidelines).
- All proposed areas for expansion lie outside the Auckland Volcanic Fields which may lessen potential risks associated with a future eruption.

## **Policy issues**



In regard to natural hazards the overarching objective of the RPS is “to avoid, remedy, or mitigate the adverse effects of natural hazards on human life, property and the environment, while minimising the adverse effects of measures implemented to reduce the risks of natural hazards.”

To give effect to the RPS and other legislative requirements, if this scenario were to be chosen several measures could be put in place by the Auckland Council to reduce risk from natural hazards. These include:

- Ensuring that subdivision, use and development of land does not create or exacerbate natural hazards on both the area being developed and neighbouring areas.
- Avoidance of large scale development in Greenfield locations that are at a high risk to 1 % AEP flood events – e.g. Drury.
- Development of land prone to natural hazards should only be undertaken if the adverse effects are avoided or mitigated, for example if building in a 1% AEP flooding zone development should not be permitted unless the flooding hazard can be avoided or adverse effects mitigated. Where there is development on land prone to instability (for example, north of Auckland) mitigation is necessary to reduce risk to people.
- Identifying appropriate land use for land prone to natural hazards through risk based decision making.
- Low impact design in new developments to reduce surface flooding issues.
- Emergency management including increased community awareness and preparedness (provided for under the Civil Defence Emergency Management Act 2002).
- Providing lifeline utilities for the region which function to the fullest possible extent during and after an emergency (CDEMA) for existing and Greenfield sites.

### Greenfields

Group 1 Industrial Greenfields		Score
Whenuapai Business	Some surface flooding.	X
Drury Business	Extensive surface flooding issues, steeper hills prone to land instability issues. Zone of greatest ground shaking amplification – can be largely alleviated through building design. Expansion of Drury on active fault line – development should avoid active fault.	XXX
Airport Stage 2	Some surface flooding and coastal inundation.	X
Paerata Business	Some surface flooding.	X
Silverdale West Business	Some surface flooding issues, steeper hills more prone to land instability issues.	XX
Residential Expansion Areas		Score
Brookby Valley	Some flooding issues. Expansion area sits at the intersection of several catchments – development may exacerbate flooding downstream – land use planning can help mitigate these effects. Steeper hills prone to land instability issues.	XX
Dairy Flat Expansion Area	Expansion will lead to increased exposure to coastal flooding and erosion, some flooding issues. Steep land prone to rain induced instability.	XX
Drury Residential	Extensive surface flooding issues, steeper hills prone to land instability issues. Zone of greatest ground shaking amplification – can be largely alleviated through building design. Expansion of	XXX

	Drury on active fault line – development should avoid active fault.	
Karaka Residential	Some coastal inundation and flooding issues. Coastal estuarine soils prone to liquefaction.	XX
Leigh Expansion Area	Coastal erosion issues due to beach erosion and cliff instability (could be exacerbated by sea level rise), land prone to rain induced instability.	XX
Mahurangi East Expansion Area	Coastal hazard issues due to beach erosion, cliff instability and inundation (coastal hazards could be exacerbated by sea level rise)	XX
Martins Bay	Coastal hazard issues due to beach erosion, cliff instability and inundation (coastal hazards could be exacerbated by sea level rise)	XX
Northern Expansion Area	Flooding issues for low lying areas and floodplains. Steeper hills are prone to rainfall induced instability.	XXX
Northwest Expansion Area	Some surface flooding (development should avoid floodplain), inundation and erosion near the coast.	X
Omaha Expansion Area	Extensive coastal erosion issues experienced at present and could be exacerbated by sea level rise in the future. Coastal inundation issues.	XX
Puhoi Residential	Some river and surface flooding. Steeper hills prone to land instability issues.	XX
Ramarama Residential	Some localised surface flooding on low lying land.	X
Takanini Stage 3	Extensive flooding throughout Takanini, some coastal inundation.	XXX
Waiheke Expansion Zone	Coastal erosion issues due to beach erosion and cliff instability. Drought conditions could result in a decline of groundwater supply for domestic and commercial purposes. Rain induced land instability.	XX
Waiwera Expansion Area	Coastal erosion issues due to beach erosion and cliff instability (could be exacerbated by sea level rise). Steep land prone to land instability. Coastal and river flooding.	XX
Whitford Beachlands	Coastal erosion issues due to beach erosion and cliff instability and coastal inundation (could be exacerbated by sea level rise). Some localised surface flooding on low-lying land.	XX

\* We refer to resilience as the ability to absorb, learn from and modify/adapt to perturbations (such as natural hazards). Resilience within a community can help people cope with the unknown risks of natural hazards. Some natural and social systems have an inbuilt capacity to return to a normal state after a natural hazard and others have to learn how to be resilient. Resilience can be increased in a number of ways. For instance, enhancing social networks and improving sense of community increases the capacity to respond and adapt to sudden changes as does increasing community awareness and preparedness for natural hazard events.

### Summary of assessment measures for growth scenarios

Table 1 provides a summary of natural hazards within the Auckland Region and ranks the four scenarios based on the level of risk that will arise from the proposed land use and transport provisions. This summary demonstrates that there is no one scenario which is best for all natural hazards in the Auckland region. While the dispersed scenarios (B and D) will decrease the risk of low frequency hazard events (earthquakes and volcanism) they will also increase risk from land instability, coastal hazards and fault rupture due to the locations of proposed development. Intensification of the current urban areas will result in increased building density (additional levels) which will increase the vulnerability of people should a natural disaster occur. However, by intensifying growth within the current urban the probability of people, development and infrastructure being exposed to new hazards (for example land instability hazards north of Auckland) is reduced. Table 1 also identifies the scenarios which provide the greatest flexibility for mitigation practices to be put in place to reduce the risk from natural hazards. The dispersed scenarios provide greater opportunities for best practice mitigation techniques (for example low impact design to reduce stormwater runoff and subsequent flooding hazards) to be implemented whereas the opportunities are less likely when intensifying land within the current urban limits.

**Table 1: Summary of assessment measures for growth scenarios**

(4 = worst scenario 1 = best scenario)

ASSESSMENT MEASURES	Scenario A	Scenario B	Scenario C	Scenario D	EXPLANATION
<b>Earthquake (ground shaking and liquefaction)</b>	4	2	3	1	Greater dispersion of people decreases risk from earthquake hazards. Scenario D represents the least risk from earthquake hazards as it has the greatest dispersion and Scenario A is the greatest as it is the most intensive growth scenario.
<b>Earthquake Fault Rupture</b>	1=	3	1=	4	Proposed development in scenario B and D coincide with one of the active faultlines in Auckland (Drury faultline). Scenario D represents the greatest risk as it has the greatest amount of population growth.
<b>Volcanism</b>	4	2	3	1	Greater dispersion of people decreases risk from volcanic hazards. Scenario D represents the least risk from earthquake hazards as it has the greatest dispersion and Scenario A is the greatest as it is the most intensive growth scenario.
<b>Flooding</b>	4	1	3	2	New developments allow for best practice flood mitigation techniques to be put in place to reduce risk from flooding. Intensification of the current MUL does not provide as much opportunity for this and therefore a greater number of people will be exposed to flooding hazards.
<b>Land Instability</b>	1	3	2	4	Scenario D represents the greatest risk from land instability due to the proposed expansion north of Auckland where much of the land is highly unstable. Scenario 3 also proposes develop in areas where the land is unstable.

<b>Coastal hazards (inundation, erosion, instability)</b>	1=	3	1=	4	Scenario D represents the greatest risk from coastal hazards due to the proposed expansion north of Auckland where coastal hazards are known to exist. Scenario B intensifies development on the coast where hazards are known to be – increases exposure of people to current hazards.
<b>Mitigation Flexibility (ease of solution)</b>	4	2	3	1	New developments allow for best practice mitigation techniques to be put in place to reduce risk from natural hazards. Intensification of the current MUL does not provide as greater of an opportunity for this and therefore a greater number of people will be exposed to natural hazards.

## 3 Social wellbeing

### 3.1 Greater housing choice

#### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
Housing Choice	0	✓✓	✓	X

#### Key comments

- Recent research papers indicate that there will continue to be strong demand for detached housing. Studies also indicate that in order to meet the demand for housing there will need to be a greater reliance on more multi-unit housing.
- The Darroch housing assessment (2010) identifies 14 Housing Market Areas (HMAs) throughout the region and determines the existing capacity within these and the demand through to 2026. The scenarios were assessed against these HMAs.
- Scenario A relies on multi-unit development in centres and corridors and would not necessarily supply typologies that match current market preferences. Would need to identify new typologies to provide 3 and 4 bed room apartments to cater for families.
- Scenario A's increased capacity would meet demand in half of the HMAs therefore housing choice is scored neutrally.
- Expansive growth in Scenario B (contiguous and in satellite towns) is easier under current policy settings and generally favoured by developers
- Scenario B's increased capacity would meet demand in over half of the HMAs therefore it is scored positively. These HMAs are also well located further improving housing choice and affordability. Therefore scored two ticks.
- Scenario C has growth focused within the existing urban area and no additional capacity is provided in rural areas. Additional capacity for detached housing is provided through extensive infill within the existing urban area which is likely to meet people's desire for housing in these areas.
- Scenario C's increased capacity would meet demand in most of the HMAs therefore Scenario C scores positively for housing choice. However, the locations of housing would be more widely dispersed than Scenario B and therefore only scored one tick.
- Scenario D has additional capacity focused in greenfield expansion in the rural areas. This development would be largely detached, but would need to also provide for multi-unit development around new centres and transport nodes.

- Scenario D's increased capacity meets demand in almost half of the HMAs, therefore insufficient capacity is provided for over half of the HMAs. As such Scenario D is scored negatively.

## **Introduction**

Initial feedback was sought from a workshop held on 31 May 2011 of council and central government officers (Auckland Policy Office and Department of Building and Housing), which forms the basis of this evaluation. Additional input for evaluation included qualitative evidence on housing demand.

## **Discussion**

The evaluation of the housing choice criterion is based on qualitative research on housing demand to identify the mix of housing likely to be required for the future population and assess this against the different scenarios. The model does not produce outputs that illustrate different types of housing, but allocates capacity in a range of locations. Whilst some initial comments were made in the workshop, the following evaluation focuses on qualitative research on housing choice recently completed

Key evidence used in evaluation:

- Future Land Use and Transport Planning Project: Future housing demand study (ARC, 2010)
- Auckland Region Housing Market Assessment (Darroch, 2010)

Housing demand has been addressed through a number of recent research papers, all of which indicate that there will continue to be strong demand for detached housing. However, studies also indicate that in order to meet the demand for housing there will need to be a greater reliance on more multi-unit housing for a number of reasons.

The ARC study (2010) on future housing demand illustrates how housing preferences have begun to change over the past ten years, with an increasing proportion of multi-unit dwellings being constructed. Part of this shift in housing preferences reflects changing demographics and decreasing household size, but also changing lifestyles and expectations.

Research shows that generally different types of housing suit people at different stages in their lives. Therefore people are likely to transition through different housing types; families with children will always tend favour detached housing; whereas singles and couples without children are more likely to choose to live in multi-unit housing. In addition, people will make trade-offs depending on what is most important to them, often resulting in a different type of housing.

Based on demographic projections and current housing preferences the ARC study identified the mix of housing types needed to meet future housing demand in the region (Table 1). A range is illustrated to reflect that there may be a higher demand for multi-unit housing in the future than currently the case, as a result of increasing costs for fuel, energy, transport and infrastructure.

**Table 1 Mix of future housing stock**

Housing type	Proportion (2006)	Proportion (2051)	Additional dwellings
Detached	76	64-71	268,000 – 330,000
Low rise apartments (1-3 storeys)	22	27-29	149,000 – 172,000
Mid-high rise apartments (4 storeys +)	2	2-7	18,000 – 51,000

Whilst it is acknowledged that demand will remain strong for detached housing, meeting future demand for multi-unit housing will require a significant shift in housing preferences. Further work is required to ensure that multi-unit housing provides the attributes of housing that people desire, and in appropriate locations to achieve the trade-offs necessary to make it attractive.

The Darroch housing assessment (2010) identifies 14 Housing Market Areas throughout the region and determines the existing capacity within these and the demand through to 2026. The study also considers the future demographics of these areas to determine the type of housing demand (detached vs multi-unit). A number of areas are identified through this research as running out of capacity by 2026, either of detached or multi-unit housing.

The following assessment was undertaken against the Housing Market Areas identified in the Darroch report (see appendix 1).

#### **Scenario A**

- Relies on multi-unit development in centres and corridors and would not necessarily supply typologies that match current market preferences. Would need to identify new typologies to provide three and four bed room apartments to cater for families.
- Overall at the regional level housing choice would be increased, but would be difficult to meet demand for detached housing. Some medium density development of small lot housing largely in existing greenfields areas and the redevelopment of some larger sites.
- Significant redevelopment of land would be required to achieve intensification. To be successful this would require absolute certainty within the regulatory framework, comprehensive master planning and incentives for developers.
- Policy interventions would be required to obtain intensification in areas that are not attractive to the market.
- Extent of multi-unit development would help provide greater housing choice within the existing urban areas, specifically around centres, also supporting opportunities for ageing in place.
- Increased capacity would meet demand in half of the Housing Market Areas therefore housing choice is scored neutrally.

#### **Scenario B**

- Expansive growth (contiguous and in satellite towns) is easier under current policy settings and generally favoured by developers

- Redevelopment in high amenity coastal areas would result in more efficient use of land which could result in smaller units and greater diversity of choice (including ageing in place) across more urban areas. Developers are more likely to look at the options to create higher density living in high amenity areas as they are likely to get a high return on any developments.
- Seems to have greatest all round access to public transport options and the most diversity of supply of different housing typologies. It could possibly therefore be the most affordable.
- Intensification in corridors is likely to improve affordability and choice.
- Some additional opportunities to provide for detached housing in new greenfields areas and also in rural satellites. This helps to increase choice around detached typologies but not necessarily where growth is occurring.
- Provides more medium density opportunities, which can provide for smaller lot detached housing, as well as duplexes and terraces to provide different types of housing whilst still meeting the attributes people desire.
- Increased capacity would meet demand in over half of the Housing Market Areas therefore it is scored positively. These HMAs are also well located further improving housing choice and affordability. Therefore scored two ticks.

### **Scenario C**

- There was little discussion in the workshop around Scenario C, however it was mentioned that Scenarios A and C are similar in many ways and that they differ mainly in their policy settings.
- Growth is focused within the existing urban area, therefore no additional capacity is provided in rural areas. Therefore there is likely to be a shortfall in these areas in terms of demand.
- Additional capacity for detached housing is provided through extensive infill within the existing urban area which is likely to meet people's desire for housing in these areas.
- Additional capacity is also provided across the region in centres, to a lesser extent than Scenario A.
- Overall, this scenario is likely to provide the greatest choice within the existing urban area meeting growth demands and housing preferences. However, such housing would not necessarily be well located to access public transport, employment or amenities; and is also likely to adversely impact on the urban form and character of existing suburbs.
- Increased capacity would meet demand in most of the Housing Market Areas therefore Scenario C scores positively for housing choice. However, the locations of housing would be more widely dispersed in Scenario B and therefore only scored one tick.

### **Scenario D**

- Additional capacity is focused in greenfield expansion in the rural areas. This development would be largely detached, but would need to also provide for multi-unit development around new centres and transport nodes.



- Whilst providing significant capacity for detached housing, this occurs on the periphery of the existing urban area and therefore not necessarily where the demand for housing is.
- Limited housing choice is provided for within the existing urban area, as additional capacity is only provided in a small number of centres identified as market attractive. Therefore there is limited opportunity for people to age in place, due to the range of housing types that would be available in existing areas.
- Increased capacity meets demand in almost half of the Housing Market Areas, therefore insufficient capacity is provided for over half of the HMAs. As such Scenario D is scored negatively.

## Appendix 1 – Assessment of Housing Choice

Housing Market Areas	Capacity -2026 (CHRANZ 2010)		Scenario A	Scenario B	Scenario C	Scenario D
	Detached (2026)	Multi unit (2026)				
Rural North	11270	1530	No additional capacity provided beyond existing zoning	Additional capacity in rural satellites & reduced capacity for countryside living	Existing capacity	Reduced capacity in rural (countryside living), additional greenfields in coastal settlements
Rodney Southern Coastal	-390	460	Additional capacity in growth centres	Additional capacity focused in centres and existing greenfields	Existing capacity	Additional capacity through greenfield expansion
North Shore	-920	3770	Additional capacity in growth centres	Additional capacity in centres and coastal areas	Additional capacity through smaller centres and more infill	Additional capacity in coastal centres (market attractive)
Waitakere	1220	1440	Additional capacity in growth centres	Additional capacity in centres and corridors, plus existing greenfields	Additional capacity through smaller centres and more infill	Additional capacity in coastal centres (market attractive), and greenfields expansion
Auckland CBD	-	3210	Additional capacity in growth centres	Additional capacity	Additional capacity added	Additional capacity provided as market attractive
Auckland North East	1300	-480	Additional capacity in growth centres	Additional capacity in centres and coastal areas	Additional capacity through smaller centres and more infill	Additional capacity in coastal centres (market attractive)
Auckland North West	420	1390	Additional capacity in growth centres	Additional capacity in centres and coastal areas	Additional capacity through smaller centres and more infill	Additional capacity in coastal centres (market attractive)
Auckland South East	-500	1570	Additional capacity in growth centres	Additional capacity in centres	Additional capacity through smaller centres and more infill	No additional capacity provided
Auckland South West	890	-1950	Additional capacity in growth centres	Additional capacity in centres and corridors	Additional capacity through smaller centres and more infill	No additional capacity provided
Manukau North	-6100	920	Additional capacity in growth centres	Additional capacity in centres and coastal areas	Additional capacity through smaller centres and more infill	Additional capacity in coastal centres (market attractive)

Housing Market Areas	Capacity -2026 (CHRANZ 2010)		Scenario A	Scenario B	Scenario C	Scenario D
	Detached (2026)	Multi unit (2026)				
Manukau North West	-1080	-840	Additional capacity in growth centres	Additional capacity in centres	Additional capacity through smaller centres and more infill	No additional capacity provided
Manurewa & Papakura	2340	-3740	Additional capacity in growth centres	Additional capacity in centres and existing greenfields	Additional capacity through smaller centres and more infill	No additional capacity provided
Pukekohe	790	-710	No additional capacity provided beyond existing zoning	Additional capacity in rural satellites	Existing capacity	No additional capacity provided
Rural South	440	-2080	No additional capacity provided beyond existing zoning	Reduced capacity for countryside living	Existing capacity	Reduced capacity in rural (countryside living) - with additional capacity through greenfields expansion

Capacity increased sufficiently to meet housing choice	
Increase in capacity will partially meet housing choice	
Insufficient capacity added to meet housing choice	

## 3.2 Improved air quality (impact on public health)

### Auckland Plan Draft Scenarios A-D

#### Assessment of Air Quality

August 2011

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### 3.2.1 Context

This report discusses the relative impacts of four land use scenarios (A-D) being analysed by Auckland Council staff to inform the development of the Auckland Spatial Plan. The types of air quality impacts considered include:

- Total emissions from each scenario
- The relativity of each scenario on the basis of meeting standards and guidelines, and
- Whether some scenarios are more likely to lead to reverse sensitivity issues.

### 3.2.2 Background

Air quality levels are currently degraded within the Auckland region. This is because the current air quality does not meet regional particulate (PM<sub>10</sub>, and PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>) air quality targets in the Council's Regional Plan: Air, Land, and Water. The National Environmental Standards for Air Quality (AQNES) PM<sub>10</sub> and NO<sub>2</sub> are also regularly breached<sup>9</sup>. In addition, the annual average concentration of Auckland PM<sub>10</sub> has not reduced in the past few years.

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<sup>9</sup> Note Ministry for the Environment (MfE) have indicated compliance with the standard will be a priority for the Minister

The primary purpose of the regional and national air quality standards is to provide a guaranteed level of protection for the health of all New Zealanders. The World Health Organization (WHO) (2005) also note there is “no safe level” for population exposure to particulate emissions. Air emissions also impose significant health costs on the population of Auckland. These have been estimated at \$726 million (ARC 2006). Consequentially, a gradual reduction in pollution exposure over time for the Auckland population will have both short and long term health and amenity benefits for residents.

As Auckland currently has a growing population, only a slowly declining emission profile, (and little evidence of reducing concentrations in recent years), this potentially exposes a greater number of people to greater risk from air pollution. Regional population is projected to increase by 500,000 people by 2041 to just over two million people, with its associated travel demand growth. (See Appendix 1 for contextual background graphs). Increasingly stringent air quality standards and monitoring reductions in emissions and concentrations is the WHO best practice management approach to air pollution to achieve the lowest concentrations possible over time. Such an approach will achieve the greatest health and amenity benefits for Auckland citizens.

As Auckland grows so does the potential for reverse sensitivity effects to occur. Reverse Sensitivity occurs when established land uses, such as heavy industry are adversely affected by sensitive activities such as schools or houses locating nearby. This reverse sensitivity effect limits the ability of the established land use to operate efficiently and leads to an uncertain regulatory environment. Reverse sensitivity effects are particularly likely to occur near industry near existing industrial air quality management areas, and in new residential areas adjacent to established rural activities.

Air Quality needs to be considered in land use planning, transportation, and urban growth policy responses if the liveable outcomes are to be realised.

### **3.2.3 Method**

This report discusses the different landuse scenarios both quantitatively and qualitatively. The quantitative assessment take into account the changing vehicle emissions over time based on the four scenarios, but does not allow for other emissions sources such as industry and domestic sources.

Auckland Council’s Vehicle Emissions Prediction Model (or VEPM, version 4.0 for short) was used to calculate the emissions from Scenarios A-D of the Auckland Spatial Plan. Emissions of PM (particulates), CO<sub>2</sub> (carbon dioxide), VOC, (volatile organic compounds), and NO<sub>x</sub>, (oxides of nitrogen) have been modelled for the four sectors of the Auckland airshed.

These sectors represent North Shore/Rodney (North) Waitakere (West), Auckland City (Central), Manukau, Franklin, and Papakura (South) respectively. They are discussed by emission type and sector as appropriate. This assessment is predicated on the basis of the need to:

- Reduce exposure to poor air quality to avoid additional air pollution exposure as the population of Auckland increases
- Meet Auckland Council regional air quality targets, and
- Meet national air quality standards.

These needs will require concurrent measures to reduce both transport and domestic home heating emissions. The assumptions of the VEPM 4 model were incorporated and are presented in this report. These assumptions include the expected composition of the vehicle fleet based on Ministry of Transport predictions. The amount of travel is based on traffic models for the Auckland region.

### **3.2.4 Summary of Results**

Overall, scenarios A, B and C are similar on a gross and per capita basis for particulate, VOC, and NOx emissions from transport over the modelled period. The modelling of transport emissions predicts that these emissions will reduce until 2021, due to the introduction of vehicles in the fleet with improved emission standards. The rate of air quality improvements decline from 2021 to 2041 due to the increase in vehicle kilometres travelled (VKT). Therefore the growth in vehicle numbers forecast mean that overall, in the long term air quality improvement will be less from 2021. This is because of the predicted increase in the number of vehicles in the fleet and travel demand growth, which will result in substantial increases in total vehicle kilometres travelled by the fleet.

Scenario D was consistently poorer than all other scenarios in total air emissions and fuel consumption/energy resilience terms. Scenario D would not be recommended as a suitable scenario from an air quality perspective in the long term as it has higher vehicle emissions, and greater increases in VKT and fuel use, with consequently decreased energy resilience, relative to other Scenarios.

Scenarios A, B, and C all have similar emissions based on the modelling and are the preferred scenarios in terms of air quality outcomes for Auckland's in the long term, provided particulate and NOx emissions can continue to be reduced. This may be achieved by measures such as reducing domestic emissions and including new provisions in the Auckland Unitary plan that integrate landuse and air quality management, and manage reverse sensitivity effects. The compact urban form also facilitates modal shift to more sustainable forms of transport. However, if measures are not taken to reduce other emissions sources, then scenario D may be better in the medium term as fewer people will be exposed to poor air quality in the older areas of Auckland (as there will be not so much in-fill housing).

Table 1 – Scenarios assessed against current air quality levels in Auckland Region, based on modelling and on reductions in domestic and vehicle emissions

Scenario	Issues	Assessment based on modelling and BAU policies	Assessment if domestic and vehicle emissions reduced
<b>Scenario A</b> Current policy	Location of new industry is status quo? Residential exposure beside road corridors Clarification required on heavy industry location. Potentially a good scenario from an air quality perspective .	x Breaches NES (2-6 exceedences/yr) Amenity issues regularly	✓ Meets NES but only just. May be occasional exceedences (1/yr) Amenity issues every now and then More compact urban form facilitates modal shift to more sustainable forms of transport.
<b>Scenario B</b> Partial Infill and Corridors	As above, and; Location of industry potentially exposes some residents to higher pollutant levels and more residential areas on road corridors may mean greater exposure to vehicle emissions (particularly heavy duty diesel emissions on freight routes).	x As above	✓ As above (provided residential areas not located adjacent to road corridors or industry)  ✓ As above
<b>Scenario C</b> Extensive Infill	Reverse sensitivity issues for industry in South Auckland in particular if housing density increased nearby. Clarification required on heavy industry location. Otherwise potentially a good scenario from an air quality perspective (provided domestic heating emissions are reduced)	x As above	
<b>Scenario D</b> Market Forces	Worst performing scenario for total emissions and GHGs relative to all other scenarios. Poor scenario in relation to potential exposure of residents in South Auckland to air pollutants due to greater emissions in the southern sector. Location of residential areas near industry	x As above	x Very difficult to reduce transport emissions due to high VKTs caused by dispersed population in this scenario. This may mean more stringent domestic emission reductions may be required

**Assessment criteria:**

- ✓ ✓ ✓ Ambient air quality at background levels – no noticeable anthropogenic impact. Minimal health impacts. Very high levels of amenity. e.g. sparse rural areas.
- ✓ ✓ Acceptable ambient air quality with low health impacts. No amenity issues e.g. Small urban areas or countryside living rural areas.
- ✓ Meets standards and guidelines but only just and annual average particulate concentrations are low. May be occasional exceedences (1/yr). Amenity issues every now and then. e.g. Urban areas
- X Breaches standards and guidelines (2-6 exceedences per year), and moderate annual average particulate concentrations of particulate matter. Amenity issues regularly. (e.g. brown haze. Local nuisance effects due to odour and dust.
- XX Breaches standards and guidelines frequently and high annual average particulate concentration of particulate matter. Moderate increase in number of exceedences and exposure levels. Degraded amenity levels
- XXX Breaches standards and guidelines constantly and very high annual average annual average particulate concentrations of particulate matter. Large increase in number of exceedences and exposure levels. Very degraded amenity levels.



### 3.2.5 Detailed Transport Emission Results

The modelling results are provided in the following pages and are based on outputs from the Auckland VEPM V4.0 model. For each of the graphs, A, B, C, and D respectively represent spatial plan scenarios A-D respectively, which can be characterised in a urban form terms as follows:

- Scenario A: Current policy
- Scenario B: Partial infill plus corridors
- Scenario C: Extensive infill
- Scenario D: Market forces

The following abbreviations for each of the air quality parameters are also used in the graphs:

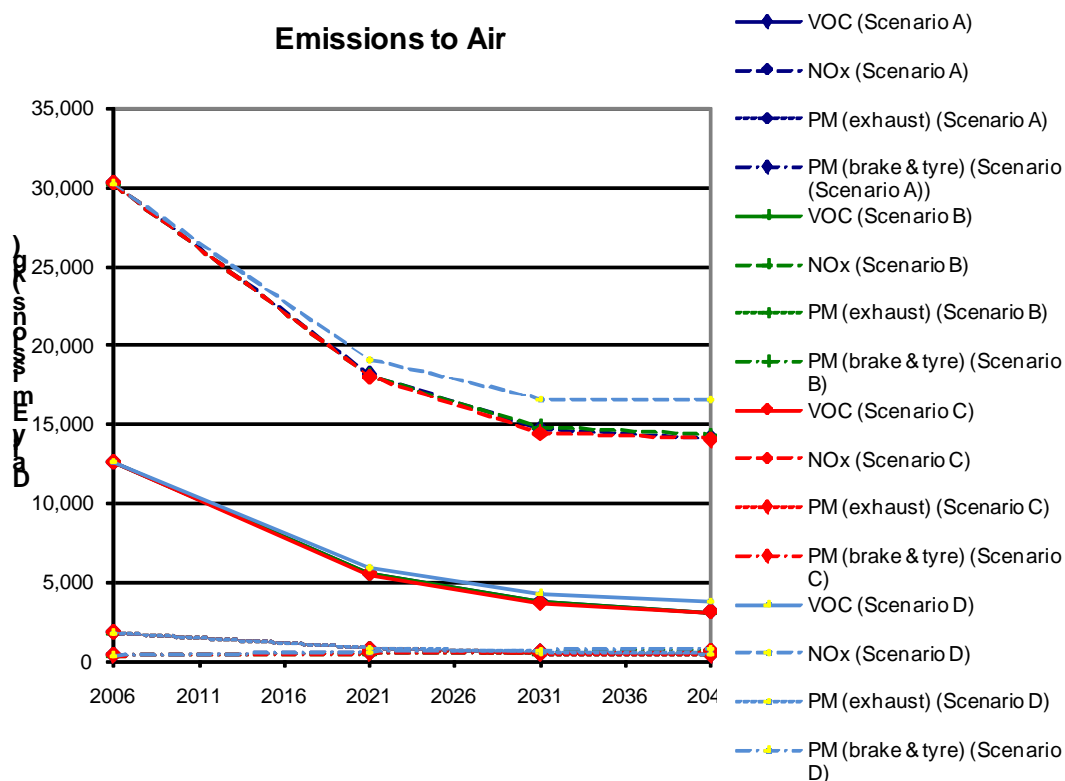
- NOx: Oxides of Nitrogen
- VOC: Volatile Organic Compounds
- PM: Particulate Matter

In terms of location, the following geographic breakdown represents North, West, Central, and South on the graphs:

- North is the former Rodney and North Shore areas,
- West is the former Waitakere City,
- Isthmus or Central is the former Auckland City, and
- South is the former Manukau City, Papakura and Franklin areas combined

Note that the numerical scenario analysis and graphs only show transport emissions and do **not** address domestic emissions.

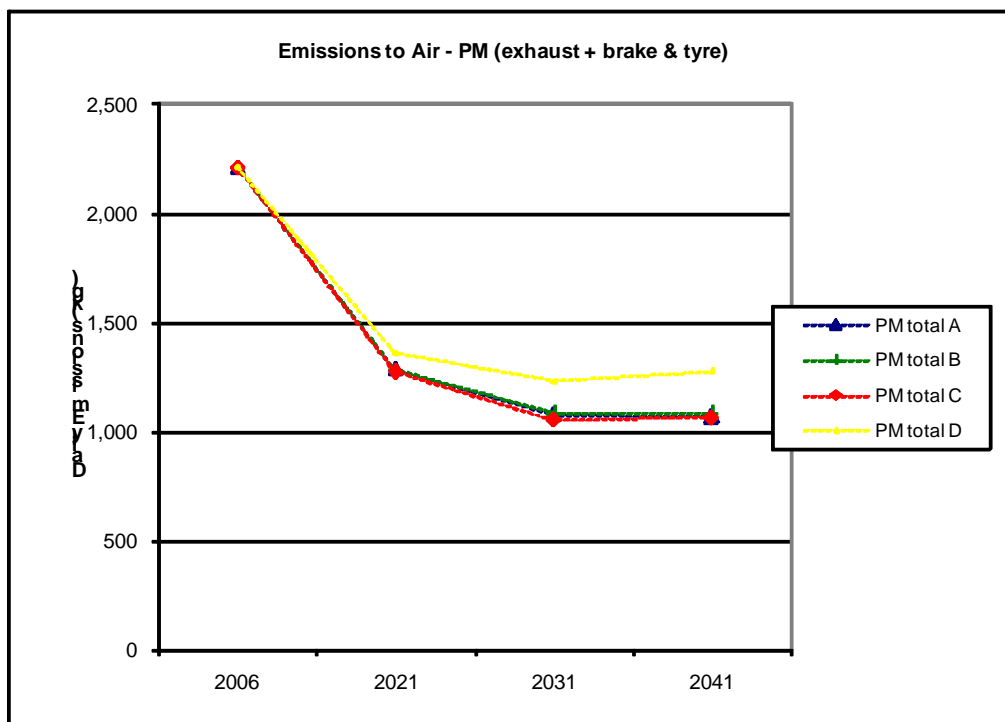
## Emissions Overall



**Figure 1: Emissions to air from each Pollutant**

Modelling of NOx, (nitrogen oxides) VOC (volatile organic compounds) and PM (particulates) emissions indicates a large reduction in emissions from 2006 until 2021, with a slower rate of emissions reduction after that date. The initial improvement will be driven by improved vehicle emission standards. The slower rate of emission reduction will be due to the growth in VKT associated with travel growth after 2021.

## Total Vehicle Particulates



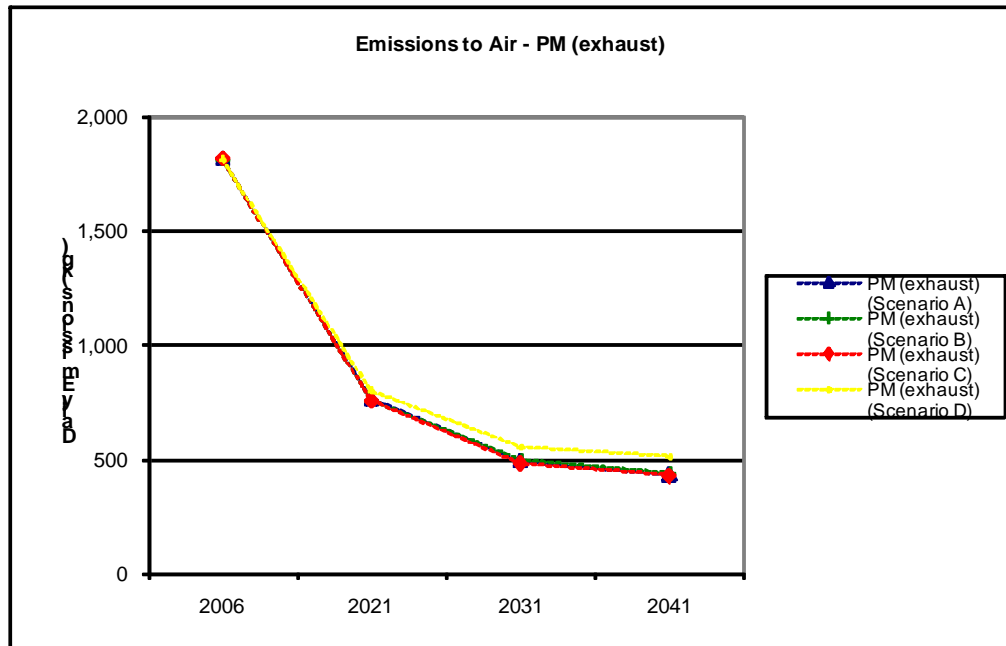
**Figure 2: Total Vehicle Particulates (PM<sub>10</sub>)**

This graph shows the total particulates emitted by vehicles over the modelled period. It comprises the *sum* of vehicle emissions, tyre, and brake wear, and generally shows a similar pattern to the overall emission graph.

Scenarios A, B, and C show a very similar a trend with only minor improvement in emissions reductions from 2021. Scenario D, because of the growth in VKT over the same period, does not show any overall reduction in total particulates from the 2021 to 2041 period.

The following pages show the emissions from vehicle exhaust and brake and tyre wear separately. Vehicle exhaust particles are smaller (typically <math><1 \mu\text{m}</math> in size), than particles from brake and tyre wear.

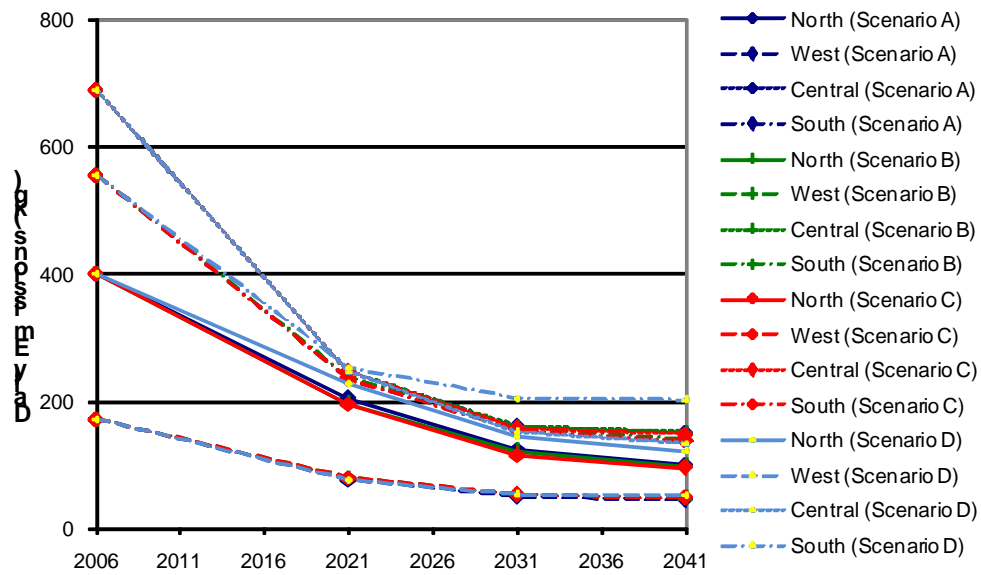
## Exhaust Particulates



**Figure 3: Exhaust Particulates**

Figure 2 shows that modelled particulate emissions from vehicle exhaust of fine particles (less than 1  $\mu\text{m}$  in diameter) reduce significantly modelled from 2006 until 2021 for all scenarios. This will be driven by improving vehicle emissions standards. Because of the VKT growth after this period, the improvement trend declines, particularly between 2031 and 2041. Scenario A, B and C are virtually identical in terms of emissions, however, scenario D results in slightly more emissions than other scenarios from 3031 and 2041.

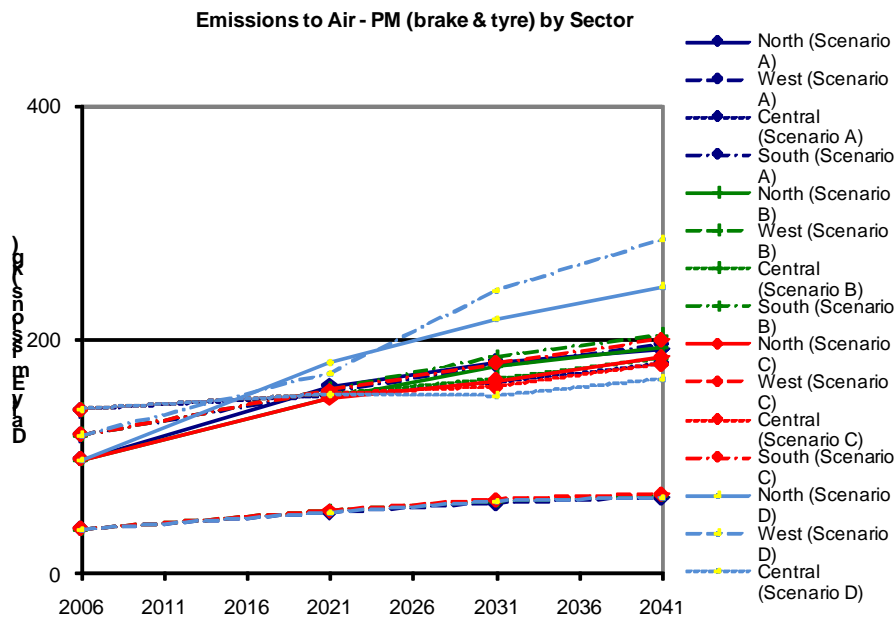
### Emissions to Air - PM (exhaust) by Sector



**Figure 4: Exhaust Particulates by Sector**

In terms of exhaust emissions by sector, a similar shaped curve is generated, with scenarios A and B generally demonstrating fewer total emissions than scenario C and D in the southern sector.

## Tyre and Brake Wear



**Figure 5: Tyre and Brake Wear**

Figure 5 shows estimated emissions from particulates from tyre and brakes wear by sector. This suggests that the total particulate emissions from brake and tyre wear increase over the modelled period.

The growth of emissions from brake and tyre wear could increase the risk of exceeding for the PM<sub>10</sub> standard. This risk does appear to be heightened by the largest growth rate in emissions occurring close to the time (2016) when the AQNES PM<sub>10</sub> compliance standard is due to be met.

Scenario D has two sectors where emissions increase significantly until 2041, and that is in the southern (Franklin, Manukau, and Papakura) sectors and northern (North Shore, Rodney) sectors, reflecting the increased VKT associated with this scenario.

VOC (Volatile Organic Compounds)

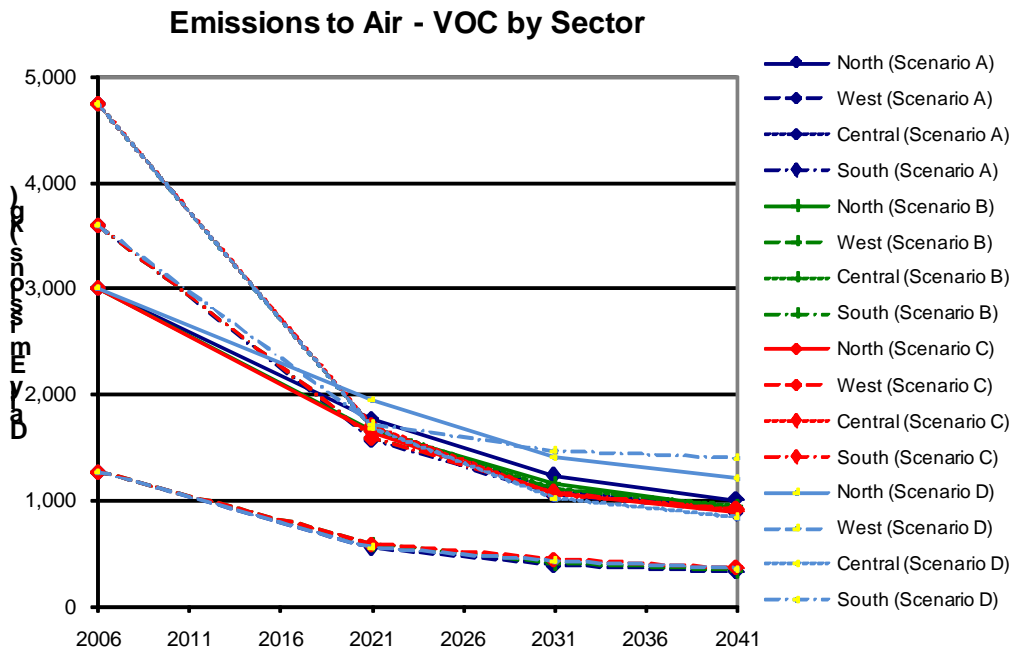
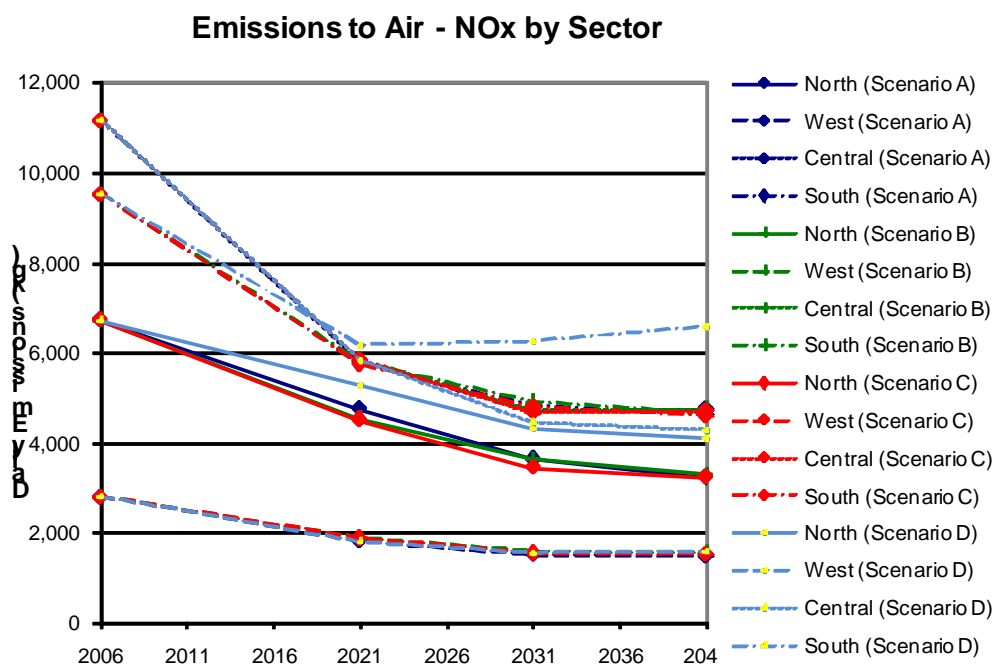


Figure 6: VOC Emissions by sector

VOC emissions show a similar trend to vehicle exhaust particulates. Under scenario D, the northern and southern sectors show higher VOC emissions than other scenarios, reflecting the increased VKT in this scenario.

## NOx



**Figure 7: NOx Emissions**

NOx reductions generally follow a similar pattern to the vehicle exhaust particulates. Figure 7 shows that most NOx emission scenarios decline by approximately 40% by 2031 from 2006 emissions, except in South Auckland. This would reduce the potential for NO<sub>2</sub> exceedences in Auckland in the future.

A significant concern is the growth in NOx emissions from 2021 to 2041 due to travel demand growth in the southern sector of Scenario D. In addition, the European experience (Transport and Environment news, 2011) suggests that the predicted reductions in emissions of NOx is not evidenced in monitoring data. Therefore it is possible that emissions reductions may also not be realised in Auckland.



## Greenhouse Gas emissions

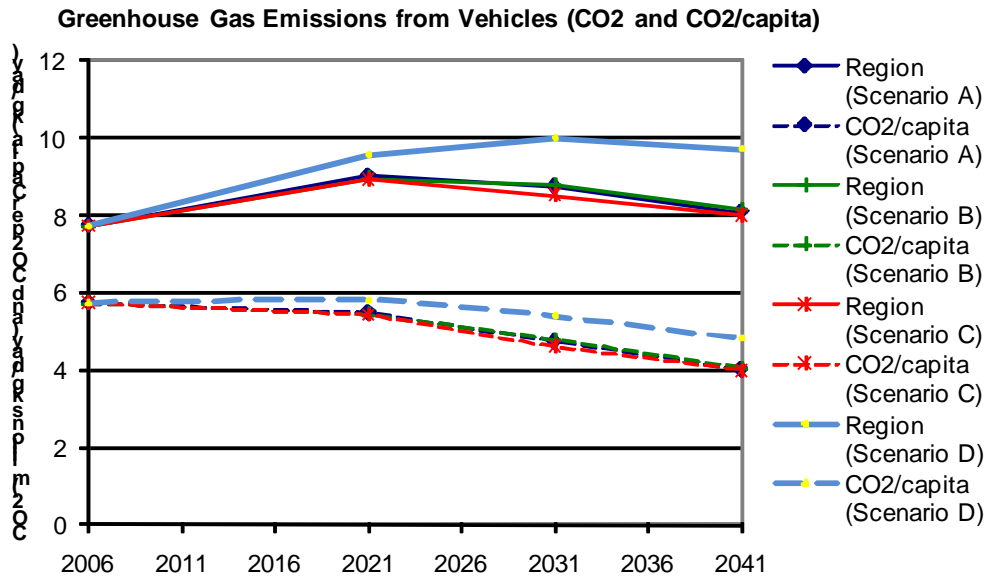


Figure 8: GHG Emissions

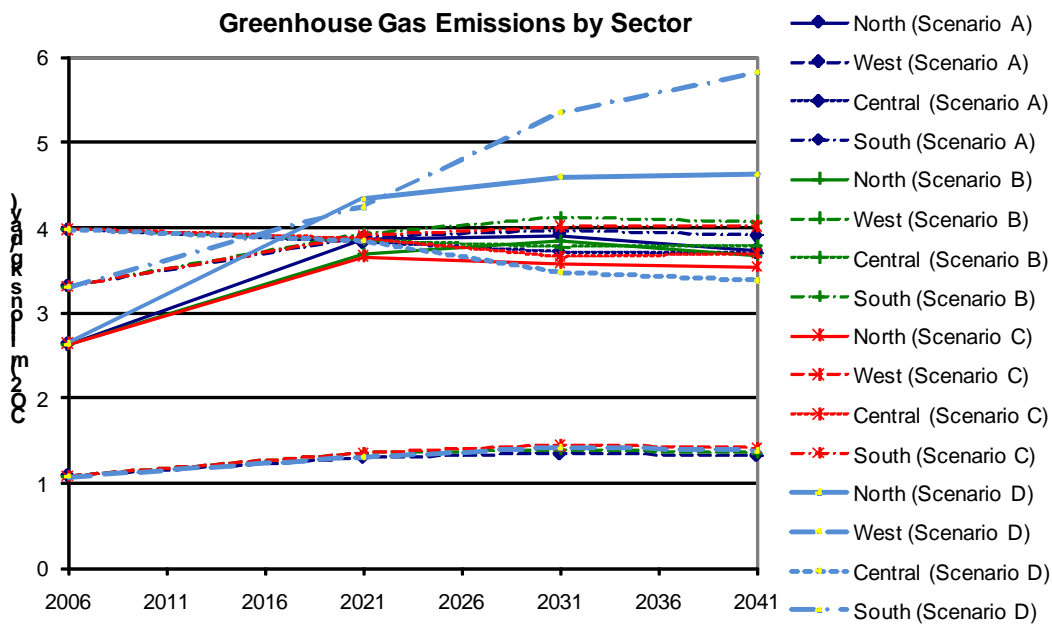


Figure 9: GHG Emissions by Sector

Total vehicle kilometres travelled will increase for all scenarios by 2041, with Scenario D showing consistently the greatest travel from 2021. Average vehicle trip length increases for all scenarios over the period. Scenarios A, B, and C exhibit slow growth from 2021, while Scenario D increases significantly from 2021. The growth in Scenario D is caused by the population growth and consequent vehicle travel in the more highly dispersed north south settlement pattern (see Appendix 1 figures 10 and 11).

Figure 8 illustrates that greenhouse gas emissions (CO<sub>2</sub>) of Scenarios A-C increase from 2006 to 2021, when emissions stabilise at 2021 levels until 2041. However, Scenario D results in increased GHG emissions from 2006 levels out to 2041.

In terms of sector differentiation in figure 9, the northern (North Shore, Rodney) and southern (Manukau, Franklin, Papakura) sectors of scenario D show the greatest emissions growth rate. This is due to the increased VKT associated with this scenario. Most other sectors indicate a “levelling off” of GHG emissions from the 2021 period onwards. On a per capita basis, the GHG emission reduction over time does decrease for all scenarios, mainly due to predicted improved fuel efficiency of vehicles. Scenario D demonstrates the least improvement from 2021.

Overall, the differences between scenarios A, B, and C are small and result in similar GHG emissions at 2041 from 2021. This will not assist in meeting the Mayors GHG emissions reduction target. The per capita GHG emissions will decrease by 2041 for all scenarios, but due to the overall population growth and increased travel, the gross GHG emissions will not reduce.

Scenario D is consistently the **worst** performing scenario in terms of GHG outcomes and results, with this trend is particularly evident in the northern and southern sectors. This is due to the higher VKT associated with this scenario.

### 3.2.6 Discussion

#### Vehicles

Air emissions from vehicles on a gross and per capita basis for particulate, NO<sub>x</sub>, VOC, and GHG emissions over the modelled period are lower for scenarios A, B, and C. However, the modelling of transport emissions predicts that the bulk of the emission improvements will occur by 2021, and reduce after that date. This decline in emissions reduction after 2021 is due to the predicted increase in the number of vehicles in the fleet (travel demand growth) which will result in substantial increases in total vehicle kilometres travelled (VKT) by the fleet. The initial (2006-2021) emissions improvement is due to the introduction of improved vehicle emission standards by Government. This modelling is consistent with a historically measured trend towards lower overall vehicle emissions per vehicle as outlined in Bluett et. al. (2010) from 2003 to 2009.

Scenario D consistently produces the worst outcomes for the air quality indicators overall compared to other scenarios by 2041, on a per capita and a gross basis. This is due to a growing population and the location of this population north and south of the current metropolitan urban limits, increasing the VKT under this scenario.

While Auckland’s transport total emissions have historically been decreasing, there are still grounds for concern, especially for particulate and NO<sub>x</sub> emissions (Bluett et al. 2010). The Auckland vehicle fleet is aging, and a significant trend that has been observed is that per vehicle NO<sub>x</sub> emissions from diesel vehicles may have plateaued. A similar trend has been observed in the European Union by the European Environmental Agency (2011) for diesel NO<sub>x</sub> emissions, (that is, the emission improvements have been less than what was expected). The EU fleet is more modern than the New Zealand fleet. The risk of not meeting Auckland’s air quality standards and New Zealand’s AQNES NO<sub>2</sub> and particulate ambient air standards for motor vehicles is still therefore assessed as a risk in any scenario adopted. This is despite the introduction of Euro V vehicle emission standards for new

heavy duty diesel vehicles by January 2015, because the European experience illustrates a measured air quality benefit may not be certain.

The levelling off of vehicle emission improvements after 2021 means that a strategy to shift to a combination of less travel and/or lower emission transportation is critical in improving Auckland's future air quality and protecting it's population from adverse health effects. A range of best practise mitigation and avoidance strategies will need to be applied to reduce transportation emissions. This would include integrating landuse, particularly new roading and air quality provisions in the Auckland Unitary plan.

Scenarios A, B and C show Auckland's overall fuel consumption by 2041 remains at 2006 levels due to improved fuel efficiency by vehicles despite increasing travel. Scenario D does not assist with meeting the Mayor's goal of reducing greenhouse gas emissions (GHG) by 40%, over 1990 baseline levels. Scenario D increases fuel consumption by 2041. Meeting the Mayor's target will require dramatic decreases in our use of energy over the next generation.

If there is a shift to greater proportion of biofuels in Auckland over the modelled period, there are also potential implications for air quality. Changes by central government to fuel specifications for biofuels in the future could therefore also affect the conclusions of this analysis as the implications in terms of risk to Auckland population are not clear.

### **Air Pollution Exposure**

A number of scenarios provide for higher density residential living in some areas. If vehicle travel is not minimised in these areas then this may result in increased exposure to air pollution, particularly if residential areas are close to strategic freight routes. In addition, if domestic heating is not reduced then overall exposure to poor air quality will increase with scenarios A to C (given the increase in population in more central urban areas).

A large proportion of Auckland's motorway network is concentrated in the middle of the isthmus, particularly in central Auckland. Further dispersion modelling and monitoring of vehicle emissions is recommended to ascertain the exposure of Auckland residents in these areas.

### **Ports and Airports**

Emissions from the Port of Auckland, Onehunga, and NZDF Devonport and Auckland International Airport and potential airports are likely to be significant as an air pollution source in Auckland but are not discussed in any scenario. Cost-effective best practise emission reduction practises need to be applied to all these sources. Population growth of the expected magnitude proposed may justify a second (northern) Auckland airport. The scenarios are silent on this possibility, and the air quality implications of such a proposal have not been assessed.

### **Reverse Sensitivity (Scenarios B-D)**

More compact urban form increases the potential for more conflicting landuse activities to be located close together. This increases the potential for reverse sensitivity. Reverse sensitivity implications for residential uses could occur with all scenarios, with Scenario B, C and D having a greater assessed risk than scenario A, unless mitigated by other policy measures e.g. reducing emissions from home heating and including provisions in the unitary plan for buffers and separation (particularly from heavy industry or transport).

Scenario C appears to have the greatest assessed risk of reverse sensitivity effects due to higher density residential land uses being established near the established industrial air quality management areas (IAQMAs) in South Auckland.

## **Industry**

The treatment of heavy industry (Group 1 industry) is not consistent across all scenarios and clarification is required in particular for the provisions for Group one industrial sites in Scenario A and C. No Group one industrial sites are shown on scenarios A and C.

Optimal locations for new Group 1 industries (IAQMAs) need to consider, amongst other issues:

- topography
- the prevailing and diurnal wind patterns
- meteorological effects,
- the sensitivity of adjacent land use zonings to avoid reverse sensitivity issues
- Air Quality Emissions
- adjacent downwind activities

Location of Group 1 industry in the Whenuapai / Drury area on scenarios B and D in particular, potentially exposes the Greenhithe / Pukekohe residents to higher level of emissions from the predominant SW wind. This location also potentially increases particulate matter emissions into the Auckland airshed, rather than away from it.

Further dispersion modelling of industrial emissions from new industrial (Group 1) landuses is recommended to ascertain the exposure of Auckland residents. In particular, if heavy industry is to be located anywhere it needs to be adequately separated from sensitive land uses.

## **3.2.7 Conclusions**

The WHO recommends continuing to work towards lowering the concentrations of air pollutants, particularly particulate matter for which there is no known safe concentration. Therefore it is important that concentrations are reduced, particularly so that with an increasing population, increasing numbers of people are not being exposed to poor air quality

## **Vehicles**

Overall, the air quality differences between scenarios A, B, and C are small and result in reductions in air pollution on 2006 levels, including particulates by 2041. This improvement is driven by improved vehicle emissions from the vehicle fleet. A slower rate of air quality improvement is expected from 2021 to 2041, reflecting the greater vehicle kilometres travelled.

Scenario D is consistently the worst performing scenario compared to other scenarios in terms of air quality emissions. This trend is particularly evident in the northern and southern sectors for particulates, NO<sub>x</sub>, and VOC. If Scenario D were selected as the preferred scenario, this would mean that more stringent domestic emissions reductions would certainly be required, and any consequential emissions reductions required would need to be reassessed.

Auckland Council does not manage vehicle emission standards and can only advocate to the Ministry of Transport for different standards. In effect, Auckland Council has to accept the national emissions

standards for vehicles, unless it can make a case to central Government for more stringent standards. The levelling off of transport emissions past 2021 means that an enhanced focus on reduced travel and/or lower emitting transport modes is required to further improve air quality from that date. Strategies to encourage lower emitting transport are desirable to further reduce air pollution caused by vehicles, aircraft, and ships.

On road, real time measurements of NO<sub>2</sub> emissions in Auckland, reinforced by the European experience, indicate that the risk of NO<sub>2</sub> concentrations exceeding the national air quality standard may remain.

Per capita basis fuel consumption gradually decreases with all scenarios, but is highly unlikely to be enough to meet the Mayor's GHG emissions reduction target. Scenarios A, B, and C are consequentially better than Scenario D for energy resilience as they reduce fuel consumption overall by 2041. The additional benefits of achieving the GHG goal include; individual and societal cost savings in health costs, greater resilience, less emissions, cleaner air, and a greater ability to hedge against peak oil induced petroleum fuel prices.

### **Domestic Emissions**

It is assumed that NZ best practise measures will be applied to manage Auckland's domestic emissions from solid fuel heating concurrently with managing transport emissions. Failure to jointly address domestic emissions and transport could result in a heightened risk of non-achievement of the regional and national air quality standards.

### **Integrated Landuse**

With an increasing population, it becomes more important that landuse is integrated with air quality management, including managing reverse sensitivity, and allowing for air quality considerations in new infrastructure projects (e.g. large roading projects or retail centres). Provisions for this could be outlined in the Auckland Unitary plan. Such provisions would reduce issues associated with an increasing population exposure to poor air quality, including associated health costs, and reduced amenity.

### 3.2.8 References

A strategy for Improving Air Quality in South East Queensland (1999, updated 2008) South East Queensland Regional Air Quality Strategy. State of Queensland.

Bluett, J , Kuschel, G, Rijkenberg, M, Shrestha, K. (2010) Are the Harmful Emissions from New Zealand's Light Duty Vehicle Fleet Improving?. NIWA Client report CHC2010-TBA. National Institute of Water and Atmospheric Research Ltd, Christchurch, NZ

A Review and Update of HAPINZ for the Auckland Region (2010). Kruschel, G and Mahon, K. Report prepared for the Auckland Regional Council. ARC internal report No 2010/004

Metcalfe, J and Kuschel, G (2010) Domestic fire Emissions: Scenario Analysis. Prepared for Auckland Regional Council. ARC Internal Report No. 2010/007.

Porteous, A. S, G.W. Fisher, Reid, S.J. and Thompson, C.S (1993). Air Quality in Auckland. The meteorological data network. Report to Auckland Regional Council.

"Road transport drags down air pollution efforts". Transport and Environment news, Tuesday, June 21 2011. <http://www.transportenvironment.org/News/2011/6/>

WHO air quality guidelines for particulate matter, ozone, nitrogen dioxide, and sulfur dioxide: Global Update 2005 Summary of risk assessment. World Health Organisation, Geneva, Switzerland

Webster, K. (July 2011) Air Quality Management in Auckland. Auckland Council staff briefing to Environment and Sustainability Forum

### 3.2.9 Appendix 1: Contextual Background Graphs

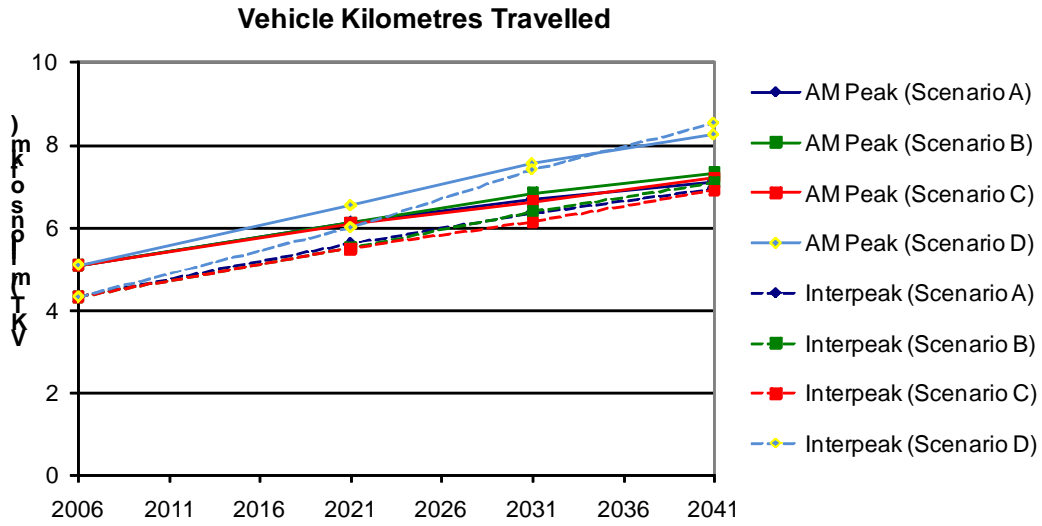


Figure 10: Vehicle Kilometres Travelled

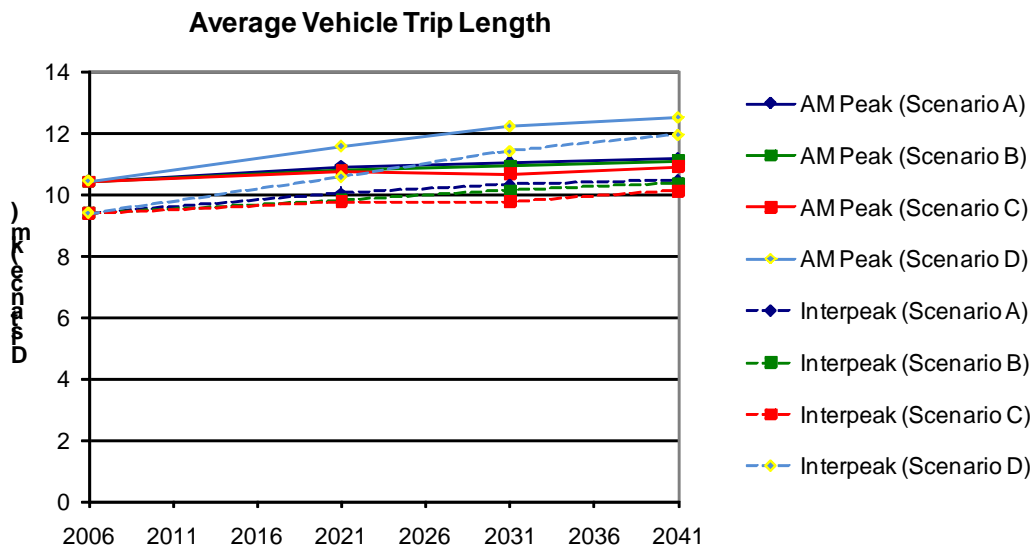


Figure 11: Average Vehicle Trip length

### 3.2.10 Appendix 2: Airshed and Sources

#### 3.2.10.1 The Auckland Airshed

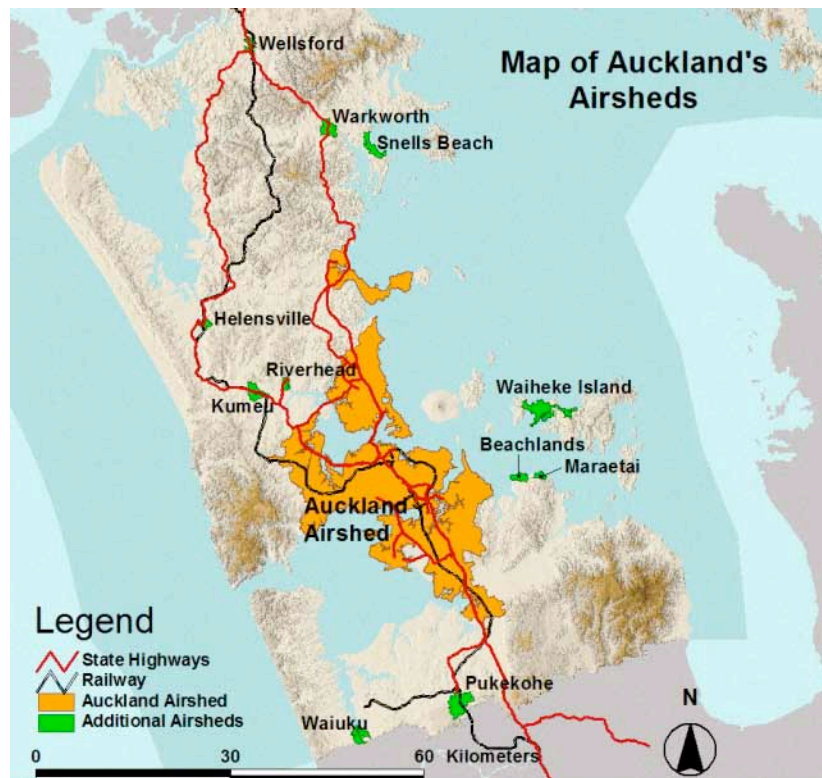


Figure 13: Auckland Airsheds

Figure 13 illustrates the various air sheds gazetted in Auckland under the AQNES to manage air quality in the region. The Auckland airshed is within the current metropolitan urban limit (MUL), and is the orange area in Figure 13. Air quality in the Auckland region is currently assessed at 15 monitoring sites which have been selected to represent a variety of pollutant sources and exposures. Compliance with the national standards is assessed from the worst of the air quality monitoring sites (Regulation 15 AQNES).

Under business as usual, the Auckland Airshed cannot meet the 2011 AQNES air quality standard by 2016 (Metcalf and Kuschel (2010)). Further, it is not likely to do so unless best practise measures are adapted to address both domestic and vehicle emissions. For the Auckland Airshed to meet the regional and national standards, then two important requirements will need to be put in place. Metcalf and Kuschel (2010) stated that both domestic and transport emissions need to be reduced by 58% (compared to 2005 levels) to achieve compliance with the national particulate standard. This target is not a stringent compared to other South Island airsheds in New Zealand, but nevertheless will require concerted efforts to reduce emissions from both sources.



Exceedences of regional and national standards in Auckland are primarily caused by domestic solid fuelled home heating (wood burning) and vehicle emissions from vehicle exhaust, tyres and brake wear.

### **3.2.10.2 Source: Domestic**

Domestic home heating contributes around three quarters of the emissions in winter time and comprises approximately half of the emissions on average over the whole year. A significant reduction programme would be needed to phase out existing domestic fires, to reduce emissions from this major source. This would involve management of both existing open fires and existing and new solid fuel burners. Metcalfe and Kuschel (2010) assessed the four basic options that are available to Auckland Council to reduce domestically-sourced emissions by 2016. The 2011 AQNES now requires Auckland to meet the PM<sub>10</sub> standard by 2016, and three of the four options identified by Metcalfe and Kuschel enable Council to meet this target.

### **3.2.10.3 Source: Transport**

In addition to a strategy to reduce domestic heating emissions, transport emissions should be reduced. The transport sector is a major emitter in the Auckland airshed. Transport is estimated to contribute 37% of annual emissions of PM<sub>10</sub> to Auckland's airshed, and is the greatest contributor to a number of other pollutants such as nitrogen dioxide (NO<sub>2</sub>). Vehicle emissions are mainly from vehicle exhaust, but tyre and brake wear are also significant sources of transport particulate emissions.

Transport emissions are regulated through Ministry of Transport rules, including fuel and emissions standards. Therefore Auckland Council has little control over fuel and emissions standard and is the recipient of the air quality results of these rules but can advocate for improving standards.

The adoption of a Land Transport rule for Vehicle Exhaust emissions 2007 (updated 2010) will be the major driver of improvement in vehicle emissions. The rule specifies that new heavy diesel vehicles must be at a Euro V standard and new and used light vehicles and diesel vehicles be Euro IV standard by 1 January 2015. Euro V particulate standards for diesel vehicles are the same as petrol (5 mg/km). The Euro V standard represents an 80% reduction from Euro IV standards, so that theoretically at least, air quality improvements from the emissions from the fleet should progressively accrue from this time.

The large used proportion of used Japanese imported vehicles is a significant issue for air quality management in Auckland (Bluett et. al. (2010)). Used Japanese vehicles mean that there will be a considerable lag effect before significant numbers of these vehicles with improved emission performance enter the Auckland market. This is due to the affordability of new and replacement second hand vehicles. As the current average age of the Auckland light vehicle fleet is fleet is approximately 11 years, (Bluett et.al. (2010, p 25)), air quality improvements arising from these standards will take some time to take effect. Vehicle age is important for Auckland as 2016 is the compliance date for meeting the national particulate air quality standard, as well as other pollutants. The bulk of the initial particulate improvements will therefore have to come from domestic heating to meet this target. One of the main methods that the council has to reduce emissions from transport is to reduce travel in the region and encourage significant mode shift to public transport.

## 4 Cultural wellbeing

### 4.1 Māori perspective

#### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
Protection of Māori heritage and areas of cultural significance	0	0	0	XX
Enabling economic opportunities for Māori	X	✓	✓	✓✓
Promoting Māori culture	0	X	XXX	X
Preserving the Mauri	✓	X	XXX	XX

#### Key comments

- At this level of assessment, it would appear that Scenario B has the better balance of proposed development options in relation to Māori values. But this level of assessment should be investigated further to ensure that the spatial parameters for this scenario can align with or be fully cognisant of Māori values.
- Scenario A has minimal or neutral impact across all four measures. Infill areas will cause some consternation with iwi given their coastal location. Ngati Paoa has two registered sites located around Victoria Park and the central CBD. Waiohua, Ngati Whatua also have interests along the coastal fringe.
- Scenario B has minimal to medium impact but concerns could be raised in areas of coastal infill.
- Scenario C has a large impact and is possibly untenable; it will cause high concern with iwi.
- Scenario D's increased MUL may have negative impact on Māori interests in southern Manukau. Greenfield areas are problematic to the extent that they may impact on Māori freehold land rating, increased infrastructure that may be inappropriate unless mitigation through effect engagement or trade-offs. Unregistered waahi tapu sites or cultural sites of significance are at risk.

#### Overview

This paper aims to provide information as to how Māori values can be considered against the four scenarios put forward for the Auckland Plan and the impact that each scenario has on Māori values. Māori values in this paper include concepts of tikanga, Māori aspirations, Māori well-being and perspectives.

This work follows on from the Future Land Use and Transport project ("the project") that was undertaken by the Auckland Regional Council in 2010 and the Māori input at that time is still relevant to this process. This document is attached as an appendix.

This paper undertakes to:

- Review and clarify the Māori assessment criteria that were developed for the project as a tool for evaluating the four scenarios.
- Provide an initial assessment of the scenarios based on the above criteria.

### **Key Starting Points**

At the time of drafting the Māori input into the project there were some key starting points that are still relevant, namely:

- Māori are an important part of the social fabric of the region and it is important these values are given priority.
- Māori values range from iwi to iwi and region to region. There is no one way to categorise Māori values nor is it useful to put blanket concepts across Māori.
- Māori society is ever-changing and there are a number of factors that influence Māori values. Understanding these potential catalysts for change will help to ensure that we continue to move with the needs of Māori and the wider region.
- Assessing the impact on Māori values requires an ongoing working relationship with Māori at all stages of the planning process.
- Māori values span social, cultural, economic and environmental well-beings and must be considered in a holistic manner.
- Issues that pertain to Mana Whenua cannot be assessed at a regional level. Mana Whenua are very local and these issues must be given due consideration despite the regional impact.

### **Criteria**

The following criteria should be applied to the four scenarios to provide an assessment of the impact on Māori values.

#### **1. Protection of Māori heritage and areas of cultural significance**

MEASURE: Extent to which options contribute to the loss and desecration of Māori heritage and areas of cultural significance.

This criterion focuses on preventing further loss and the desecration of Māori heritage and areas of cultural significance to Māori including wāhi tapu. There is no one way to promote the protection of these areas e.g. protection of these areas does not just mean conservation or not developing but can include policies which promote the enhancement and appropriate use of these areas.

A key method for ensuring protection or the appropriate use of these areas is to embed Māori in the decision-making process that concerns the management of these areas. Such involvement will also enable Māori to identify where, in a generic sense; these areas are and development appropriate management or co-governance mechanisms.

Given this and the key starting points for a regional spatial assessment, the basic application of this criterion is to assume that where there are new areas of proposed development, the likely impact on Māori heritage and areas of cultural significance increases.

#### **2. Enabling economic opportunities for Māori**

MEASURE: Extent to which economic opportunities are enhanced

This criterion focuses on using space in a way that encourages economic opportunities for Māori. Again there are a number of policy matters that can contribute to achieving this and is not limited to the availability of industrial or business areas. It can include but not limited to:

- provision of infrastructure to rural areas such as broadband;
- re-designation of reserves set aside for Māori purposes to multi-purpose.

- reviewing the rates remission policy on Māori Freehold Land to release economic potential
- targeted funding to support community driven projects that promote training and education
- creation of appropriate decision making frameworks concerning areas of Māori interests

When considering Māori economic opportunities it is important to understand the drivers behind why Māori choose to live in particular areas. The skill set that Māori have can often dictate where Māori will settle, traditionally this has been industrial and manual labour industries. However with the changing skill set of Māori and the opportunity to enter into other areas of labour, more industrial/business zones does not necessarily achieve the enabling of economic opportunities for Māori.

An important issue that will significantly shift Māori economic development will be the outcomes from Treaty settlements and the increasing ability for iwi to realise their commercial aspirations. Some of these Treaty settlement negotiations have clearly identified areas of commercial redress. Planning strategies that restrict residential development in tribal areas, due to their pristine and rural character, can often limit the opportunity for Māori economic development.

Given this and the key starting points for a regional spatial assessment, this criterion is applied by identifying the nature of development in areas of high Māori population and enabling greater economic opportunity in areas ring fenced for commercial redress. In assessing the nature of development in areas of high Māori population, it assumes that with increased development comes an increased opportunity for employment and business.

### **3. Promoting Māori culture**

MEASURE: Extent to which Māori can access places and resources for Māori culture.

This criterion focuses on how the scenarios encourage and enhance access for Māori to resources to maintain their cultural practices.

For Mataawaka (Māori who are not Mana Whenua) in Auckland, this can include access to places such as marae, Māori services and resources used for traditional practices such as rongoa (medicine) or weaving. This can be supported through appropriate policies and is not solely reliant upon the way in which Auckland is configured. It is however important to consider the way in which new or existing town centres are developed to provide for those communities.

For Mana Whenua this criterion explores the way in which greater access to coastal areas or areas of traditional practice e.g. marae, rivers and Māori land is encouraged. In terms of the scenarios, the assumption is that with more development, there is greater infrastructure support and amenity value thus providing greater and easier access to these areas. For example, better transport networks to rural marae or better access to coastal areas where Māori would collect kaimoana.

### **4. Preserving the Mauri**

MEASURE: Extent to which scenarios impact on the Mauri of the resources.

This criterion focuses on how the impact that the scenario will have on the environment. This encompasses many of the resource management aspects including impacts on air, land and water from a Māori perspective. Mauri can be described as the essence or the natural state generated from the “life-force”. Mauri also denotes preservation of a state and that to maintain it, only certain activities may occur. Discharging waste into a clean water source will destroy its “mauri”, so there should be actions to ensure that the natural state of the water is preserved.

The assumption here is that encouragement of access to less developed areas and intensifying existing town centres places pressure on the resources of that area and consequently has negative impacts on the Māori of those resources.

#### **Assessing the scenarios against the criteria**

Rating against Māori values is conditional upon a number of matters:

- Identification of all cultural sites of significance
- Mitigation of adverse effects across scenarios B, C, and D. A will have no change of status but this is not to say that matters could be improved by providing for opportunities in decision making processes.
- Accommodating Treaty Settlement Outcomes particularly where land blocks are part of the quantum settlement packages
- Preservation of the three harbours in particular the Manukau and Kaipara

Māori Values or at least the spiritual and physical elements attached to some of them (Waahi Tapu) must be determined through an engagement process that takes into account the specific nuances attached to these sites. While these may appear as constraints, they can also provide an opportunity for Council to consider iwi alternatives in mitigating adverse impacts.

## Appendix



Toitū te marae o Tāne  
Toitū te marae o Tangaroa  
Toitū te iwi

*If the domain of Tāne is sustained  
And the domain of Tangaroa sustained  
So too will the people be sustained*

Future Land Use and Transport Project  
Considering Tangata Whenua Values  
February 2010

## Executive Summary

### Overview

This paper aims to provide a layer of information unique to tangata whenua that has a significant impact on future land use considerations in the Auckland region. It identifies some key elements of Māori society in the Auckland region in order to understand the impact of providing for a substantial population increase by 2050. This information intends to paint a current picture of Māori society in the Auckland region as it is today and identify some events that may change this dynamic.

Tangata whenua are a key part of the social fabric of the Auckland region. There are elements of Māori society that has existed parallel to mainstream society that influences the well-being of the Auckland region. In a time where Treaty settlements in the Auckland region are imminent, these elements of Māori society will become more evident. The challenge for the future is how the region can work together to ensure that Māori and western perspectives can contribute to a region that is a great place to live, work and play.

### Key legislative and strategic alignment

The leading document for land use issues in the Auckland Region is the Resource Management Act 1991 (“RMA”) and underneath that the Auckland Regional Policy Statement (“RPS”). There are some key legislative obligations requiring the consideration of tangata whenua values when undertaking functions under the RMA, namely the requirement that those persons:

- Shall recognise and provide for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga as a matter of national importance.<sup>10</sup>
- Must have particular regard to kaitiakitanga.<sup>11</sup>
- Shall take into account the principles of the Treaty of Waitangi.<sup>12</sup>

These considerations are also relevant to the Regional Land Transport Strategy which is to be consistent with the RPS<sup>13</sup>.

The Auckland Sustainability Framework (“ASF”) provides an overarching framework of sustainability for the region. It identifies eight inter-related sustainability goals of which there is a Māori specific goal and a number of strategic responses to Māori identified across the other seven. The Māori specific goal is:

*Te Puawaitanga o Te Tangata – Self-sustaining Māori Communities<sup>14</sup>*

*Mana whenua as the indigenous peoples of the region are enabled to fulfil their responsibilities and obligations as inherent kaitiaki and to manaaki those other communities that reside within their tribal domains.*

*Taurahere make a significant contribution to the well-being of the region and add to the economic, cultural and social richness.*

*The potential and value of Māori is fully realised*

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<sup>10</sup> s6(e) RMA.

<sup>11</sup> s7(a) RMA.

<sup>12</sup> s8 RMA.

<sup>13</sup> Schedule 7, clause 3(a)(iii)(B) LTMA.

<sup>14</sup> ASF, p22-23.

The Auckland Sustainability Framework also identifies a number of major 'shifts' that need to occur in our social values and expectations, systems and processes. A Māori specific shift has also been identified.

*Value Te Ao Māori<sup>15</sup>*

*Acknowledge Mana whenua as the indigenous people of Tāmaki Makaurau Auckland and recognise the significant role they play in sustaining the region.*

*Accord value and celebrate Te Ao Māori (the Māori world view, culture and values) as a core element of the region's identity.*

The Māori Relations Strategy guides the Te Hononga Māori programme reflected in the Draft 2009-2019 LTCCP. It acts as an underpinning for the role and function for Te Pae Hononga Māori (Māori Relations Team) and an integrated point for the organisation and underpins ARC's approach to working with Māori communities across the region.

The strategy provides the foundation, which informs and drives the organisation's Māori effectiveness and responsiveness approach. The strategy sits within the Auckland Regional Council's strategic framework and is underpinned by four key outcome indicators:

- Meeting legislative requirements
- Effective Treaty-based Relationships
- Sustainability of tangata whenua
- Contributing to Māori outcomes

These legislative and strategic documents provide a strong rationale for considering Māori values in the Future Project.

### **Key Conclusions**

- Māori values are a key consideration in land use planning for the Auckland Region.
- Understanding what Māori value in the Auckland Region is a necessary first step to considering these values.
- Māori society is ever-changing and there are a number of factors that influence Māori values. Understanding these potential catalysts for change will help to ensure that we continue to move with the needs of Māori and the wider region.
- Integrating Māori values requires an ongoing working relationship with Māori at all stages of the planning process.
- Māori values are relevant not just to cultural well-being but all the well-beings and consideration should be given to Maori values accordingly.

### **Introduction**

This paper forms part of Phase 3 of the Future Land Use and Transport Project. It is intended to fill an information gap which was originally identified as the cultural well-being component.

It identifies some key aspects of Māori society but is not an exhaustive list of things valued by Māori in the Auckland Region. The paper complements a series of maps representing Māori values in a spatial form which can be used to overlay values with the scenarios that were developed in the

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<sup>15</sup> Ibid p13.



earlier phases of this project. Such an exercise is useful when assessing the impact of the scenarios on Māori values.

This paper identifies higher regional Māori values which causes difficulties when it comes to implementation because Māori are local in their nature. Tangata whenua organise themselves around a local geographic area and are unable to dictate or even hold a perspective on what happens outside their rohe (tribal boundary). It is important to note that this paper identifies some common overarching themes across Māori communities that help planners and policy writers to understand the generic issues however when you drop it down, tangata whenua will have their own perspective on how these values should be managed. This raises the importance of ensuring that tangata whenua are involved at all stages of the planning process as there is not a “one size fits all” Māori perspective and should be treated on a case by case basis.

The main focus of this paper is tangata whenua – Māori who have ancestral connections to the Auckland Region – as there are unique issues for tangata whenua when it comes to land use planning. There is a small focus on Māori resident values, mainly places where Māori culture can be practiced, however many of the social, economic and environmental issues for Māori residents are left to be dealt with in the same manner as the wider regional community.

### **Background**

The Future Land Use and Transport Project (“The Future Project”) identifies the future land use for the Auckland region to 2051 by developing a number of land use scenarios and testing them against the social, economic, environmental and cultural well-beings. This project is being completed in discrete stages and is currently into the third phase of the project.

To date the project has focussed on the development of five land use scenarios and provided a number of high level conclusions and recommendations for future land use in the Auckland region. It also identified some gaps in the evaluation process. Of significant concern was the lack of information around the cultural well-being. This third phase focuses on completing the evaluation of the land use scenarios and addressing these gaps. It is important to note however that tangata whenua considerations are relevant to all four well-beings and not just confined to cultural well-being.

The Māori Relations Team was engaged by the Regional Development Team to assist in providing a Māori perspective to the Future Project and to develop this in a spatial form to support the assessment of the land use scenarios.

The Māori Relations Team identified the need to represent Māori values in isolation of other values to ensure the integrity of that information was not lost. The key regional values were identified by reflecting on iwi management plans, submissions made by Māori to other Council processes, outcomes of consultation and the Maori Relations Team’s understanding of the Māori landscape in the Auckland Region. These values were largely driven by what could be represented in a spatial form whilst acknowledging that supporting commentary would be needed to qualify this information.

The intention of this Māori information is not to provide conclusions, but identify some key current and potential considerations that will help to enable Māori values to be considered in land use planning and decision making.

## **MÂORI VALUES**

The following is a list of places that have been mapped where Māori values can be represented in a spatial form. They play an important role in the identity of Māori culture - a key element of Māori society. It is important therefore that these dots on a map are clearly understood from a Māori lens.

There are a number of labels used to describe Māori communities, either correctly or incorrectly. This paper is not intended to explore that debate so for the purposes of this paper, the terms Māori refers to Māori who reside in the Auckland Region and tangata whenua refers to those iwi, hapu or whanau that have maintained their ancestral connections to the Auckland region . The Auckland Regional Council, has a list of iwi authorities that it deals with for resource management matters and the tangata whenua are defined by the iwi / hapu that those authorities represent in the Auckland region.

The maps identify:

- Marae of the Auckland Region
  - Tangata whenua marae;
  - Community marae;
  - Church marae;
  - Defence marae;
  - Education marae;
  - Taurahere (tribes outside the Auckland area who establish satellite communities to maintain communication with members living away from home) marae.
- Māori freehold land in the Auckland Region
  - Urupa (burial grounds)
  - Māori land used for economic purposes
  - Māori land used for wider public benefit
  - Papakainga (formal and informal)
- Areas of significance to tangata whenua
  - Tribal identifiers and special land blocks

### **Treaty settlement considerations**

- Crown properties in the Auckland Region
  - Land-banked properties
  - Crown forests licensed land
- Iwi authority area of interest
  - Areas that have been settled with the Crown through the Treaty settlement process
  - Areas proposed to be settled with the Crown through the Treaty settlement process
  - Proposed commercial redress
  - Proposed cultural redress

## MARAE

### Explanation

In Māori society, the marae is a place where the culture can be celebrated, where the Māori language can be spoken, where intertribal obligations can be met, where customs can be explored and debated, where family occasions such as birthdays can be held, and where important ceremonies, such as welcoming visitors or farewelling the dead ([tangihanga](#)), can be performed. <http://en.wikipedia.org/wiki/Marae>. Most people mistakenly interpret marae as being a meeting house but more correctly the marae is known as the entire complex on which a whare nui or whare hui (meeting house), whare kai (dining hall), whare paku (ablution blocks) and in some cases puna reo (language nest) or whare karakia (church) are found.

The maps identify marae in the Auckland region. They are categorised to highlight their unique significance to the communities it serves. The explanations below attempt to explain the category and some common themes across these marae in order to understand the value they serve in the Auckland region. It is important to note that each marae has its own mana and its own kaupapa (purpose) so describing themes seemed more appropriate for this exercise.

### Methodology

The tangata whenua marae in the Auckland region were identified by those parcels of land that have a marae reservation designation. The other marae are those places that have a meeting house, dining hall, are underpinned by kaupapa Māori and is considered and called a marae by that community. This information was derived from an existing ARC database of marae as well as reference to other marae directory including a directory maintained by Te Puni Kokiri Tamaki Makaurau office.

### Sub-categories

#### Tangata whenua marae

Tangata whenua marae refers to the marae of the people who have ancestral connections to the area. In all instances, these marae are located where the iwi / hapu hold and exercise their mana whenua (customary authority). It is a physical manifestation and symbol of that tribe's presence in that area and for that reason they are only found in their tribal boundaries.

These marae symbolise the mana (regard or esteem) of the people. They are tapu (sacred) places because this is where the tikanga of the tangata whenua is practiced, preserved and passed on. It provides a place for decision making, gathering, learning and serves as a key identifier for the people of that area. This picture suggests that the marae and the people of that marae are interdependent, in that the marae sustains the people and its culture while the people in turn sustain the marae.

The importance of the marae amongst one of the tribe's in the Auckland region, Waikato Tainui, is highlighted by Huakina Development Trust in the [Waikato Iwi Management Plan 2007](#) stating:

*"The marae are the focal point of meeting place of the whanau, hapu and iwi. They are the centre of all Waikato activity, be this political, social, cultural or traditional..."*

In order for the marae and associated tikanga to be sustained, an aspiration for tangata whenua is to encourage whanau (family) to come back "home" i.e. within the vicinity of the marae. In this document we refer to this concept as a "potential tangata whenua growth node" whereby limited development consistent with supporting the social and economic needs of whanau to reside within close proximity to the marae can occur.

Currently there are examples of what are effectively papakainga settlements around existing marae in the Auckland region that can help us understand the needs of these potential tangata whenua growth nodes. (Refer to section on papakainga)

In the Auckland Region not all tangata whenua have marae nor is there a marae in every part of the iwi's area of interest. It is important to note then that the map depicts the value that marae have to tangata whenua where one exists and does not diminish the status of tangata whenua because there is no marae in that area. Certainly an aspiration for tangata whenua who do not have a marae or where the marae no longer meets the needs of the people is to erect new marae so that the traditions and knowledge of that iwi can be passed on.

The location of future marae will only be within the tribal area of that iwi. It is uncommon for iwi to build marae outside of their tribal area unless it is to serve a population of their people who reside outside their tribal boundaries (refer Taurahere marae) or there has been a gifting of land by the local iwi to another iwi who have a contemporary relationship with that land or that people.

*Well-being considerations for tangata whenua marae*

<b>Social</b>	<b>Cultural</b>	<b>Economic</b>	<b>Environment</b>
<p>Existing marae represent potential tangata whenua growth nodes where tribal members will eventually reside. Such residence supports the ability for tangata whenua to sustain their marae and associated practices. In terms of development around marae, consideration should be given to permitting activities that enhance the value of tangata whenua marae.</p> <p>Activities that promote the development of papakainga and associated infrastructure are consistent with tangata whenua social aspirations. Activities that are in excess of the needs of a papakainga community are not consistent with social aspirations unless they are used to enhance economic aspirations.</p>	<p>Tangata whenua marae support the ability for tangata whenua to preserve, practice and pass on their tribal knowledge and traditions. The marae and its associated practices contribute to the identity of that iwi which is a key element of tikanga Māori.</p> <p>Activities that enhance the ability for tangata whenua to have and use tangata whenua marae to preserve, practice and pass on tribal knowledge is consistent with tangata whenua cultural aspirations.</p>	<p>Tangata whenua marae can also be a hub for economic activity. In such cases these activities are driven and influenced largely by tangata whenua with the benefits going back to tangata whenua and can enhance their ability to be self sustainable.</p> <p>Activities around tangata whenua marae that support the collective economic aspirations of tangata whenua are consistent with supporting tangata whenua economic aspirations.</p>	<p>Activities that enhance the use of tangata whenua marae are to be promoted. Such activities include:</p> <ul style="list-style-type: none"> <li>• Papakainga development;</li> <li>• Those that provide tangata whenua with greater access and quality use of the marae (although this needs to be balanced against unlimited public access);</li> <li>• Promote the ability for tangata whenua to be self sustainable.</li> </ul> <p>Activities that undermine the use of tangata whenua marae are to be avoided. Such activities include:</p> <ul style="list-style-type: none"> <li>• Extensive excavation of land in and</li> </ul>

Social	Cultural	Economic	Environment
			<p>around the marae in excess of the needs of a papakainga community;</p> <ul style="list-style-type: none"> <li>• Destruction of wahi tapu areas;</li> <li>• Reduction in the quality of marae resources such as water supply and marae food sources.</li> </ul>

Tangata whenua marae are considered to be of high significance.

#### Community marae

Community marae are established to serve a range of activities such as recreational, social, cultural, spiritual and sporting activities for a particular geographic community – Māori and non-Māori. These marae can serve as a cultural centre for that community. Similar to tangata whenua marae it provides a place for community decision making, gathering, and learning. For Māori residents in that community, it can also support them to maintain, recapture and develop their Māori heritage.

In the Auckland Region approximately 11% of the Māori population affiliate to an iwi that has ancestral connections to the land. The remainder are from iwi outside the region or do not know their iwi. This factor highlights the importance of community marae to provide opportunities for tikanga Māori to be practiced. Community marae often present an opportunity for non-Māori to become familiar with Māori culture as tangata whenua marae can be more strict in their protocol and not as geographically accessible as community marae. Unlike tangata whenua marae which can only be built in its tribal rohe, the location of a community marae is determined by the community it serves.

In some cases the community marae will take on the kawa (protocol) of the tangata whenua who have a connection to the land that the marae is built on. This is often done to acknowledge the tangata whenua and their responsibilities in hosting those that live within their region. In other cases the kawa may be determined by the group coming to the marae or the knowledge and skills of those who run the marae.

#### Church marae

Church marae are established to provide for the social, economic, cultural and spiritual needs of a particular church community. These marae are not exclusive to Māori and hold similar benefits that a community marae hold for the church community. The range of activities that occur on these marae vary from marae to marae. It can be a physical symbol of identity for them.

#### Defence marae

Defence marae are established to provide activities including whanaungatanga (embracing extended family), matauranga (education), tangihanga (funerals) and kapa haka for members of the defence forces. Similarly it too provides the benefits associated with community marae and enable Māori

traditions to be preserved and practiced amongst defence force members. It is a physical symbol of identity for that particular community.

Education marae

Education marae are established to serve the needs of the learning institute’s community. It provides a Māori learning environment, a place to learn about things Māori as well as mainstream education and act a place of gathering for that community. It contributes to preserving, practicing and passing on Māori knowledge as well as providing opportunities for non-Māori to participate in Māori culture.

Taurahere marae

Taurahere marae are established to serve an iwi population whose ancestral connections sit outside the Auckland region. Often the taurahere group is considered to be satellite entities that affiliate to a wider entity based in their own tribal region. For example Tuhoe is an iwi based in Te Urewera, central North Island, and those Tuhoe people who reside in the Auckland region can gather at Te Tira Hou Marae in Panmure and practice Tuhoe culture with other Tuhoe members.

The kawa on taurahere marae is the kawa of that iwi. In some cases, these marae are established with the support and approval of the local tangata whenua who understand the value that taurahere marae have for iwi who have a number of members residing elsewhere. The knowledge and practices of that iwi are active in taurahere marae thus sustaining the tribal identity of those who choose to live outside their region.

*Well-being benefits of community, church, defence, education and taurahere marae (non-tangata whenua marae)*

<b>Social</b>	<b>Cultural</b>	<b>Economic</b>	<b>Environment</b>
<p>Non-tangata whenua marae provide opportunities for community cohesion and often the programmes that are offered by marae can help meet the individual / whanau social needs of a particular community. It provides a familiar environment for Māori to access social services.</p>	<p>Non-tangata whenua marae support the ability for Māori and non-Māori residents of the Auckland region to participate in Māori culture activities and act as a place of gathering, learning and decision-making for that particular community. It can act as a physical symbol of that community’s identity.</p> <p>These marae provide opportunities for Māori residents to maintain and practice aspects of their culture while they are living away from their place of origin and for taurahere communities, to maintain their connection to their home.</p>	<p>Non-tangata whenua marae can provide programmes that help meet the individual / whanau economic needs of a particular community.</p> <p>Some community initiatives can be driven out of these marae that contribute to the economic well-being of that community.</p>	<p>Non-tangata whenua marae environmental issues are consistent with wider resident issues.</p> <p>There may however be examples where there are cultural considerations that conflict with sustainable development of natural and physical resources but most of these issues sit with tangata whenua.</p>

### **Specific Marae issues in the Auckland Region**

- Tangata whenua marae currently make up a small proportion of total marae in the Auckland region. This is reflective of the fact that approximately 11% of the Māori population in the Auckland Region are tangata whenua while the balance of the Māori population comes from outside the region or are not aware of their origins.
- As the Māori resident population increases, the need for non-tangata whenua marae may increase. The location of these marae will be determined by where the community of need resides. Those choosing to live in Auckland may be attracted to a particular place of residence based on the strength of that Māori community and the presence of marae is often an indicator. Currently one third of the Māori population of the Auckland region are located in Manukau City while just over 22% reside in Auckland City. For tangata whenua who decide to “come home” their marae can only exist in their tribal rohe.
- The establishment of non-tangata whenua marae adds considerable value to the community it serves. In some instances however the establishment of marae close to existing marae can often place pressure on the sustainability of another marae as two marae in one community need to be maintained. How communities work together to ensure the cultural needs of a community are met is an important consideration.
- Tangata whenua marae have different issues to non-tangata whenua marae. Many of the issues are underpinned by the connection that tangata whenua have to the land. For Māori, the obligations to the land are not the same and therefore separate consideration needs to be given.

## MÂORI LAND

### Explanation

- All land in New Zealand has a particular status for the purposes of the Te Ture Whenua Mâori Act 1993 / Mâori Land Act 1993 (TTWMA) 16 :
- Mâori customary land
- Mâori freehold land
- General land owned by Mâori
- General land
- Crown land
- Crown land reserved for Mâori

The Mâori land maps deal with Mâori customary land and Mâori freehold land. Mâori customary land is land that is held by Mâori in accordance with tikanga Mâori<sup>17</sup> while Mâori freehold land is land, the beneficial ownership of which has been determined by the Mâori Land Court by freehold order<sup>18</sup>.

### Methodology

The map of Mâori freehold land was developed with reference to Mâori land plans, Mâori Land Online database, the ARC rates database and information from Land Information NZ. There are a number of discrepancies in the Mâori land databases for the Auckland region. This is still a work in progress to complete a comprehensive list of all the Mâori land in the Auckland region. However it is sufficient for identifying what value Mâori land has in this project.

### Mâori land

#### *Significance of Mâori land*

Mâori consider land to be a taonga tuku iho (treasure that is passed down)<sup>19</sup> and therefore holds special significance. This is illustrated by the following whakatauki (proverb):

*“Toitu te whenua, whatungarongaro he tangata”  
“Land remains but man disappears”.*

Mâori land represents those remnants of land that remain in legal ownership today. Ownership facilitates the ability for tangata whenua to fulfill their kaitiaki (guardian / stewardship) obligations, pass on the associated knowledge and practices that occur on that land and ultimately enhance mana.

In most cases, Mâori land is held by tangata whenua in their tribal rohe. It is very rare that Mâori land is held by a collective other than tangata whenua whether it is an iwi, hapu or smaller whanau group unless there has been some type of gifting arrangement where perhaps some contemporary relationship to that land or the tangata whenua is being acknowledged in the gifting.

The Mâori land holdings in the Auckland Region are proportionately small. This is the case for a number of reasons including early land transactions between iwi chiefs and the Crown, land confiscations by the Crown, the introduction of the Native Land Court or compulsory land taking through other Acts of parliament such as the Public Works Act.

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<sup>16</sup> s129(1).

<sup>17</sup> s129(2)(a).

<sup>18</sup> s129(2)(b).

<sup>19</sup> Preamble TTWMA 1993.



Māori land is also intended to be an economic base for tangata whenua so the ability to use Māori land is a fundamental aspiration for tangata whenua.

#### *Characteristics of Māori land*

In almost all cases Māori land interests are held by tangata whenua. The retention of land in the hands of its owners, their whanau and their hapu is promoted by TTWMA and such land can only be transferred to other tangata whenua. This places legal restrictions on the ability of owners to alienate Māori land in that Māori land cannot be offered on the open market unless its status is changed to general land.

Māori land is held in multiple ownership and interests are transferred or passed down to successors. This results in fragmentation of shares whereby in many cases there can be hundreds of owners in one block of land. This makes progress on the use of Māori land as an economic base for tangata whenua difficult as decision-making and communication efforts are complex. The structures over Māori land are often non-existent, inappropriate or ineffective as the capability and capacity to manage this complexity is beyond the existing means of tangata whenua. In cases where a management committee exists, there is a range of compliance measures required to manage Māori land including organising Annual General Meetings, regular communication, public notices, committee meetings and other administrative functions. In most cases there is little capital or ability to raise capital to utilise the land.

As a result of these characteristics Māori land is generally left undeveloped placing pressure on owners to absorb its ongoing costs. Māori land is also subject to rates which are rated at market value. This is a point of contention for tangata whenua because legally it does not have the benefit of being sold on the open market, nor is the disposal of land appropriate in terms of tikanga Māori. Meeting the costs for rates in this instance is difficult and causes much hardship for tangata whenua. This is more evident in coastal areas where the land values are much higher as coastal and lifestyle development occurs around Māori land. Councils are now required to develop a rates remission policy for Māori land but this does not alleviate the pressure when the land does not derive an income.

If Māori owners are in a position to develop Māori land, resource management planning needs to consider promoting the development of Māori land. In some cases there may be resistance to the development of Māori land as it may be seen to have high landscape value due to its undeveloped nature, particularly where surrounding lands have already been developed. With Treaty settlements in the Auckland region now imminent and potentially providing the capital for the development of Māori land to occur, this consideration needs to be addressed sooner rather than later.

In addition to the legal obligations associated with the management of Māori land, there is also a wider cultural or moral obligation on the owners to consider preserving access and use for those with an ancestral connection to the land but not a legal interest. So the obligations extend not just to the legal owners but also all whanau who have a spiritual association to the land.

A further point to consider is that tangata whenua have expressed the desire to build up their asset base. This may include purchasing land around existing Māori land blocks to fulfill their kaitiaki obligations. Again the Treaty settlement process could provide seed funding for this to occur thus the issues surrounding Māori land in the Auckland region will apply to a greater proportion of the region.

## **Māori Land Use**

Māori land is used for a range of purposes. There are some specific categories of Māori land use that will help to get a sense of the value of Māori land to tangata whenua.

### Urupa (Burial ground)

The urupa identified in the maps are burial grounds found on Māori land blocks so are a subset of Māori land for this project.

There are a number of undisclosed urupa that were used once by tangata whenua but their whereabouts are only known by tangata whenua to protect these sacred places and the misappropriation of ancestors.

Urupa are considered to be tapu (sacred) and afford appropriate protection by tangata whenua. This is the place where people can return to the land from where they came. Urupa today also serve as a place for whanau to understand their whakapapa (genealogy) and reconnect.

Urupa are of high significance to tangata whenua.

### Māori land used for economic purposes

This section follows on further from developing Māori land and highlights some major economic activity currently occurring on Māori land. This helps to paint a picture of the nature of activities that may occur on existing Māori land or on land acquired by iwi as a result of Treaty settlements. This explanation should be read in tandem with the Treaty settlement commercial redress section.

The nature of major tribal economic activity that currently exists on Māori land or in the process of consideration in the Auckland region include:

- Farming – pastoral;
- Forestry; and
- Commercial leases;
- Property development.

These either result from existing Māori land holdings or as a result of Treaty settlements. It is important to consider that in all of these cases, such economic activity is occurring within the tribal boundaries. In some cases however it is likely that land may be purchased by tangata whenua outside their tribal boundaries for economic development purposes. This notion is currently being considered in Treaty negotiations as well as other iwi from outside the Auckland region looking to invest in initiatives in Auckland. In that case it is important to consider that economic development for iwi on Māori land or land within their tribal rohe, is to be managed differently to land that is being developed by an iwi outside their tribal boundaries. How this plays out between iwi is yet to be seen and joint venture partnerships or agreements between iwi dealing with this issue seems likely to occur.

Other economic activity that has been considered by iwi includes wind farm and tourism.

### Māori land set aside for wider public benefit

There is but one example in the Auckland region of Māori land set aside for wider public benefit and again it is an extension of the use of Māori land.

The Orakei Act 1991 amongst other things vested the title of land described as whenua rangatira in Ngāti Whatua o Orakei Trust Board. It has been set aside as a Māori reservation for the common use and benefit of the members of the hapu and the citizens of Auckland City. It is administered by the

Ngāti Whatua o Orakei Reserves Board comprising equally of representatives from Auckland City Council and Ngāti Whatua o Orakei Trust Board.

This type of arrangement is considered to be a best practice model that may be more common. This is discussed further in the Treaty settlement cultural redress section.

### Papakainga

The maps show areas of Māori land that are either officially designated as papakainga or effectively being used as a papakainga area. The concept of papakainga embraces the ability for tangata whenua to return home. Today this manifests in housing and associated infrastructure that allows people to live on their ancestral land. Papakainga enable people to reconnect with their land and their people as well as support the ability to perform their obligations as kaitiaki in their tribal rohe.

As discussed throughout this document, the concept of returning home is a key aspiration of tangata whenua and most tangata whenua activity is carried out with this in mind. Papakainga is a mechanism that allows this aspiration to be realised.

### *Well-being benefits of Māori land*

<b>Social</b>	<b>Cultural</b>	<b>Economic</b>	<b>Environment</b>
<p>The sustainable development of Māori land as an economic base for tangata whenua can support individual whanau to derive an income and meet a number of social needs in terms of employment and dividends.</p> <p>Retaining and attaining Māori land can provide whanau with option of returning home. Papakainga development supports the social needs of tangata whenua.</p>	<p>Retaining Māori land in the hands of tangata whenua enables tangata whenua to fulfill their kaitiaki obligations.</p> <p>It enables the preservation, practice and passing on of traditional knowledge.</p>	<p>Māori land is an economic base for tangata whenua.</p> <p>Its use and development needs to be promoted in order for tangata whenua economic aspirations to be realised.</p> <p>This will not only provide iwi with the capacity to hold onto Māori land but to support other social, cultural and environmental aspirations.</p>	<p>The retention of Māori land can support tangata whenua to exercise their kaitiakitanga obligations over the natural and physical resources of that Māori land.</p>

## AREAS OF SIGNIFICANCE TO TANGATA WHENUA

### Explanation

There are a number of areas that are significant to tangata whenua. In most cases these are not in tangata whenua ownership however tangata whenua have identified these areas as having special significance to them. The reasons behind the significance of these areas range from being tribal identifiers, places where battles have occurred, chiefs have lived or interacted with the land or chiefly remains are hidden. The mapping of these sites do not suggest that there are no other areas of significance but instead illustrates some areas where iwi have consistently advocated for their protection or its return during settlement negotiations.

### Methodology

This information has been captured through tribal pepeha (sayings that outline the key natural features that identify where you are from and who you are) and from Tribunal hearings or Treaty settlements.

### Significance

Tangata whenua are entwined with the natural and physical resources of their tribal rohe. Activities that have occurred in areas require protection and preservation because something important has occurred in or around that area.

Treaty and resource management processes tend to uncover some of these stories as to why particular areas are significant to tangata whenua and often labels are attached to these area such as waahi tapu, sites of significance or battle sites. The very sight of these areas recalls the history of that iwi and denotes the cultural association that those people have with that land. Often an aspiration is to have those lands returned to ensure that they can be managed properly or mitigate the effects of any activity on those areas.

Treaty settlement processes can help to achieve this for tangata whenua long term or tangata whenua will participate in resource management processes. Often the latter requires substantial resource which tangata whenua do not have and is not a sustainable way of ensuring that areas of significance are maintained.

### *Well-being benefits of areas of significance to tangata whenua*

<b>Social</b>	<b>Cultural</b>	<b>Economic</b>	<b>Environment</b>
Papakainga can be areas of significance and support the social needs of tangata whenua.	Maintaining and preserving areas of significance to tangata whenua and the associated practices contribute to the identity and the cultural aspirations of tangata whenua.	Areas of significance may be significant for economic reasons.	Many significant areas are natural and physical resources of which are managed through resource management processes. All of these have effects on environmental outcomes.

## TREATY SETTLEMENT CONSIDERATIONS

### Explanation

Currently there are 22 hapu and iwi looking to settle their Treaty claims in the Auckland Region. It is anticipated that the Auckland region will be settled within the next two years. This will have a significant impact on the ability for tangata whenua to achieve their aspirations of being self sustainable and practise their tikanga. It provides the financial means for this to happen as well as clarifying the ongoing relationship between the Crown and tangata whenua. This section shows areas whereby land could be returned as a form of compensation for the Crown's breaches of the Treaty.

The Crown's Treaty settlement policy provides boundaries around how Treaty negotiations may end up and ultimately what position iwi will be in post-settlement. It is difficult to predict the outcome of respective negotiations and this paper does not attempt to do that. Instead it maps out what could potentially be negotiated and what is known to be negotiated given the Crown's policy and outcomes of agreements in principle with iwi.

This information helps to get an understanding of the changing dynamics of the Auckland Region and the increasing need to consider Maori values as iwi authority mandates and tribal areas are confirmed, land is returned, tribal assets are developed and decision making structures require tangata whenua representation.

In addition to the Treaty settlements over land, there are other forms of Treaty settlements. This includes fisheries and aquaculture which also have a bearing on the resources of the region. These types of settlements are not covered in this paper but it is envisaged that these be included at a later date.

### Methodology

This information has been extracted from the Crown's Treaty settlement policy, iwi deeds of settlement and information released publicly from current Treaty negotiations.

#### *Crown properties in the Auckland Region*

The Crown properties in the Auckland Region have been identified as an important layer of data to consider when attempting to predict the landscape of the Auckland Region to 2050. As part of the Crown's Treaty settlement policy, only certain areas of land are negotiable. Private land cannot be negotiated however Crown properties can be. These properties are classified whereby land-banked properties are specifically set aside for Treaty settlement negotiations. There is a high likelihood of such properties forming part of the negotiations, whether it means this land is returned to tangata whenua or sold by Crown to tangata whenua for an agreed price or some form of acknowledgement may be negotiated.

Another strategy that the Crown can take in negotiating Treaty settlements is to identify a right of refusal area for that iwi. This is effectively where the Crown negotiators and iwi can agree on an area and any Crown properties that are surplus to the Crown's needs must be offered to that iwi to purchase before it is put on the open market.

Crown forests licensed lands are also open for negotiation. The forests that are currently being negotiated or have been negotiated in the Auckland Region are mapped. In most circumstances the iwi will be required to purchase the forest land from the Crown however as part of the Crown Forest Assets Act 1989 the accumulated rentals that have accrued over that forest is also included in the negotiations of the forest.

### *Iwi authority areas of interest*

An outcome of the Treaty settlement process is the confirmation of tribal rohe. Currently there are only two iwi who have completed their substantial Treaty claims and their area of interest has been identified. This enables Councils and government agencies to be clear on which entity has the mandate to represent the issues of a particular iwi as well as identifying where their interests lie. It does not represent exclusive mandate as there are many instances, particularly in the Auckland region, where overlapping interests are recognised. In those cases, Councils are required to engage with more than one entity.

In some deeds of settlement there are a number of requirements stipulating the need for councils to recognise a particular iwi as an affected party over a certain area or to develop a memorandum of understanding with that iwi. This helps to ensure that the values of tangata whenua can be considered in managing natural and physical resources of the region.

### *Areas that have been settled in the Auckland Region*

As outlined above there has been two iwi in the Auckland Region that have settled their substantial Treaty claims – Te Uri O Hau and Waikato Raupatu Lands Trust. The majority of the Waikato claim sits outside the Auckland region however settlement with them over the Manukau Harbour and East Wairoa blocks still need to be finalised. Te Uri O Hau is our northern-most tangata whenua group of whom the ARC holds a memorandum of understanding as a result of their Deed of Settlement.

### *Areas proposed to be settled in the Auckland Region*

The map sets out the way in which the Crown intends to settle the Auckland Region. There will be direct settlements with iwi but also collective settlements with a group of iwi. This is demonstrated by the settlement of the volcanic cones and harbours whereby a collective of iwi will negotiate the transfer of a number of maunga (mountains and volcanic cones) to a collective board of iwi however public access will continue to exist. This notion is similar to the current arrangements over Whenua Rangatira for Ngati Whatua o Orakei Maori Trust Board.

Within all the respective settlements the Crown offers an apology, cultural redress and commercial redress.

### *Cultural redress properties*

There are a range of things that can be negotiated for in a cultural redress package. Some examples of the cultural redress include restoring access to traditional food gathering areas, recognising an iwi's traditional association with an area through government protocols, statutory acknowledgements or the return of certain properties.

An important part of the Auckland Treaty settlement negotiations is the proposal to return the mountains and harbours to a collective of iwi as cultural redress. Discussions occurring over this arrangement may see the title transfer to tangata whenua and the establishment of a management board which will have equal representation from council and tangata whenua.

Cultural redress packages have huge implications for resource management policy and decision making.

### *Commercial redress properties*

Commercial redress packages include such things as a lump sum payment or a right of first refusal area.

Commercial redress can be a source of contention. Te Uri O Hau's commercial redress demonstrates the need for Councils to be aware of Treaty settlement negotiations. In this case as part of their commercial redress package, Te Uri O Hau were offered a right of first refusal over an area including the North Mangawhai Forest (which sits north of the Auckland region) and consequently purchased the Forest from the Crown for the purposes of commercial development. They entered into a joint venture partnership to provide the capital to realise their property development aspirations and give effect to their commercial redress.

The Rodney District Council rejected their proposal to go ahead with the development and Te Uri O Hau were forced to scale their plans back significantly incurring substantial costs in legal and development fees to keep their commercial aspirations alive. This is currently under appeal and the ARC is strongly opposed to the development as it is inconsistent with the Metropolitan Urban Limit concept. Te Uri O Hau expected that such a development would be within the terms of commercial redress and are now seeking a recommendation from the Waitangi Tribunal that the Crown's actions in negotiating their claim prejudicially affected Te Uri O Hau Settlement Trust.

This activity and the considerable expense that tangata whenua have had to go through to realise their Treaty settlement highlights the need for iwi, councils and the Crown to be aware of what is being negotiated and whether these can be implemented.

With commercial redress packages currently being negotiated, due consideration needs to be given to current resource management planning tools and ways in which tangata whenua economic aspirations are balanced.

## **CONCLUSION**

Maori values range from iwi to iwi and region to region. It is important however to understand what Maori values are relevant and how they may clash when the use of land is being considered.

If Maori are an important part of the social fabric of the region it is equally important to reflect their values in the future in the Auckland Region and how matauranga Maori and western perspectives can work together to form a better region.

This paper presents part of the picture for Maori but certainly highlights the need to engage tangata whenua at multiple levels of decision making because we cannot assume that everything is known. The challenge also is to understand that tangata whenua are now emerging from a period where participation in resource management matters focussed on environmental protection. In an era where tangata whenua are in a better position to use the resources in a manner that is consistent with their values that others are prepared to acknowledge that this is a valid part of the development of iwi and the region itself.

## 4.2 Protection of historic heritage

### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
Protection of Historic Heritage	X	XX	✓	XXX

### Key Comments

- Interdisciplinary heritage management processes are a matter of priority for any re/development.
- View-shafts e.g. to cones and islands will have to be managed and a clear emphasis placed on their protection.
- Historic heritage protection & enhancement can help with the challenges of retaining liveability with increasing density.
- Historic heritage is not an immediate constraint to increasing density within the urban environment.
- Heritage conservation can support the adaptive use at a multitude of interdisciplinary scales including sites, buildings, areas and landscapes through a robust and intelligent design approach.
- Without careful zoning and attention to design, there will be conflicts between urban growth/intensification and the preservation and protection of heritage in residential heritage suburbs and town centres identified for potential growth/intensification, notably Grey Lynn, Onehunga, Northcote, Helensville, central city, Puhoi.
- Current historic heritage survey coverage is inadequate to provide a basis for assessing issues in many areas.

### Criterion description

Historic heritage – as defined in the RMA – being natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, deriving from any of the following qualities: archaeological, architectural, cultural, historic, scientific, technological. Places of historic heritage include historic sites, structures, places, and areas, archaeological sites, sites of significance to Māori, including wāhi tapu; and surroundings associated with these resources.

*Our heritage is our legacy from the past. Our heritage reminds us of who we are, where we're come from and informs our journey into the future. Auckland historic heritage is a precious and finite resource. It is central to the identity of communities, individuals, and is of fundamental importance to tangata whenua."*

### Measures for assessment

- Location of proposed area of growth and impact of development relative to places and areas of significant historic heritage value
- Location of proposed areas of growth and impact of development relative to significant sites scheduled in Council plans

(Please note: these measure have been altered from those advised by Regan Solomon by email on 14 June 2011 to be more relevant to historic heritage).



## **Assessor**

Built & Cultural Heritage Policy Team, ESP, CPO

### **Current Situation**

- Ongoing decline in historic heritage resources across the region.
- Re/development can often be viewed to be in conflict with historic heritage values.
- To date, the opportunities of historic heritage to add to re/development are often not realised.
- Ongoing/increased community and concern over the loss of historic heritage.
- Lack of recognition of some sites including under-representation of sites of significance to tangata whenua and the group values of sites.
- General lack of information and survey across the region.

### **Assumptions**

In all scenarios:

- That existing significant historic heritage values will be protected and enhanced.
- That survey and assessment of historic heritage values will be undertaken in areas of growth.
- That the presence and location of historic heritage values will inform where and how growth occurs, within the region, within particular areas, and on particular sites/properties.
- That the opportunities of historic heritage to add to re/development will be realised.
- That the presence of significant historic heritage will, in particular instances, result in the identification of 'no go' areas.

### **Scenario A**

#### **Discussion**

This model is based on ARPS Change 6, being the growth concept of:

*...growth will be managed by promoting quality, compact urban environments (intensification).*

At a regional scale, the model appears tolerable. This is provided the assumptions are met; particularly the process and structure to placing growth within the model recognises and respond to historic heritage places and areas from the outset.

As the scale drills down to specific locations, areas and then sites, the management tools and recognition of heritage significance will need to take a finer grain and more detailed approach.

Interdisciplinary heritage management processes are a matter of priority for any re/development.

The overarching policies of the growth strategy should consider the potential policy direction at the local area scale, in order that appropriate heritage management is proactively supported and encouraged through best "place making" practice.

Of particular interest is the nature of the rural/future urban interface. It needs to be carefully considered in order to realise the minimum impact on the natural form and use of the existing areas. Pukekohe seems to have a confused concentric arrangement which starts with a tight centre, shifts to rural town scale, before intensive urban and then back to rural.

Other issues concern the lack of study in certain areas of the region. Due to time constraints, it is not possible to accurately identify every item in the region. Accordingly, a strategy to identify broad landscape values should be applied at the early stages of this scenario.

View-shafts e.g. to cones and islands will have to be managed and a clear emphasis placed on their protection.

**Score: X**

### **Policy issues**

- Historic heritage is a key component of liveability (identity, history, uniqueness, experience, views, and continuity).
- Historic heritage protection & enhancement can help with the challenges of retaining liveability with increasing density.
- Historic heritage is not an immediate constraint to increasing density within the urban environment.
- Good re/development responds to the context & current environment, including historic heritage.
- Opportunities to protect & enhance historic heritage must be explored in re/development, and heritage is a foundation for 'place making'.
- Lack of expansion outside the urban area can help the retention of historic heritage places and areas within the rural environment.
- More information is required on what are where our historic heritage is.

### **Greenfields**

The omission of greenfield sites in this scenario puts the question back to how brownfield sites might be put to best use.

Heritage conservation can support the adaptive use at a multitude of interdisciplinary scales including sites, buildings, areas and landscapes through a robust and intelligent design approach.

The added benefit of such an approach is the sustainability aspect. Utilising or re-utilising existing structure and materials will go a significant way towards supporting the 40% decrease in carbon.

Score for the greenfields: ✓✓

### **Scenario B**

#### **Discussion**

This model suggests intensification in areas with high amenity as they are "market attractive". Growth pressures continue to result in the re/development of the same, preferred places for settlement. When the market attractive areas are based on natural amenity, particularly the coast, water/rivers, ridgeline or elevations, there is greater likelihood of affecting areas of historic heritage.

Current historic heritage survey coverage is inadequate to provide a basis for assessing issues in many areas. Based on archaeological site location modelling conflict can however be anticipated in some areas, particularly areas within approximately 500m of the coast or navigable waterways with a low level of current development. For example there will be significant numbers of Maori heritage sites in coastal areas between Hatfields Beach and the Mahurangi Harbour. This will extend further inland along the Puhoi and Waiwera river valleys as these were navigable waterways and important communication routes.

Growth in such market attractive areas can put pressure upon, and potentially erode the amenity, identity, distinctiveness, experience, views of such areas, resulting in the loss of historic heritage values.

Ideally, the creation of appropriate infrastructure and amenities such as good urban design, efficient reliable transport, will increase new market attractive areas.

**Score: XX**

### Policy Issues

- Historic heritage is often found in areas that are market attractive such as areas of natural amenity, particularly the coast, water/rivers, ridgeline or elevations.
- Good re/development responds to the context & current environment, including historic heritage.
- Opportunities to protect & enhance historic heritage must be explored in re/development, and heritage is a foundation for 'place making'.
- More information is required on what are where our historic heritage is.

### Greenfields

Satellites		Score
Helensville	<p>Helensville is one of the Auckland region's most intact historic townships.</p> <p>Within central Helensville there are 35 individually protected historic structures. There are also a number of archaeological sites, historic places within the near vicinity, and many places of significance to iwi.</p> <p>The township is currently subject to PC160 to recognise these collective values.</p> <p>The Commercial Road Precinct contains 10 individually protected historic places, and Garfield Road contains 11 protected structures, the Cemetery and places of significance to iwi.</p>	xxx (within the central area)
Kumeu/Huapai		xx
Pukekohe		xx
Warkworth		xx
Wellsford		xx
Wesley (new town)		xx
Dairy Flat (new town)		xxx
Group 1 Industrial Greenfields		Score
Whenuapai Business		xxx
Drury Business		xxx
Airport Stage 2	Significant historic heritage values including landscape, geological, archaeological, sites of significance to tangata whenua, views, particularly in & around the stonefields	xxx
Paerata Business		x
Silverdale West Business		xxx

Residential Expansion Areas		Score
Brookby Valley		xxx
Drury Residential		xxx
Northwest Expansion Area		xxx

## **Scenario C**

### **Discussion**

This model intensifies urban development everywhere urban development is now.

Without careful zoning and attention to design, there will be conflicts between urban growth/intensification and the preservation and protection of heritage in residential heritage suburbs and town centres identified for potential growth/intensification, notably Grey Lynn, Onehunga, Northcote, Helensville, central city, Puhoi.

In terms of growth proposed for the city centre, fringe suburbs and isthmus, and North Shore areas of particular heritage sensitivity include the Res 1 and 2 zones (Auckland City) and Res 3 (North Shore City).

Any growth, expansion or intensification is unlikely to be tolerable in these areas which are already protected for their historic heritage values.

Specific areas of sensitivity in the city centre include the existing conservation area and a number of local area townscapes including: Symonds street south, K Rd South face, Edinburgh Street precinct, Marmion / Airedale precinct, Beach / Anzac precinct, Wolfe Street precinct, St Patrick's Albert Street precinct and Sale / Drake precinct.

Any interventions will need to be carefully calibrated to ensure that the qualities of these places are retained through careful and considered design responses to context.

Significant growth in these areas will be constrained and, in some places, unachievable without compromising existing historic heritage values.

Current historic heritage survey coverage is inadequate to provide a basis for assessing issues in many areas.

The presence of significant numbers of archaeological sites in some areas will contribute to compliance costs, and may require avoidance (as at Long Bay) and thus limit the intensity of development.

**Score: ✓**

### **Policy Issues**

- Historic heritage is a key component of liveability (identity, history, uniqueness, experience, views, and continuity).
- Historic heritage protection & enhancement can help with the challenges of retaining liveability with increasing density.
- Good re/development responds to the context & current environment, including historic heritage.

- Opportunities to protect & enhance historic heritage must be explored in re/development, and heritage is a foundation for 'place making'.
- Lack of expansion outside the urban area can help the retention of historic heritage places and areas within the rural environment.
- More information is required on what are where our historic heritage is.

### Greenfields

Again, the omission of greenfield sites in this scenario puts the question back to how brownfield sites might be put to best use.

Heritage conservation can support the adaptive use at a multitude of interdisciplinary scales including sites, buildings, areas and landscapes through a robust and intelligent design approach. Score for the greenfields: ü

### Scenario D

#### Discussion

Current historic heritage survey coverage is inadequate to provide a basis for assessing issues in many areas.

Based on archaeological site location modelling conflict can however be anticipated in some areas, particularly areas within approximately 500m of the coast or navigable waterways with a low level of current development. For example there will be significant numbers of Maori heritage sites in coastal areas between Hatfields Beach and the Mahurangi Harbour. This will extend further inland along the Puhoi and Waiwera river valleys as these were navigable waterways and important communication routes.

**Score: XXX**

#### Policy issues

- Historic heritage is often found in areas that are market attractive such as areas of natural amenity, particularly the coast, water/rivers, ridgeline or elevations.
- Good re/development responds to the context & current environment, including historic heritage.
- Opportunities to protect & enhance historic heritage must be explored in re/development, and heritage be a foundation for 'place making'.
- More information is required on what are where our historic heritage is.

### Greenfields

Group 1 Industrial Greenfields		Score
Whenuapai Business		xx
Drury Business		
Airport Stage 2	Comments in previous scenario.	
Paerata Business		
Silverdale West Business		
Residential Expansion Areas		Score
Brookby Valley		xx
Dairy Flat Expansion Area		xxx

Drury Residential		xx
Karaka Residential		xx
Leigh Expansion Area		xxx
Mahurangi East Expansion Area		xxx
Martins Bay		xxx
Northern Expansion Area		xxx
Northwest Expansion Area		xxx
Omaha Expansion Area		xxx
Puhoi Residential	A historic village consisting of a regionally significant group of buildings, structures, trees and the rural and river backdrop. Puhoi village and river port was the focal point of a colonial government promoted Special Settlement founded by Bohemian settlers in 1863. It includes the best preserved 19 <sup>th</sup> and early 20 <sup>th</sup> century historic village landscape in the Auckland region. The village landscape extends from the Presbytery (1906) and Convent (1923) to the Puhoi Hotel and Stables on both sides of Puhoi Road. The village contains ten individually scheduled historic places.	xxx
Ramarama Residential		xx
Takanini Stage 3		xx
Waiheke Expansion Zone		xxx
Waiwera Expansion Area		xxx
Whitford Beachlands		xxx

This feedback was not done by GIS analysis using spatial layers. A more comprehensive analysis would be possible, with time and GIS input, by using overlays with model maps with existing GIS information.

## 5 Implementation

### 5.1 Market Feasibility

#### Scenario Score Summary

	Scenario A	Scenario B	Scenario C	Scenario D
Market Feasibility	XXX	✓✓	XXX	✓✓

#### Key comments

- The preferred scenario would be a mixture of Scenario B (for choice) and Scenario D (for additional greenfields); this scenario would score three ticks ✓✓✓.
- If an element of Scenario B were to prove too difficult to implement, then further development capacity would have to be provided in greenfields i.e. a Scenario D response.
- There is insufficient demand in Auckland for housing typologies required to meet intensification aspirations; large market for the standalone suburban option.
- There is a poor perception of intensification amongst the public at large. Auckland Council needs to be a champion for good exemplars.
- Support intensification in appropriate market attractive areas, but this must be complemented with a sensible provision for greenfields.
- Auckland Council needs to be definitive about where the MUL is in future and control the timing of the release of developable land within it.
- Auckland has a geographically unbalanced development market, different communities require different solutions. Intensification in non-market attractive areas would require subsidy from local or central government.
- Strong leadership and a significant investment of time and money are required to implement place based redevelopment projects. New Lynn has been many years (20 plus) in the making.
- Amenity is a strong driver for the market however amenity isn't just coastal; need to look for pockets of built amenity and open space such as parks as well.
- Support for growth in satellite towns, provided sufficient employment options are available.

- The capacity of the construction industry is currently insufficient to cope with the projected growth in Auckland (exacerbated by economic climate and Christchurch earthquakes).

## **Introduction**

The scoring, key comments and discussion contained in this paper were provided at a workshop of property developers convened on 10 June 2011 to discuss the four scenarios as part of the Auckland Plan Scenario Evaluation Workstream.

An appendix is attached as further reading, although it does not contribute to the scoring of the scenarios. The appendix contains notes taken at a joint New Zealand Property Council and Auckland Council workshop on the market attractiveness of town centres held as part of the Auckland Plan Centres Classification Workstream.

## **General Comments**

- The group viewed Scenario D as the default position, suggesting that strong political leadership is necessary to achieve the intensification required to achieve Scenarios A and B.
- The current capacity of the construction industry is insufficient to cope with the projected growth in Auckland, and this will be exacerbated by the general economic climate and the need to rebuild Christchurch following the earthquakes.
- Auckland Council needs to be definitive about where the MUL is in future and, perhaps more crucially, control the sequencing and release of developable land within it. Certainty of sequencing and intervention is most important to the market.
- Auckland has a geographically unbalanced development market, different communities require different solutions. Need a suite of responses to apply to a variety of situations that vary across the region and across time.
- Infill and redevelopment on a significant scale requires considerable time and financial investment; many developers engaged in intensification in Auckland have gone bankrupt. Greenfield developers are also struggling due to lack of availability of developable land and reduced (pent up) demand.
- The lack of return on intensification or redevelopment is a key issue for the development community. Auckland Council could provide a subsidy (not always financially) if these outcomes are sought.
- The building costs of an intensive or redeveloped product is higher than greenfields because of higher design costs, project management costs, consent risk, land aggregation and holding costs, build costs, land costs and finance costs. They also have lower sale prices compared to standalone (other than in some high amenity locations).
- Geotechnical and contour considerations also key concerns driving location of development.



- Patrick Fontain has calculated that there is potential for a further c. 40,000 dwelling units in the existing urban area under a business as usual scenario, perhaps this figure could increase to 100,000 with significant rezoning. It was noted that rezoning must be for a significantly higher density that is actually desired, as development / redevelopment is ad hoc and piecemeal and that where it does happen, the financial return is maximised, or intensification objectives will not be realised.
- The Mill Road to Manukau roading development will drive development pressure to east of Mill Road due to improved accessibility.
- There will be an inevitable push for a Waymouth to Karaka bridge for network resilience reasons. There is currently only one road to access Auckland from the south. When (not if) this happens, urbanisation of Karaka area is inevitable.

### **Retail**

- Auckland has an overabundance of specialty retail (<200m<sup>2</sup>) of poor quality offerings in out-of-centre locations which undermines town centre retail. There is a general oversubscription and provision of this type of development.
- Speciality retail should be directed into town centres. Large format retail and supermarkets locating out of centres is not negative in its own right but inevitably leads to demand in surrounds for specialty retail (to capture passing trade), similar to an anchor store in a mall context.
- Supermarkets avoid developing high quality buildings as can have negative connotations to consumers (i.e. making too much money meaning that prices are too high).

### **Affordable Housing**

- The issue is more around *entry level housing* rather than *affordable housing*. The development industry is unable to provide a new standalone house in any location for a purchase price lower than \$450,000.
- Also, for those who prefer to live with extended family, affordability could be about building bigger houses on smaller sections.
- Housing New Zealand renting from the private sector could work for the investment market. There could be a role here for Public Private Partnerships.

### **Scenario A**

#### **Discussion**

- Totally unfeasible scenario, unless a huge amount of intervention or subsidy in all aspects of development economics is also proposed by Auckland Council, and this is considered unlikely.

- Businesses would be pushed from Auckland to places like Hamilton or Tauranga; where the jobs go, people will follow.
- The marginal cost of transport once loaded on truck is very small. It will make sense to ship goods to and from Hamilton or Tauranga to Auckland. Tauranga is actively targeting businesses to move to the Bay of Plenty offering the 'total package': design and build business site, house sourcing, etc.
- Not sufficient demand in Auckland for the housing typologies required to achieve intensification levels required; there is a large market in Auckland for the standalone suburban option.
- Many developers who previously worked on intensification projects have gone bankrupt and it is far more difficult to obtain bank funding for intensification projects.
- There simply is not sufficient land within the urban area available to develop or redevelop.
- There is evidence that this policy approach is not working, particularly in low amenity areas.
- It is resource intensive to undertake intensification projects therefore it becomes out of reach for the smaller developers.
- The example of Melbourne was cited; they have found it difficult to intensify and have met much community opposition. They are now looking at a more balanced approach considering alternatives such as 'innovative' greenfields, brownfield regeneration and corridor development.
- However the group does support intensification in appropriate market attractive areas, but this must be complemented with a sensible provision for greenfields also.
- No chance of affordable housing under this scenario as intensification will only occur in market attractive areas and the units would command a higher price in the market

**Score: XXX**

### **Policy Issues**

- This scenario requires major up zoning in centres and even then the market won't deliver near to the densities required.
- There is generally a poor perception of intensification amongst the public at large due in the main to very poorly designed, constructed and run examples developed in the past, which are still in the news media (leaky building stories are a very bad advertisement and a disincentive for investment in this type of product). Good exemplars are needed, there needs to be a champion for good quality intensification. Auckland Council could lead this.

- Policy of intensification is working in some centres (high amenity locations), but numbers even in those locations are low and far less than needed.
- Would require strong political leadership. Communities don't like change and therefore need to be provided with information. It also takes a great deal of time and money to properly engage communities and make things happen, for example what is happening in New Lynn has been many years (20 plus) in the making.
- Investment and energy should be targeted at where there has already been local and central government investment. There has also been a commitment made to communities in these areas, we need to build on this, Auckland Council must remain in the area for the long term, not complete an area plan and walk away.
- Auckland has a geographically unbalanced development market, different communities require different solutions. Intensification in non-market attractive areas would require subsidy from local or central government.
- There is a lack of large institutional investors in New Zealand; perhaps Auckland Council could become a property developer?
- Would need to very tightly restrict the release of greenfields to drive intensification.
- Unit title developments (i.e. intensive products) are generally purchased by people *with an existing house* against which loans can be raised. Banks are reluctant to loan on unit title (prefer freehold), and a higher deposit is also required (i.e. it is less affordable to get in initially, even if the total cost of purchase is lower).
- Banks also reluctant to finance intensified product (collapse of intermediate finance market has also made this type of development harder to do).
- Auckland Council must think like a property developer, and understand the costs and the dollar value of time are huge. Council should ensure that Development Contributions and all regulatory and non-regulatory tools align to achieve the intended outcome.

## **Scenario B**

### **Discussion**

- This scenario suggests a dilution of the city's historical north south axis with increased growth on the east west axis.
- This scenario gives a wide range of options for development and is therefore generally positive.
- Seems the most preferred of the scenarios with a comment suggesting that whenever an element of Scenario B proves too difficult to implement then the capacity will have to be provided in greenfields i.e. a Scenario D response. A combination of Scenarios B and D would result in a score of three ticks üüü.

- Achieving the degree of intensification required for this scenario is also difficult. Outside centres it was estimated that current zoning (business as usual) could accommodate an additional c. 30,000 dwellings; and with major up-zoning c. 160,000 could be achieved.

#### *Coastal Amenity Areas*

- The distinction between infill and refill is critical to realising intensification in high amenity coastal areas. Some targeted infill is possible in pockets but not wholesale refill due to issues such as community resistance and slope instability and gradient. However this will only produce product for the upper end of the market, and does not cater for the affordable housing market.
- Amenity is a strong driver for the market however amenity isn't just coastal; need to look for pockets of other types of amenity around the whole of the urban area, e.g. built amenity (Ponsonby, Grey Lynn, Mount Eden etc) and open space such as parks.
- Look at the Tamaki estuary because it may be easier and act as a good exemplar for other areas to follow.

#### *Satellite Towns*

- Support for growth in satellite towns, provided sufficient employment options are provided for too. Must be careful to ensure scale and rate of growth does not overtake existing social infrastructure, community and jobs, leading to commuter towns; must build on existing social infrastructure. Provides choice but will only take a small proportion of the overall growth. Good for sub-regional resilience and the polycentric city, in keeping with Auckland's history.
- Strong employment growth in south (and to a lesser degree north west) will encourage population growth in these areas.
- Beachlands should be included as a satellite town due to Plan Changes taking place there likely to raise population from c. 6,000 to c. 10,000. Also Waiuku and Riverhead. Role for Helensville, but maybe staged later.
- Clevedon – limited growth potential due to floodplain issues.
- New towns are a good idea but more challenging to implement.

**Score:** ✓✓

#### **Policy Issues**

- Generally covered by comments under other scenarios.
- This scenario would require protection of the surrounding areas of the satellite towns to ensure development actually occurs within the satellite town.
- Countryside Living – small lots have sterilised many peripheral areas and made it difficult for quality masterplanned urban development – if future urban areas are

identified, they must have very strict subdivision controls within them until a masterplan is completed and development is underway in accordance with it.

- Rating system very important to achieving this – compare Rodney and Manukau’s approach to rates – Rodney rated on potential subdivision capacity, disincentivising productive rural activities in favour of the subdivision, creating large pressure for development of countryside living. Manukau used an Annual Rental Value (related to actual use) which allowed it to better (politically) resist subdivision and encourage productive rural use in meantime.
- There are new drivers affecting productive rural land including lifestylers living on land but working in the city, and intensification of productive activities (i.e. horticulture and boutique production).
- Geotechnical and other constraints should also be used to identify and sequence land release.

### **Scenario C**

#### **Discussion**

- Another totally unfeasible scenario – requires a blank slate approach to planning.
- Not desirable to the public or developers and shouldn’t be on the agenda.
- There is not sufficient infill potential to provide capacity for growth, and redevelopment would be required at a level that is not feasible given current land holding patterns. Infill development tends to lead to the foreclosure of future development / redevelopment options.
- Past experience has shown that many communities would be very resistant to large scale redevelopment of their neighbourhoods, and this scenario suggests change to many neighbourhoods.
- However parts of this scenario could happen e.g. pockets of intensification in areas of high amenity (as per Scenario B discussion).
- Again bad for housing affordability and land values would increase significantly in this scenario.
- Intensification likely to occur too slowly to accommodate projected growth.

**Score: XXX**

#### **Policy Issues**

- The level of redevelopment required would depend upon large interventions and subsidy from both local and central government. However doubt around whether this would be politically palatable.

## Scenario D

### Discussion

- New greenfield developments should be done relatively intensively and supported by brownfield redevelopment.
- Crucial that the right land is selected for development. Geotechnical aspect must be feasible, floodplains avoided. Earthworks can kill developments before they start.
- Greenfield growth should start in the satellite centres followed by outward sequenced growth.
- Must control the growth and distribution of specialty retail (100-200m<sup>2</sup> shop areas), there is currently too much and it is too distributed. It should be specialised and concentrated in town centres (note that most existing District Plans allow this type of development as a very low level consent (or a permitted activity) in business areas).
- Retain natural greenbelts e.g. hills north of Albany. Countryside Living areas are potentially an existing greenbelt, but should be protected from further low quality unplanned urbanisation, as well as a supportive rates system (see comments above regarding Rodney and Manukau).

### *Specific Areas*

- Growth in south seems logical – Brookby and Drury leveraging of Mill Rd corridor developments and Karaka off a potential future Weymouth to Karaka bridge. Strong Employment growth in these areas, population will follow.
- Whitford - difficult to urbanise due to well funded community resistance and difficult geotechnical issues.
- Papakura – not good for residential growth due to peat soils. More appropriate for industrial use.
- Dairy Flat / Redvale – generally not economical to develop east of State Highway 1 due to geotechnical challenges and strong environmental values. Easier to develop west of motorway.
- Whenuapai – good location for industry, growing and high quality workforce. Could triple area for Group 1 activities, but need to sequence appropriately.
- Warkworth area including eastern coastal communities - good potential for development however not large scale, nor affordable housing, as would be higher end with a limited market. Also area is geotechnically difficult due to topography and there would be community resistance.
- Massey North / Westgate – is a sub-regional centre and therefore needs growth around it to support it.

- Greenfield Group 1 business area at Drury should be larger than shown on map and take in the whole area between State Highway 1 and Mill Road.
- Hobsonville / Riverhead area – growth should start from these satellites and eventually coalesce.

**Score:** ✓✓

### **Policy Issues**

- The sequencing of release of greenfield land for development is crucial to protecting the urban boundaries as it will dampen speculation.
- Look at infrastructure projects that are already committed, for example Mill Road corridor - this will require a land use to support it. This is a logical area for urban expansion. Also look at the Weymouth to Karaka bridge concept. Auckland to the south is not well served by access and the single road (State Highway 1) has resilience issues. If road built logical to urbanise Karaka. Council should step in proactively and control development of land.
- Need to protect agricultural land, therefore need to have rating system that supports keeping productive lots productive.

## Appendix

### Property Council New Zealand Workshop on market attractiveness of town centres

17 December 2010

#### Main Points (from whiteboard)

#### Top 10 places where there is potential for market led development

Centres	Groups			
	A	B	C	D
CBD and fringe	1	1	1*	1
Newmarket	2**	4		3
Albany	3	5	3	2
Manukau		2	1	4
Westgate	6	9	4	9
New Lynn	7	3	7	7
Airport				
Sylvia Park		8	2	10
St Lukes		7		
Takapuna			5	6
Papakura / Drury	10	10	10	
Onehunga-> SH20	9			
Remuera Ridge				
Tamaki / Glen Innes	8	11		8
Flat Bush	4	6		5
Pukekohe		12		
Silverdale	5		9	
Henderson			6	
Botany			8	

Shading indicates a degree of correlation in scores/frequency



\* Group C ranked the CBD (not including fringe) as 1

\*\* Group A saw CBD as 1 with CBD fringe including Newmarket as 2

### **Why are centres “ripe” for development?**

The following points summarises feedback from workshop attendees about what characteristics or criteria that can determine whether a centre is ripe for development:

- Availability of land
- Market profile – socio economic perception
- Transport accessibility / connectivity / convergence
- Momentum, pre-existing investment
- Amenity
- Regulations
- Ability to operate at scale
- Economics / demand
- Place in development cycle
- Cluster effect
- Land tenure
- Appropriate infrastructure
- Confidence in regulatory environment (certainty)
- Density of investment / infrastructure/ efficiency
- Bankability/ risk

### **Constraints**

The following points summarise feedback from workshop attendees about what challenges and constraints that may prevent future development of a centre:

- Ownership pattern / large land holdings/ land tenure leasehold
- Lack of incentive for aggregation larger scale development
- Market realities bite (in cycles)
- Public sector ready for cycles

- Demand v cost of housing v apartments
- Don't understand the importance of too much time in process
- Costs of development (DCs)
- Incentives for piecemeal development
- Height density - perceptions they are "bad"
- Iwi values standardisation of the process values and engagement
- Consistency of vision and rules

### **Additional Points from Groups**

#### **On Centres**

- CBD - Fringe - Newmarket debate around whether Newmarket was part of the CBD Fringe or a separate centre
- Newmarket increasingly functions as part of the CBD
- Tamaki - the wider area - Glen Innes, Mt Wellington Quarry (Stonefields) and Panmure
- Onehunga-Stoddard Corridor - a number of centres along this corridor with improved accessibility due to SH20 extension and relatively good accessibility to central city
- Stoddard Road may not be in the top 10 but may be in the top 20
- Papakura (ie Greater Papakura) – the centre could become ripe for development if there was significant supporting urbanisation southwards to areas such as Drury, Ramarama and Karaka
- Tamaki - socio economic issues need to be resolved before the market will go there- so while it may be a priority for government it will not be for the market.
- Albany, Manukau and Westgate will be main centres; New Lynn, Sylvia Park, St Lukes are the next tier. Flatbush not ready
- Takapuna will be eclipsed by Albany because in Albany there is a convergence of various networks (eg roading and catchments) and there are greater efficiencies in developing there. Takapuna's location is a challenge – as the motorway acts as a barrier and breaks catchment in half and therefore the opportunity of this centre. Over time it is considered that intensity of development and services and clusters will see Albany eclipse Takapuna and its natural amenity. Takapuna is not on a route to anywhere else.
- Albany has more greenfields, Takapuna is constrained

- Westgate and Manukau have same qualities as Albany (see above) so that is why they should be priorities.
- Airport – would not put this in this exercise but it is a given
- St Lukes town centre- going to happen over the next 10 years, includes Morningside and St Lukes planning area
- Glen Innes – government as an accelerant of development
- Intensification of waterfront takes away from intensity of the CBD

### **General discussion on criteria and barriers**

- While the CBD is the main growth opportunity, the development of office parks out of centre are the result of constraints on development in the CBD
- Developers need to have confidence in the market to invest
- In the UK a major catalyst for the redevelopment of centres is the constraints on out of centre development which provides confidence to investing in centres.
- There is a low correlation between where people live and where they work
- The RGS wasn't tested with economic analysis; the spatial plan needs this
- There is public resistance to height and density based on their perception; this needs to change so they recognise that these are not necessarily bad
- A standardised process is needed to engage with lwi, otherwise there is uncertainty and risk
- The market likes certainty (eg certainty in rules and infrastructure provision) and is discouraged by risk
- Land tenure- large owners have greater ability to develop and also to bring in the right skills and research (leaders in fields).
- Using tools to induce aggregation – eg development zones that give sites no value unless you deliver what it is zoned for. These tools will influence the market.
- There needs to be a combination of market led and public investment. This may vary depending on centre but there needs to be an element of both. Development contributions- market will be ok with paying if there is a measureable return shown in the immediate area.
- There are missing categories of centres- there needs to be a focus on the neighbourhood centres and decision made on corridors.
- Joint venture opportunities- market open to these ideas.

## 5.2 Minimised infrastructure costs

### **Auckland Plan – Scenario Evaluation Workstream Report on Feedback from Infrastructure Providers**

#### Introduction

This report relates to the Scenario Evaluation Workstream undertaken as part of the Auckland Plan process. The purpose of this work is to evaluate four spatial scenarios in order to test different urban forms at the macro level. It will, when considered alongside a number of other workstreams, provide the evidential base for the preferred urban form to be expressed in the Draft Auckland Plan. As part of this process, the Council's Spatial and Infrastructure Strategy Unit undertook a consultative exercise with a range of public and private infrastructure providers. Details regarding the four different scenarios are provided in other officers' reports.

These infrastructure providers were provided with detailed scenario information, including residential and employment capacities for number of existing and proposed land use categories across the region. Each provider was asked the following five questions:

- What are the cost implications of each scenario?
- How feasible is each scenario for you as an infrastructure provider/operator?
- How does each of the scenarios fit with the strategic direction and legislative requirements of your organisation?
- Are there any consequential land requirements for you if a particular scenario is chosen?
- Is there any other information that you think we may need to understand for each of the scenarios?

The following report takes the raw feedback received by Council and identifies key themes across infrastructure sectors, as well as wider infrastructure issues for the region. Copies of the information received are attached as an appendix. It should be noted that responses from each provider contained a mixture of information that did not always reflect the questions asked by the Council.

#### **Water**

Water infrastructure can be split into three broad areas, these being:

- Water supply
- Wastewater collection and treatment
- Stormwater management

With the exception of small privately owned systems or on-site water infrastructure (as well as services provided by United Water in Papakura), Watercare Services Limited is responsible for the reticulated water and wastewater networks across the region and as such, feedback has only been sought from Watercare. The ownership of stormwater infrastructure is more complicated, with various components owned by private individuals, the Council, and Auckland Transport. However, feedback regarding stormwater has only been sought from the Council's Stormwater Development and Technical Services unit.

## Water Supply

	<b>Cost Implications</b>	<b>Feasibility</b>	<b>Land Requirements</b>
<b>Scenario A</b>	Cheapest Option	More Feasible	No significant land takes
<b>Scenario B</b>	Second most affordable though local upgrades needed.	More Feasible	No significant land takes
<b>Scenario C</b>	Would require significant spend	Less Feasible due to resource limitations	No significant land takes
<b>Scenario D</b>	Significant additional funding needed	Less Feasible due to resource limitations	No significant land takes

Again, Watercare advise that Scenario A is the preferred option. This scenario follows their current asset management plan. The other scenarios face increasing costs, especially the expansive network which would require significant funding to service the coastal and ribbon developments. Watercare have also advised that the intensification associated with Scenario C would be difficult to service. This may be due in part to the engineering difficulties associated with supplying water to the North Shore and Isthmus.

## Wastewater

The following table breaks down the feedback received from Watercare regarding wastewater. The table is then followed by analysis of this feedback

	<b>Cost Implications</b>	<b>Feasibility</b>	<b>Land Requirements</b>
<b>Scenario A</b>	Cheapest Option	Most feasible	No additional land
<b>Scenario B</b>	Third Cheapest (\$150 – 300 million)	Second Equal	New land for pump stations, possible new treatment plants
<b>Scenario C</b>	Second Cheapest (\$50 – 200 million)	Second Equal	New land for pump stations, possible new treatment plants
<b>Scenario D</b>	Most Expensive (\$500 – 750 million)	Least Feasible	Would require the most land for pump stations and new treatment plants

The upgrading and expansion of wastewater networks can be a lengthy and expensive process. The public have high expectations regarding the quality of wastewater treatment and expect to pay a minimal cost for the service. It is also fraught with consenting issues, given the sensitivity of discharges to the environment and the decrease in land values of properties in close location to new or upgraded wastewater facilities. The cost associated with expanded networks can also be a significant factor rendering a development uneconomic.

Given these factors, Watercares preference is for Scenario A, which follows the existing Regional Growth Strategy (which itself has influenced Watercare’s planning to date). However, Watercare do highlight that at least 7 to 10 years would be needed to add new areas to their networks (which are not already in their Asset Management Plan).

### *Stormwater Management*

The following feedback was received from the Council’s Stormwater Unit:

	<b>Cost Implications</b>	<b>Feasibility</b>
<b>Scenario A</b>	Lowest Cost	Most Feasible
<b>Scenario B</b>	Medium Cost	Medium Feasibility
<b>Scenario C</b>	High Cost	Low Feasibility
<b>Scenario D</b>	High Cost	Least Feasible

The Stormwater unit also provided a number of comments relating to key stormwater management themes for all four scenarios, these being:

- *“Many existing flooding problems and impacts on waterways and coastal receiving environments exist as a result of previous development methods. Comprehensive redevelopment offers sometimes the only opportunity to address these. Cost of addressing these effects after they have occurred is expensive.*
- *Several coastal, low-lying developed areas are at risk of future coastal inundation. Further development in these areas will increase exposure to risk.*
- *Low energy, depositional receiving environments adjacent to the oldest and most urbanised areas of the city are showing the greatest signs of being affected by stormwater contaminants.*
- *Loss of headwaters and channelizing/piping of streams has had a significant impact on biological and physical stream values.”*

The Unit also highlighted that it is better for growth to occur in specified intensification areas, rather than general infill or by expansive development, while it is the increase in impervious surfaces rather than population increase which affects stormwater flows and assets.

Given these factors, the Stormwater Unit scored Scenario A the highest, while Scenario D was scored the lowest.

### **Energy**

Feedback was also received from a number of energy companies. This included electricity distribution and electricity generators, as well as the operators of the Wiri Oil Terminal. Feedback from each company has been split between energy subsectors.

### *Transmission*

The operation and management of New Zealand’s national grid is the responsibility of Transpower New Zealand. Transpower have commented that there is little difference in costs, feasibility, or land take between the four scenarios. However, new corridors would be required for any new growth.

This is due in part to Transpower's transmission function. Electricity is brought to Auckland by a number of transmission lines and is then allocated to lines companies (for local distribution) via a number of fixed grid exit points (GXPs). This transfers cost for distribution to the local lines companies and onto consumers. Transpower also highlighted that focusing growth on certain areas of the city may alter the timeframes for its projects. For instance, the promotion of growth on the North Shore would likely require the bringing forward of an additional cross-Auckland cable.

### *Distribution*

Feedback was sought from the two lines companies that service the Auckland region. The first of these, Counties Power, services areas within the old Franklin District (including sections of the Waikato Region) and Papakura, while the remainder of the Auckland region is serviced by Vector. The feedback from both companies is provided below:

#### Vector

Vector were only able to provide high level costs regarding the nature of their business and costs. They identified that Scenario A would be the cheapest, with Scenarios B and C costing similar amounts (but more than A), while Scenario D would be the most expensive.

Vector also highlighted the difficulty with servicing expansive growth. Electricity distribution in urban Auckland is based on a modular network which must connect back to one of Transpower's GXPs. While this is easier to do within existing urban areas given the shorter distances to existing GXPs, new Greenfield areas are more difficult and expensive to connect. Vector identified this as a particular issue for the coastal development in Whitford identified in Scenario D.

#### Counties Power

Counties Power identified that while the expansive scenarios would be more costly, they would be able to manage growth (as long as overhead transmission was allowed). They considered that all four scenarios were equally feasible although substantial development in satellite nodes (e.g. Awhitu) could be more difficult to service.

Counties Power also highlighted the resilience of placing growth towards the south, thereby putting new development closer to the sources of electricity. They also highlighted the need to protect land corridors for their infrastructure, in order to maintain a secure electricity network.

### *Liquid Fuels*

Scenario feedback was sought from Wiri Oil Services Limited and its parent company New Zealand Refining Company with regard to the growth demands on liquid fuel infrastructure. Liquid fuel infrastructure in the region is quite limited, with only the Wiri Oil Terminal, the refinery to Auckland pipeline, and the aviation gas pipeline to Auckland Airport being of strategic significance.

Verbal feedback was received from New Zealand Refining that Scenario D, with its focus on Greenfield development, was preferred. This was due to the risk profile of their pipeline, which runs under several urban areas of West, Central, and South Auckland. The pipeline is regularly at risk to encroachment by other development. The immediate effects of a pipeline breach would probably result in the loss of life and significant localised damage, while the economic effects would be felt nationwide. The intensification along major arterial corridors (where the pipe is located) increases the risk of a pipeline breach, while Greenfield development can be located to avoid the pipe.

### *Electricity Generation*

The only electricity generator to respond back to the Council was Genesis Energy. Genesis Energy currently hold live consents for the Rodney Power Station (currently unbuilt) as well as a number of generation assets outside the Auckland Region. While Genesis did not provide comment on the cost or feasibility of the scenarios, the following general comments were made:

- *“ensuring that any options for future electricity supply for the Auckland Region are realistic and acknowledge the constraints within the region on generation options;*
- *ensuring that, no matter what scenario is adopted, appropriate provision is made for bulk transmission of energy (electricity and gas) to and through Auckland;*
- *ensuring that Council promotes the uptake of new energy efficiency technologies in future development, without precluding new (and unknown) technologies that may be developed.”*

### **Telecommunications**

Auckland is served by a number of telecommunication providers. Chorus is the infrastructure arm of Telecom New Zealand and is responsible for the copper and fibre networks across the region, while Three Degrees and Vodafone New Zealand provide a variety of mobile and internet based services. Regional connectivity is provided by FX Networks, which owns and operates a New Zealand wide network of fibre cables. Feedback was sought from a variety of telecommunication providers, as well as the Council’s own Broadband team (which forms part of the wider Economic Development division).

The Broadband Team highlighted a number of high level issues associated with the scenarios. A significant issue was the provision of broadband services to greenfield areas, as properties in areas previously identified as rural may not have adequate access to fibre (thus resulting in residents being dependent on wireless broadband access). They also highlighted the difficulty in supplying broadband to general infill development (given the need to provide more complex fibre networks), while the use of satellite communities could place additional strain on the provision of fibre networks. Overall, Scenario A was the preferred option for the Broadband Team.

### **Ports and Airports**

While the Auckland region features a number of freight distribution hubs and small airfields, passenger and goods movements are dominated by the Ports of Auckland and Auckland International Airport. Feedback regarding the scenarios was sought from both Auckland International Airport Limited and Ports of Auckland Limited. Their comments are provided below.

#### **Auckland Airport**

Auckland International Airport Limited has not provided specific comments on each scenario. However, they have highlighted their dependence on lifeline utilities and the resilience issues that expansive growth, such as Scenario D, would cause. As such, they support Scenarios A and B.

#### **Ports of Auckland**

Ports of Auckland also provided high level comments regarding the four scenarios. Their prime concerns were how the growth models affected transport networks and restrictions on business growth. They have commented that Scenario A appears to place the greatest constraints on business growth given the limited land available for development, while they have also assumed that this scenario also limit the upgrading of road networks.



### **Social Infrastructure – Education**

Feedback was also received from the Ministry of Education. The Ministry stated that they preferred Scenarios B and C. Both scenarios gave the greatest flexibility to upgrade existing schools and construct new facilities, whereas Scenario A was too dependent on existing facilities (which are often constrained) or the purchase of land within the existing urban area (which would be costly to the Ministry), while Scenario D was too reliant on the provision of new costly facilities.

### **Other Infrastructure Sector Members**

Feedback was also received from the New Zealand Council for Infrastructure Development (NZCID).

	<b>Cost Implications</b>	<b>Feasibility</b>
<b>Scenario A</b>	Least Cost	Feasible
<b>Scenario B</b>	Medium Cost	Unfeasible
<b>Scenario C</b>	Medium Cost	Feasible
<b>Scenario D</b>	High Cost	Feasible

With regard to cost, NZCID highlight that Scenarios B and C do not align with current transport funding, whereas Scenario D would not make full use of the funding provided for rail transport. They also highlight that while Scenario A may be the most technically feasible, it is not likely to have political support and would be undesirable due to limited scope to improve housing choice. NZCID also consider that while Scenario D would be the most politically feasible, it would be difficult to get public support for the infrastructure costs associated with this form of growth.

Overall, NZCID see benefit from features of Scenarios A, B and D. They have provided a further scenario “Scenario E”, which would feature the following:

- Intensification around rail nodes:
  - within the CBD,
  - within the wider urban area, and
  - in satellite centres.
- Limited intensification in centres not served by rail.
- Limited urban intensification outside centres.
- Some expansion of the metropolitan urban limit, but restricted to those areas supported by existing and committed transport investment.
- Provision of Group 1 business land consistent with scenarios B and D.

### **Scoring of Respective Scenarios**

Following the receipt of submissions, a scoring workshop was held between Council Officers to align the feedback received with scenario evaluation criteria of the wider evaluation workstream. The key criterion for this report is “the prospective cost and feasibility”. Scoring for each scenario could potentially range from **LLL** to **XXX** with a neutral score (0) if the scenario aligned with providers’ legacy documents.

This was only possible where feedback on all four scenarios was received from infrastructure providers, although the comments provided by other providers are still valuable for the overall review of each scenario. Once this scoring was completed, Council Officers contacted the various providers to confirm that the scoring was correct.

The table below shows the final scoring for each infrastructure sector:

	Scenario A	Scenario B	Scenario C	Scenario D
<b>Wastewater</b>	0	XX	X	XXX
<b>Water Supply</b>	0	X	XX	XXX
<b>Stormwater</b>	0	X	XX	XXX
<b>Energy – Electricity Supply*</b>	0	X	X	XX
<b>Broadband</b>	0	X	XX	XX
<b>Education</b>	X	LL	LL	XX

\* With regard to electricity supply, the scoring is based on the feedback from Vector, Transpower, and Counties Power. Greater weighting was placed on Vector’s scoring given the large number of customers it serves and the geographic area that it is responsible for.

### **Conclusions**

From the feedback received from infrastructure providers, a number of key infrastructure themes can be identified and should be taken into account when determining the preferred urban form.

These themes are:

- Expansive growth is often costly for infrastructure, requiring significant investment in new network components.
- A mixture of intensification in specified locations provides the cheapest and most feasible form of development for infrastructure providers.
- Intensification provides the best opportunity to provide support population growth while remedying outstanding infrastructure constraints e.g. improving stormwater infrastructure in corridors.
- Widespread infill does not provide the opportunity to improve on existing infrastructure constraints and can increase costs.
- The environmental impacts of infrastructure servicing new growth must be taken into account e.g. the role of stormwater discharges on the marine environment and the proliferation of electricity lines in rural areas.
- Infrastructure funding and planning often lags behind growth decisions, resulting in stranded investment and reduced services for new urban areas.
- New growth and intensification can threaten infrastructure corridors and networks. As such, any new growth must recognise existing critical infrastructure and avoid adversely impacting on the physical wellbeing and operation of this infrastructure.