HUTT CORRIDOR PLAN FOR THE TRANSPORT NETWORK -

SUSTAINABILITY OF ROAD LINK OPTIONS

Prepared by Karen Bell
Enviro Solutions New Zealand Ltd.
June 2002

PO Box 11880 Wellington, phone 025 570-279,
karen.bell@envirosolutions.co.nz

Executive Summary

This project will assist in providing greater strategic direction to the Hutt Corridor Study in relation to the likely environmental and social impacts. The purpose is to prepare a report that will assess the environmental and social sustainability of the six possible road link options in the Hutt Corridor Plan. A detailed analysis of the environmental and social sustainability of the options has not been undertaken to date due to lack of comprehensive data on the environmental and social impacts of each of the options. The sustainability analysis that has been undertaken to date is based on the Wellington Regional Council's transport modelling of CO, CO_2 and fuel consumption. The model was not designed to, and does not capture things like particulate matter, the environmental effects of congestion, health effects from vehicle emissions, impacts on ecology, landscape and community severance.

This report identifies a set of key measures of environmental and social sustainability and assesses them and their likely impacts/risks where data is available in relation to the six proposed road link options. By necessity (because of a lack of available data and information) this report only provides very tentative and qualitative research findings and conclusions.

All of the six road link options will have significant environmental and social impacts. The extent and nature of the likely impacts require further analysis once there are fewer options to consider.

This is a comparative assessment and is, by necessity, (due to limited data) a broad and coarse assessment. Therefore the results are qualitative and the professional opinion of the author.
This broad-brush assessment indicates that:

- option X6 – State Highway 58 extended to four lanes, was viewed as a pragmatic option by some of the people who provided information for this project. Option X6 is perceived to have less significant environmental and social impacts than the "greenfield" options. Option X6 which would utilise the existing transport network will still have environmental and social impacts (such as air pollution from vehicle emissions, sedimentation, noise etc) that will need to be remedied or mitigated but is likely to have less environmental and social impacts than the other options;
- option X1 – Petone Esplanade relates to an existing road but is likely to have significant environmental and social impacts such as storm water run off into the port, sedimentation, possible natural hazards effects (from predicted sea level rise) and community severance;
- the options that involve Belmont Regional Park (Options X2, X3 and X4) would require significant earthworks and land take on the steep slopes of the park and would have significant environmental and social effects in the recreationally zoned park and health and community severance effects in the urban and residential environments they relate to. Options X2, X3, X4 would have to have strong efficiency and economic benefits to survive the process and be realistic strategic projects; and
- option X7 – the Akatarawa Road – was not viewed favourably in the economic analysis, so as this is less likely to be pursued by the Wellington Regional Land Transport Committee only a brief outline of the likely environmental and social impacts has been undertaken.

Acknowledgements

The Wellington Regional Council's Transport Division commissioned this project, to assess the social and environmental sustainability of the road link options in the Hutt Corridor Plan.
Karen Bell of Enviro Solutions New Zealand Limited prepared this report.

Thank you to the following people who discussed this project and provided information/feedback:

Wellington Regional Council	Tony Brennand, Nick Sargent, Ann Manly, Susan Edwards, Philippa Crisp, Ross Jackson, Perry Davy and John Holmes
Hutt City Council	Joe Hewitt, Stuart Duncan, Ernie Albuqueuque and Bronwyn Little and Robyn Fisher for provision of maps
Ministry for the Environment	Caroline Austwick
Ministry of Transport	Paul Irving
Ministry of Health	Louise Thornley
Friends of Belmont Regional Park	Richard Sadleir (Convenor)

The following people also attended a meeting of the Technical Team on 2 May 2002 to discuss the project and agreed in principle to the suggested measures of sustainability and project approach:

Wellington Regional Council	Nick Sargent
Hutt City Council	Joe Hewitt
Upper Hutt City Council	Lachlan Wallach
Porirua City Council	Geoff Marshall
Wellington City Council	Paul Desborough
Transit New Zealand	Lindsay Daysh
Transportation Planning	Tim Kelly
Opus International Consultants	Clement Fisk

Contents

1. Introduction

Purpose of this project

The Wellington Regional Council is developing a Hutt Corridor Plan, as part of the region's wider transport strategies. The corridor links Hutt Valley, Porirua and Wellington City and beyond. The corridor includes highways, major local roads, rail and bus services. This study considers only the road link options.

The purpose of this project is to prepare a report that will assess the environmental and social sustainability of the road link options in the Hutt Corridor Plan.

This report identifies a set of key measures of environmental and social sustainability and assesses them in relation to the six proposed road link options and their likely impacts/risks. It will assist in providing greater strategic direction to the Hutt Corridor Study in relation to environmental and social impacts. The main users of the report are likely to be the Transport Division at Wellington Regional Council and the Technical Team, from Hutt City, Upper Hutt City, Porirua City, Wellington City and the Wairarapa district councils, Transit New Zealand and Wellington Regional Council. It may be of interest to those who manage or use Belmont Regional Park, local residents and businesses in the study area and those who will be affected by the road link decisions but has been prepared for a technical audience in the first instance.

Background and scope

The vision of *The Wellington Regional Land Transport Strategy 1999-2004* (Wellington Regional Council, 1999) is: *A balanced and sustainable land transport system that meets the needs of the regional community.* Five key objectives are identified in order to achieve this:

- accessibility and economic development;
- economic efficiency;
- affordability;
- safety; and
- sustainability.

Sustainability is a broad term that has different meanings to different people. Sustainability is defined in the land transport strategy as the objective *"to provide a land transport system that operates in a manner that recognises the needs of the community; avoids, remedies or mitigates adverse effects; uses resources in an efficient way; and supports an optimal demand for energy"* (Wellington Regional Council, 1999). The policies relating to sustainability in order to minimise the impact of transport on the environment, include to

- promote environmentally benign transport mechanisms;
- make cycling and walking more attractive; and
- price at peak times on the road network to mitigate adverse impacts of road use.

Six possible road link options have been identified for the Hutt Corridor Plan and include:

A X1 Petone – Grenada Link Road (Melling - Porirua link) and Esplanade Upgrade

B X2 Melling – Porirua Link Road and a Cross Valley Link

- Whites Line Road to Wakefield Bridge
- 4 Lane road from Randwick Road to Dowse SH2

C X3 Melling to Porirua Link Road

Melling Grade Separartion and

Randwick – Melling Link around the Lower Hutt CBD

D X4 Belmont – Porirua Link Road and Randwick, Cambridge Terrace, Belmont Link

E X6 SH58 extended to 4 lanes

F X7 Akatarawa Road Upgrade.

Refer to Appendix 1 for an indication of the location of the six road link options. These options are being considered in relation to the five key objectives identified in the transport strategy (accessibility/economic development, economic efficiency, affordability, safety and sustainability). This project assesses the Porirua – Hutt road link options in relation to the sustainability objective. The project does not consider the State Highway 2 upgrade options and passenger transport options at this stage. It is suggested that these broader transport considerations be considered in an integrated manner in terms of sustainability in the future.

Approach

This study is at a strategic level and is a broad desktop assessment of the environmental and social sustainability of the options for the Hutt Corridor Study road link transport network. Detailed discussion and analysis of the options has not been undertaken. The assessment does not involve any primary research but is based on existing information and data. This information may have been prepared for other purposes, ie not explicitly for considering sustainability; and there have been no site visits and no additional community input.

The brief was to assess the six road link options in terms of sustainability, using the broad analysis matrix that has been used previously for the Regional Land Transport Strategy. This includes assessing each option against a set of predetermined measures and ranking them in terms of the following scale.

Key objectives/measures	X1 Esplanade	X2 Whites Line	X3 Hutt CBD	X4 Belmont Porirua	X6 4 lane SH58	X7 Akatarawa
Accessibility, development						
Economic efficiency						
Affordability						
Safety						
Sustainability						

Very positive impact for this objective/measure	++
Positive impact for this objective/measure	+
Neutral / OK	0

Negative impact for this objective/measure	-
Very negative impact for this objective/measure	--

A list of possible measures of environmental and social sustainability were developed based on viewing other transport effects reports in the region, assessing the key resource management and management plans, and the relevant proposed national environmental performance indicators. These were presented to the Technical Team along with this suggested approach as a practical methodology, and agreed to in principle. The Technical Team was asked to provide any relevant reports and information to assist this project. Other relevant people (from the Wellington Regional Council, Hutt City Council, Ministry of Transport, Ministry for the Environment, and National Health Committee) were approached for information.

The key measures of sustainability are considered in relation to each of the six options and an assessment of the likely environmental and social sustainability issues/impacts (including the risk ranking matrix) provided.

Report outline

This report is structured as follows:

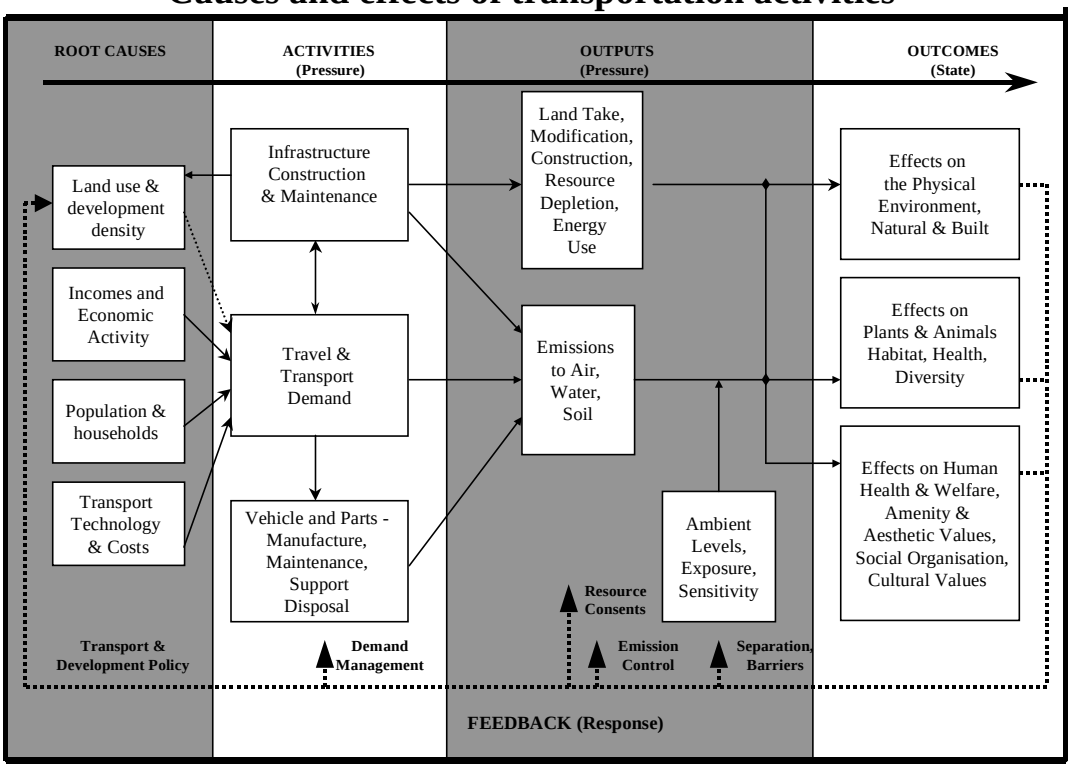
- proposed sustainability measures;
- discussion/analysis;
- conclusions and recommendations;
- references; and
- appendices.

2. Sustainability measures

The transport system (including roads, rail, shipping, air corridors and vehicles) is necessary to people for daily life and can also significantly impact on the environment and on communities. Motor vehicles have the greatest effect. As urban areas have expanded so has motor vehicle use and the tendency to build more roads. Increased road traffic puts pressure on surrounding air, land and water resources. Current transport effects include: congestion, air pollution from vehicle emissions, contamination of waterways, encroachment of roads and motorways on land and effects from earthworks (erosion, sedimentation), limited use/access to public transport, contributions to greenhouse gas emissions (and climate change), amenity issues such as noise, community cohesion, and public health and safety. Figure 1 below, is one way of illustrating the causes and effects of transportation activities and points towards a complete set of sustainability measures based on all possible effects of the proposed road link options.

Figure 1:

Causes and effects of transportation activities



Source: (Ministry for the Environment, 1999)

Efficient transport management seeks to meet the needs of those using public transport, freight services and private vehicles while minimising their negative environmental impact (Ministry for the Environment, 2002).

Table 1 over, lists the recommended measures of sustainability to determine the environmental and social sustainability of Porirua – Hutt road link options. It is possible to assess the options with certainty only if data exists. As there is only ad hoc data available from which to assess the sustainability of the road link options (except a few measures that are included in the transport model), the conclusions reached in this report are very tentative and it is recommended that once there are fewer options that a more comprehensive sustainability assessment is undertaken (which may include some primary research).

Table 1 Possible measures of social and environmental sustainability

Possible measures of sustainability	Impacts/indicators where known
Community severance and conflicting uses	Effects on local amenities / utilities Effects on amenity / quality of life (below) Effects on people's properties Community disruption / severance Impacts on opportunities to cycle / walk
Impacts on human health	Safety (covered by other studies) Vehicle emissions and noise (as below) Physical activity Community networks and social isolation Environmental factors (values/connection with environment)
Land take or modification	Net change of land area under transport infrastructure Erosion and sediment control (from earthworks)
Cultural and historical heritage impacts	Impact on significant identified sites Impact or loss of heritage sites/values Impact or loss of archaeological, cultural or spiritual values
Fuel efficiency & consumption	CO_2 Fuel consumption VFECS (Vehicle Fleet Emissions Control Strategy)
Ambient air pollutants & emissions from road transport	CO PM_{10}, $PM_{2.5}$ N0x S0x VOC/benzene
Congestion from high traffic volumes	Change in level of road congestion over time (journey time)
Storm water run-off – water run off pollution	Water quality of harbour, rivers etc Sedimentation
Public access	Access to and along water (harbour, rivers, streams, inlet)
Landscape or visual impacts	Visual impact of road in landscape/trees Impact on geological features
Noise levels	dBA – residents exposed to outdoor road traffic noise Prior perception surveys
Amenity (odour, dust etc)	Vibration from heavy road vehicles Odour, dust Prior perception surveys
Impact on ecology/biodiversity (effects on plants, animals, habitat, health and diversity)	Impact and loss of wetlands Loss of biodiversity Loss of habitat of significant vegetation and fauna Impact on any wildlife reserves Impact on significant natural areas
Impact on council owned land (such as Regional Parks, water catchment areas)	Impact on regional land (eg, regional parks) owned or managed by WRC for: ecology; recreational use; heritage (signature values), resource management purposes
Hazards mitigation	Flood protection, sea level rise, erosion
Cumulative effects and holistic integrity of the Park	?

International good practice in environmental performance management suggests that there is not one indicator of sustainability that should be used but a range of measures in order to assess the social and environmental impacts of transport. The Wellington Regional Council Transport Model provides some useful data but does not capture many of the measures of sustainability listed in Table 1 – so desktop investigations of additional measures were required. The result is the above table which attempts to capture all possible effects of the road link options.

3. Discussion/analysis

General discussion of transport effects

A recent report on the health effects of vehicle emissions in New Zealand shows that the impacts are greater than previously realised. Estimates show that 399 people aged 30 and over die prematurely each year from exposure to microscopic particles (PM_{10} and $PM_{2.5}$) from vehicle emissions.[1] Of the 399 people, 56 are from Wellington (Ministry of Transport, 2002).

The Department of Prime Minister and Cabinet has recently released the Government's preferred climate change policy package, which focuses on policies to reduce green house gas emissions and meet international commitments under the Kyoto Protocol. The underlying principle is that everybody needs to do something to reduce green house gas emissions and as such an emissions charge, capped at $25 per tonne of CO_2 equivalent, will be introduced and effect all emitters, including those driving private vehicles. 16% of all green house gas emissions (CO_2 etc) are from the transport sector. So these policies are highly relevant to discussions of the road link options.

It is clearly a priority to reduce vehicle emissions/congestion and consider comprehensively (from an environmental perspective) the six road link options and work towards options that will reduce vehicle emissions. Transport modelling indicates that *"increased expenditure on roads has little effect on congestion"* (Wellington Regional Council, 1998b, page 54); so reducing vehicle emissions/congestion may involve options other than the road link options such as a greater emphasis on passenger transport and cycling/ walking routes, and possibly pricing mechanisms to reduce private vehicle usage.

Tackling severe traffic congestion will have a direct impact on ambient air pollution levels, as congested roads produce more pollution than roads where the traffic is flowing freely. Steep roads with many trucks will produce higher emissions than flat/free flowing roads (Caroline Austwick, Ministry for the Environment, pers com, 2002). The Ministry of Transport recently developed the New Zealand Traffic Emission Rates (NZ-TER) model to project future trends in vehicle fleet emissions and assist in identifying any long term management strategies to manage vehicle emissions and their effect on air quality (including CO, VOC, NOx, PM_{10}). There are significant differences between congested and freer flowing driving conditions (Appendix 2).

Reducing congestion and vehicle emissions is a priority and things such as ensuring well tuned and maintained vehicles, emissions testing as part of the warrant of fitness process, spot checks on vehicle emissions to reduce the worst vehicles have contributed to reducing congestion and vehicle emissions in other countries (Ministry of Transport, 2002). The Vehicle Fleet Emissions Control Strategy (VFECS) is a programme of measures designed to assist with improvements in local air quality, especially those associated with transport emissions.

Other impacts of transport options are listed in Table 1 and are not always comprehensively assessed, such as impacts on human health, cultural and historic heritage, community severance, storm water run off and sedimentation, effects on public access, landscape and visual impacts, effects on ecology and amenity, and so on.

[1] The same study estimates that 970 people aged 30 and over die prematurely each year from air pollution derived from all sources (including fires for home heating); and in comparison, in 2001, 454 people died from road accidents, of which 243 were aged 30 years and over.

Transport impacts on the Hutt Corridor Plan road link options

A key question asked during this project is *why is it important to have a road link between Porirua and Hutt cities?* Is there a need for a link between Upper Hutt City and Kapiti Coast? Do people in Hutt and Porirua cities want a road link? Linking SH1 and SH2 would mean a substantial change in the structure of the region, and mean more of a focus away from Wellington and towards Porirua. A retail study carried out by Hutt City Council in 2001 found that the attraction is towards Wellington, rather than Porirua (pers com. 2002). Discussions with people involved in this project indicated that some would favour the existing roading network rather than greenfield proposals, and in particular option X6 to four lane SH58, for a range of reasons including social and environmental impacts.

The following discussion highlights the *key* likely social and environmental impacts of the six road link options. The matrix that ranks these likely impacts in relation to each of the road link options follows this discussion.

Option X1 - Petone – Grenada Link Road (Melling - Porirua link) and Esplanade Upgrade

Previous studies and the transport model show that the Petone Esplanade option would provide relief for congestion in Petone-Ngauranga and Johnsonville-Ngauranga. But there would inevitably be environmental and community impacts such as:

- Stormwater run off and sedimentation (into the harbour) – likely to be substantial
- Noise levels are likely to exceed the Hutt City Council Proposed District Plan requirements of 55dBA in the residential area (and complaints indicate there will possibly be other effects like vibration)
- Community severance (effects on local amenities / utilities, quality of life, people's properties, community disruption, impacts on opportunities to cycle and walk)
- Limited public access to and along the Petone foreshore (this is listed as a matter of national importance under the Resource Management Act 1991)
- Impacts on human health (vehicle emissions, impeding people's ability to walk/bike, safety, impacts on people's connection with the foreshore environment)
- Increased vehicle emissions and therefore possibly increased air pollution
- Landscape/visual impacts (is currently primarily a foreshore vista)
- Cultural and historical heritage impacts (there is a Community Iwi Activity Area in this area and an urupa – refer Appendix 5) and
- Natural hazard risk – from possible/predicted sea level rise in the case of a tsunami.

Options X2, X3, X4 through Belmont Regional Park

The three new proposed road options (X2, X3 & X4) provide benefits in terms of directness but are likely to be strongly challenged because they would involve putting in a new road through Belmont Regional Park. As such they have been considered in terms of social and environmental sustainability impacts collectively. Any key differences in terms of sustainability will be highlighted at the end of the collective discussion about the impacts of Options X2, X3 and X4:

- *Option X2 - Melling – Porirua Link Road and a Cross Valley Link* (includes Whites Line Road to Wakefield Bridge and 4 Lane road from Randwick Road to Dowse SH2)
- *Option X3 - Melling to Porirua Link Road* (includes Melling Grade Separartion and Randwick – Melling Link around the Lower Hutt CBD)

- *Option X4 - Belmont – Porirua Link Road, Randwick, Cambridge Terrace, Belmont Link*

Impacts on Belmont Regional Park

The Belmont Regional Park was conceived in the 1970s to provide recreational access and to protect important local landscapes. The aim in the 1996 management plan is *to provide for the development and management of Belmont Regional Park for outdoor recreational use, while protecting and enhancing its natural character, intrinsic values and cultural heritage.* This has been achieved through community partnerships and multiple ownership. The Park has 100,000 visitors a year (Wellington Regional Council, 1996).

The topography of the areas being considered for a new road link between Porirua and Hutt cities is on the escarpment of the Wellington Fault Line; and would follow some major ridgelines (Belmont Hills and Porirua East Ridge). It is reported to be a highly dissected and variable landscape and therefore the development of any new roads would involve considerable reshaping of steep and high escarpments and significant earthworks, therefore significant costs (Opus, 1997) and environmental impacts.

Any road development through this area would impact on indigenous vegetation, noise, recreation, geological features, waterways and habitats, landscape and visual amenity, historical and cultural impacts (to name a few effects). The options are likely to be strongly challenged by a range of park managers and users. Some of the key likely impacts on Belmont Regional Park are considered below. These findings are preliminary only and a more thorough investigation is recommended if any of these options (X2, X3 or X4) is likely to proceed.

- *Recreation zone*

  The Belmont Regional Park is zoned "recreation" and therefore a road would be a non-complying activity because of the adverse effects on the recreation zone and because it would be contrary to the objectives and policies in the Hutt City Council Proposed District Plan.

- *Impact of ecology and biodiversity*

  The Wellington Regional Council has identified six Key Native Ecosystems (KNEs) that would be affected by options X2, X3 and X4. These KNE areas have protection status (such as covenants and reserve status) for ecological purposes. The KNEs are illustrated in Appendix 3. Some of these KNEs contain rare and endangered species such as the Giant Kokopu and Kereru, or priority species, such as Kamahi, Kowhai, Beech and Fuschia. There would be impacts on Speedy's Reserve which is listed in the Hutt City Proposed District Plan as a *significant natural resource* (refer to Appendix 4); and a protected site in *A biological resource of the Wellington Region*, under the Reserves Act 1977. A more detailed analysis is required of which specific KNEs would be affected by the X options and this is dependent on the exact location of the road link options (which was not available to the author at the time this report was prepared).

- L*andscape and visual impacts*

  There would be significant landscape and visual impacts from the development of a new road through Belmont Regional Park. The area is a significant backdrop to Wellington and Hutt City inhabitants and visitors and protecting outstanding natural landscapes is a mater of national importance under the Resource Management Act.

- *Community severance*

  Community severance would occur due to dissecting the park, affecting quality of life and recreational opportunities, such as reducing people's opportunities to cycle, walk and picnic in the park. The Convenor of the Friends of Belmont Regional Park (Dr Richard

Sadleir) has indicated the group would be concerned about any proposals to put road links through the park (email correspondence, 2002). In addition to the other factors mentioned in this assessment Dr Sadleir also communicated concerns about the "holistic integrity" of the park. *"What we mean is keeping the land area of the park as a whole with no incursions into it by cutting off land for other purposes"* (Dr Richard Sadleir, Convenor, Friends of Belmont Regional Park).

- *Nuisance effects – noise, vibration, odour, loss of amenity*

  Noise levels are likely to exceed Plan requirements for this zone and there would be a loss of amenity values.
- *Air and water pollution* –storm water run off and sedimentation is likely to occur and air pollution is likely to occur due to increased vehicle emissions.
- *Impacts on human health* –increased vehicle emissions, issues regarding safety and impacts on people's connection with the park environment are likely to occur.
- *Cultural and historical heritage impacts* - there are important heritage sites, such as the ammunition bunkers in the park.

Impacts on urban and residential areas

Environmental and community concerns also relate to impacts on urban and residential areas (Kelson, Belmont, Watangarua).

- *Amenity*
  Rivers and Buchan carried out a social impact study in Hutt City households in the late 1980s. Residents like living in Hutt City because of the following things: has good access, open space, recreational opportunities, is quiet/peaceful/safe environment and has a great quality of life.
- *Community severance*
  This would be a significant issue for and concerns have been raised about safety and danger in relation to options X2, X3 and X4.
- *Noise*
  Although dated, a study carried out in Hutt City in the late 1980s is relevant, as it found that existing noise levels on Whites Line Road were 70dBA. The Proposed Hutt City District Plan states that the Council will …*"establish noise levels that maintain or enhance the health and amenity values"*. The levels set for the residential area are a maximum of 55dBA between 7am and 10pm and a maximum of 45dBA between 10pm and 7am (every day). This means it is likely that there would be substantial noise effects on the surrounding environment in the valley (which is zoned residential).

Hutt City Council staff commented that it would be positive if the Melling interchange were upgraded.

Option X6 - SH58 extended to 4 lanes

From an environmental and social impact perspective, extending SH58 to four lanes is likely to be the option with less significant impacts, compared to the other options, because it makes use of an existing road. There would still inevitably be environmental and social impacts such as:

- Storm water run off and sedimentation (into the Pautauanui Inlet and any nearby waterways), which is likely to be substantial;
- Impacts on human health (from vehicle emissions) and possibly increased air pollution;
- Increased noise levels;
- Effects on ecology; and

- Possibly cultural and historical heritage impacts (there is a Marae near the highway).

It is important to note that at the time of preparing this report the SH58 4 lane option would link SH1 and SH2. If Transmission Gully were to go ahead then this would mean that SH2 would link to Transmission Gully and if so the environmental effects that the report associates with Option X6 are likely to differ as many of the environmental effects apply to the existing road that follows the Pautauanui Inlet.

Option X7 - Akatarawa Road Upgrade

Possible environmental and community impacts for the Akatarawa Road upgrade would be similar to those mentioned for the other options. This option has not been analysed in detail because it did not perform well in terms of economic benefits.

4. Conclusions and recommendations

To conclude, the following matrix (Figure 2) provides a broad and coarse assessment of the likely impact of each option in relation to the predetermined measures of sustainability. This is a coarse assessment due to lack of comprehensive data from which to base analysis.

Figure 2 –DRAFT Assessment of Key Measures of Sustainability & X road link options

Measures of sustainability – Assessment Criteria	X1 Petone Esplanade	X2 Whites Line	X3 Hutt CBD	X4 Belmont Porirua	X6 4 lane SH58	X7 Akatara-wa
Community severance & conflict						
Effects on local amenities / utilities	--	0	0	0	0	0
Effects on amenity / quality of life (below)	--	-	-	-	?	-
Effects on people's properties	--	-	-	-	?	--
Community disruption / severance	-	--	--	--	0	-
Impacts on cycle / walk opportunity	--	--	--	--	-	-
Impacts on human health						
Safety (covered by other studies)	0	-	-	-	0	0
Vehicle emissions (as below)	--	--	--	--	-	-
Noise (as below)	-	--	--	--	0	0
Physical activity	-	0	0	0	+	?
Community networks and social isolation	-	--	--	--	0	?
Environmental factors – values connection with environment						
Land take or modification						
Net change of land area under transport infrastructure	-	--	--	--	-	-
Cultural, historical heritage impacts						
Impact on significant identified sites	0	--	--	--	0	?
Impact or loss of heritage sites/values	--	-	-	-	-	?
Impact or loss of archaeological, cultural or spiritual values	-- <	? <	? Requires	? consultation	? >	? >
Fuel efficiency & consumption	**NB[2]**					
CO_2						
Fuel consumption						
VFECS (Vehicle Fleet Emissions Control Strategy)						
Ambient air pollutants & emissions						
CO						
PM_{10}, $PM_{2.5}$						
N0x						
S0x						
VOC						
Benzene						
Congestion from high traffic volumes						
Change in level of road congestion over time (journey time)						
Storm water run-off – water pollution						
Water quality of harbour, rivers etc	--	--	--	--	-	?
Sedimentation	--	-	-	-	-	?

[2] Shaded area has been modelled on the WRC transport model and there were no discernable differences between the options.

Measures of sustainability – Assessment Criteria	X1 Petone Esplanade	X2 Whites Line	X3 Hutt CBD	X4 Belmont Porirua	X6 4 lane SH58	X7 Akatara-wa
Public access						
Access to and along water (harbour, rivers, streams, inlet)	--	-	-	-	Most 0 But Inlet --	?
Landscape or visual impacts						
Visual impact of road in landscape/trees	- 0	-- --	-- --	-- --	-- Inlet -	-- -
Impact on geological features						
Noise levels						
dBA – residents exposed to outdoor road traffic noise	--	--	--	--	?	?
Prior perception surveys	--	NA	NA	NA	NA	NA
Amenity (odour, dust etc)						
Vibration from heavy road vehicles	-	-	-	-	-	-
Odour, dust	?	?	?	?	0	?
Prior perception surveys	-	NA	NA	NA	NA	NA
Impact on ecology/biodiversity						
Impact and loss of wetlands	0	?	?	?	0	0
Loss of biodiversity	0	--	--	--	-	--
Loss of habitat of significant vegetation and fauna	0	--	--	--	-	--
Impact on any wildlife reserves	0	--	--	--	0	?
Impact on council owned land (such as Regional Parks, water catchment areas)						
Impact on regional land owned or managed by WRC for:						
• ecology;	NA	--	--	--	NA	NA
• recreational use;	NA	--	--	--	NA	NA
• heritage (signature values),	NA	--	--	--	NA	NA
• other resource management purposes	NA	--	--	--	NA	NA
Hazards mitigation	?	?	?	?	?	?
Flood protection						
Cumulative effects	?	?	?	?	?	?
Need to develop a measure						

The report is heavily qualified by lack of data. It has brought together what information there is available at the moment and the likely problem areas. Drawing on the material presented in this report, there are a number of conclusions that can be drawn, including:

- In terms of environmental and social sustainability the option that stands out as having the least potential impact (though still having a significant environmental impact) is option X6 to extend SH58 to four lanes;
- The options that are likely to have the most significant environmental and social impacts and be strongly challenged are options X2, X3 and X4 for a new road through Belmont Regional Park. Options X2, X3, X4 would have to have strong efficiency and economic benefits to survive the process and be realistic strategic projects;
- There were significant social severance issues and environmental issues associated with option X1 the Petone Esplanade upgrade but these were not quite as significant as the environmental impacts associated with options X2, X3 and X4;
- There was not a lot of information available on option X7 Akatarawa upgrade, but as this performed poorly on the economic analysis this option was not examined in any detail.

On the basis of these conclusions it is recommended that from an environmental and social sustainability perspective that option X6 to extend state highway 58 to four lanes is the most favourable option, but that there would be a number of significant effects to remedy and mitigate (particularly if the road links were to apply to linking SH1 and SH2, as presently would apply). If Transmission Gully goes ahead then there will be differences in the environmental effects outlines in this report and a full environmental

The environmental and social impacts of any and all of these road link options would be significant and will need to be addressed early in any further investigations before committing to any road link proposals. This should involve consultation with all affected parties (such as local residents, businesses, iwi, park managers, local authorities and users etc) and further investigations into the social and environmental sustainability of the options pursued.

References

Beca Carter Hollings and Ferner Ltd (2002) *Hutt Corridor Study, Stage 1*, prepared for Wellington Regional Council.

Boffa Miskell Partners Landscape Architects (1988) *Belmont Regional Park Landscape Assessment*, prepared for Wellington Regional Council.

Fisher, G (2002) *Health Impacts of vehicle emissions*, report prepared for the Ministry of Transport by NIWA.

Opus International Consultants (2002) *Stage 1 Hutt Corridor Transport Options: Economic Evaluation of Stage 1*, prepared for Wellington Regional Council by Clement Fisk

Opus International Consultants (1997) Wellington Regional Council Hutt Valley – Porirua Road Link Study Feasibility Investigation Report, prepared for Wellington Regional Council

Ministry for Environment (1999) *Proposed indicators for the environmental effects of transport*

Wellington Regional Council (1999) *Wellington Regional Land Transport Strategy 1999-2004*

Wellington Regional Council (1998a) *Regional Land Transport Strategy Review: First Stage Strategy Scenario Modelling Report*

Wellington Regional Council (1998b) *Regional Land Transport Strategy Review: Second Stage Strategy Scenario Modelling Report*

Wellington Regional Council (1998c) *Regional Land Transport Strategy Review: Third Stage Strategy Scenario Modelling Report*

Wellington Regional Council (1998d) *Regional Land Transport Strategy Review: Fourth Stage Strategy Scenario Modelling Report*

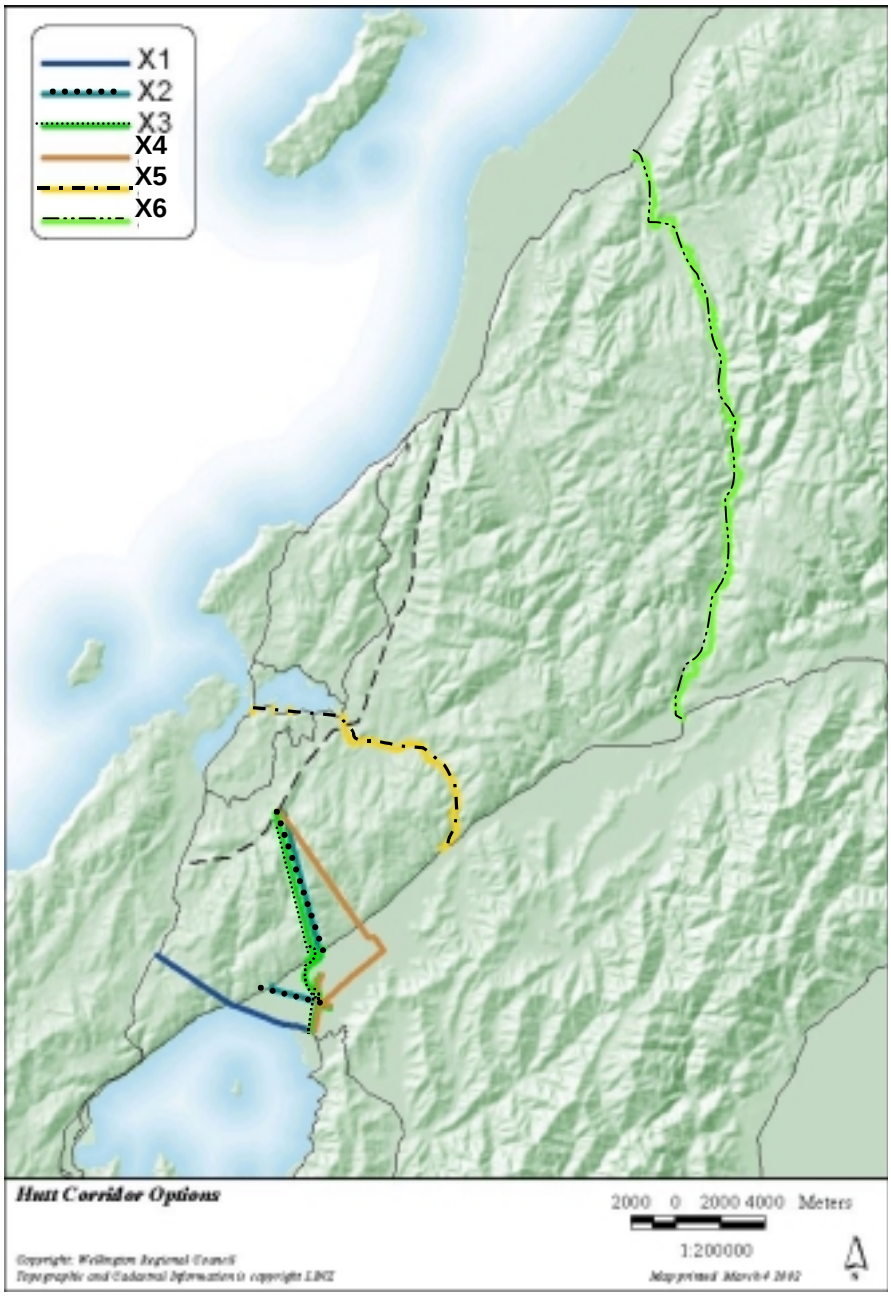
Wellington Regional Council (1996) *Belmont Regional Park Management Plan: Part 1 – Aims, Objectives and Policies*

Wellington Regional Council (1996) *Belmont Regional Park Management Plan: Part 2 – Resource Statement*

Relevant statutory documents:

- Wellington Regional Council, Regional Policy Statement
- Wellington Regional Council, Proposed Water Plan
- Wellington Regional Council, Proposed Coastal Plan
- Wellington Regional Council, Proposed Air Plan
- Wellington Regional Council, Draft Landscape Plan
- Hutt City Council, Proposed Hutt City District Plan
- Porirua City Council, Proposed Porirua City Plan

Appendix 1 – Study Area with Six Road Link Options



Appendix 2 – Emissions work in the transport sector

The primary structure for the emissions factor profiling is summarised in Figure 1. This applies across the full range of vehicle types and technology generations.

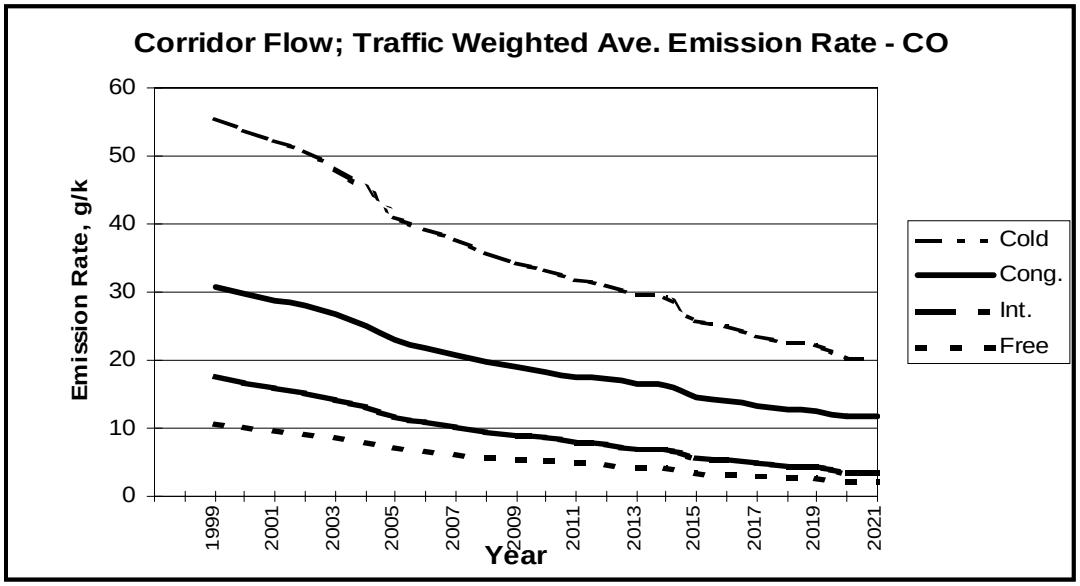
Figure 1 – VFEM Emissions Factor Matrix

Driving Condition / Road Type	Cold Running	Congested Flow (LoS E/F)	Interrupted Flow (LoS C/D)	Free Flow (LoS A/B)
Urban – CBD				
Suburban				
Urban M'way				
Rural Roads				

Emission factors, g/km

This approach makes it possible to correlate the emissions performance of vehicles, and their various engine and fuel technologies, directly with the actual conditions in local traffic networks. For example the fleet average emissions projection for CO, in the form of the g/km emission rate per unit vehicle in the typical traffic flows, given in Figure 2.

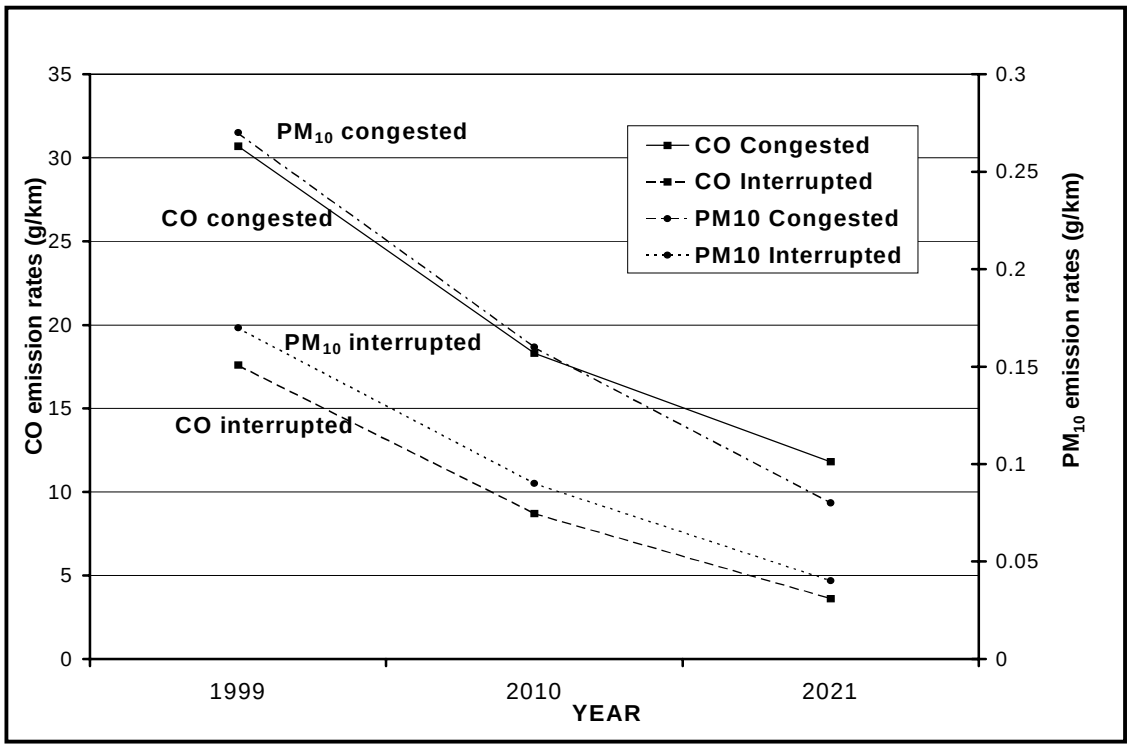
Figure 2 – Fleet Average CO Emission Projections



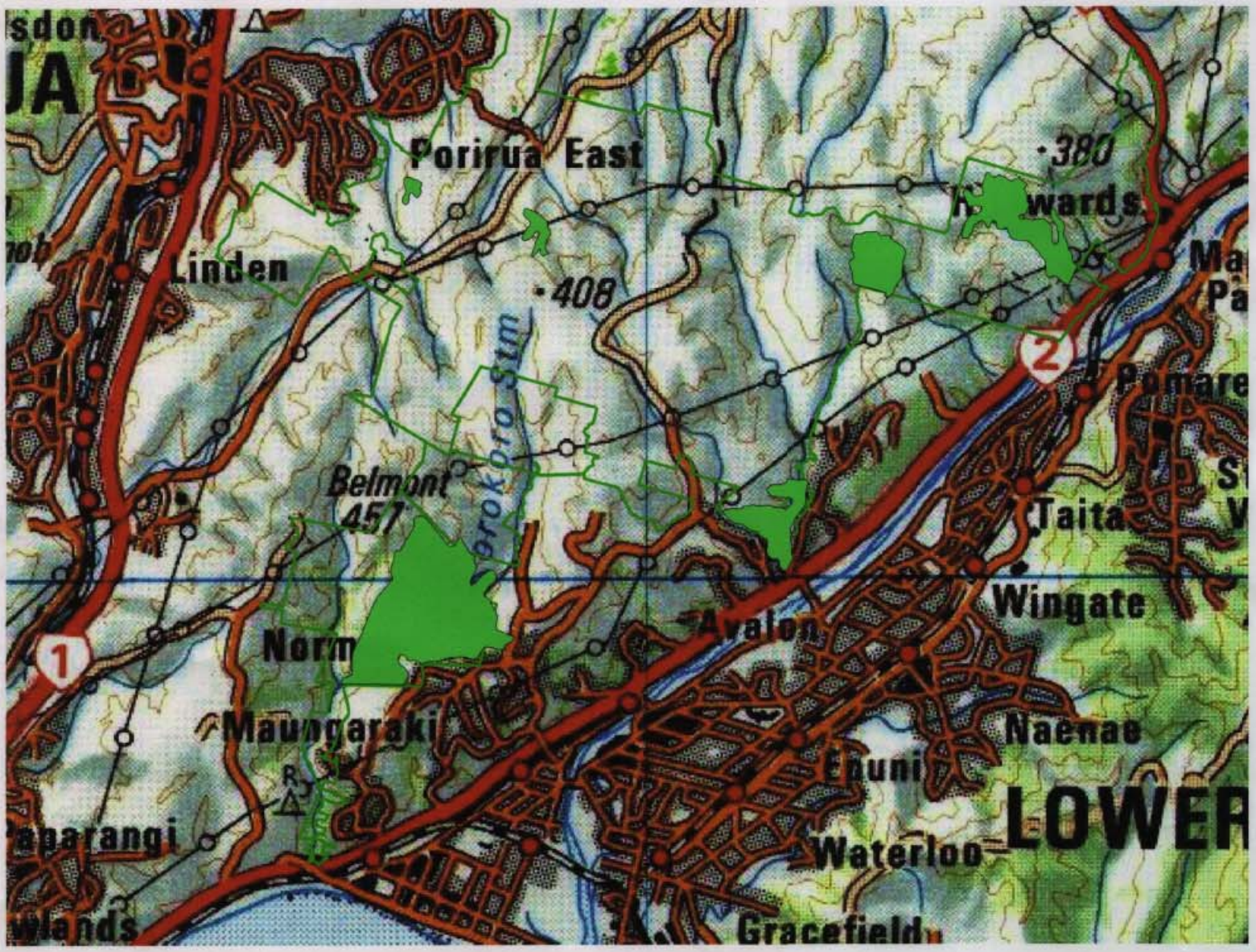
This illustrates the basic trends for all emission types. The output per kilometre increases significantly and exponentially with the degree of traffic congestion. In this example, under central urban driving conditions, the emission rate for the traffic flow increases by up to a factor of three when the traffic volume approaches the capacity of the roadway. There is also a significant increment again for the running period immediately after a cold start, which represents a significant proportion of many short local urban trips (source: Ministry of Transport, Ian Moncrieth and Paul Irving, October 2001).

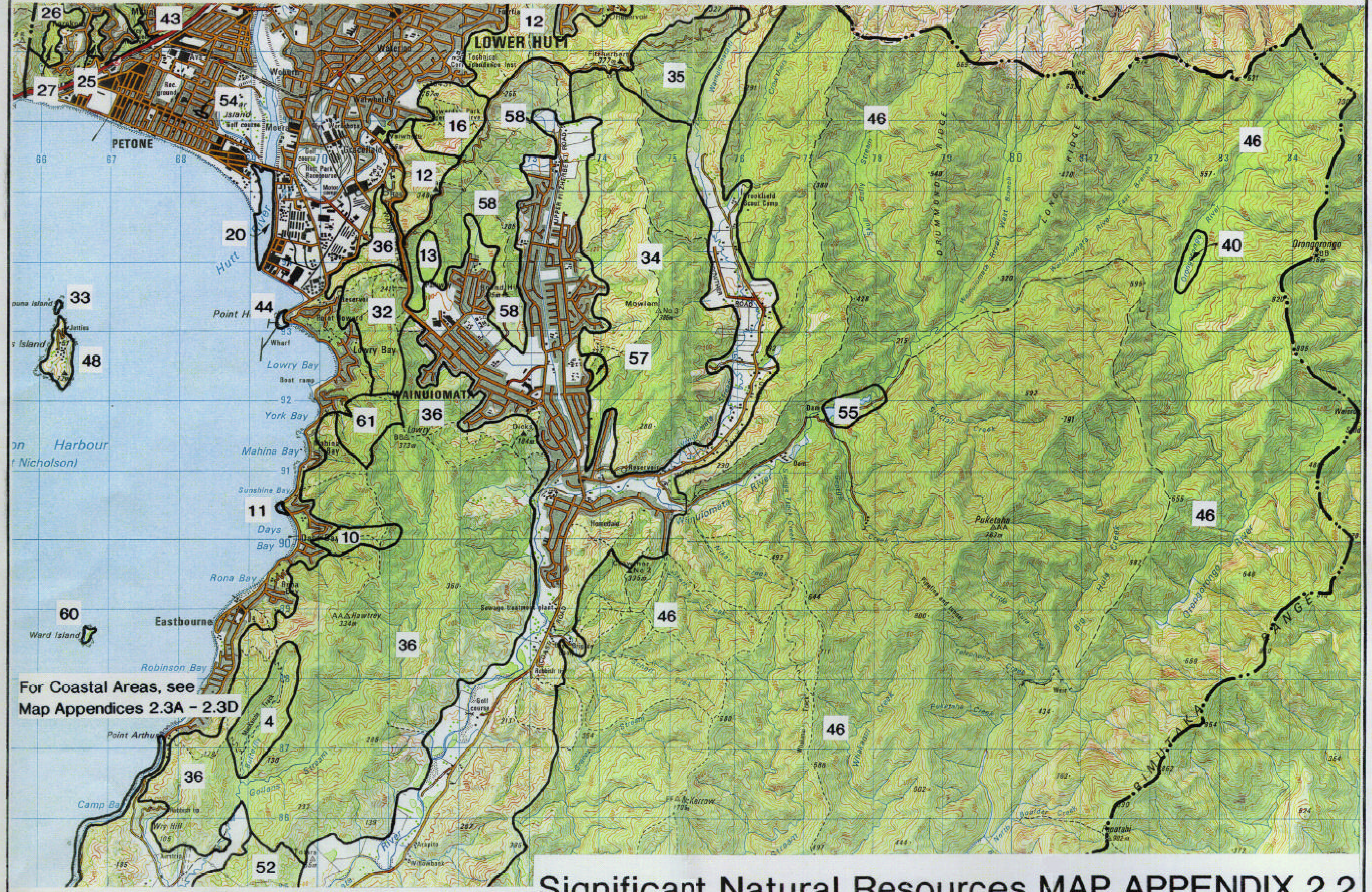
Figure 3 describes the improvements expected in 'average vehicle' emission performance over time as older vehicles in the fleet are gradually replaced by vehicles with improved emissions performance *and* the difference in emissions between 'congested' driving conditions and 'interrupted' driving conditions (this is based on studies carried out in Christchurch by Bob Ayrey, October 2001).

Figure 3. Single Vehicle Weighted Average Carbon Monoxide (CO) and PM_{10} Emission Rates (g/km) for Central Urban Type Roadway Network



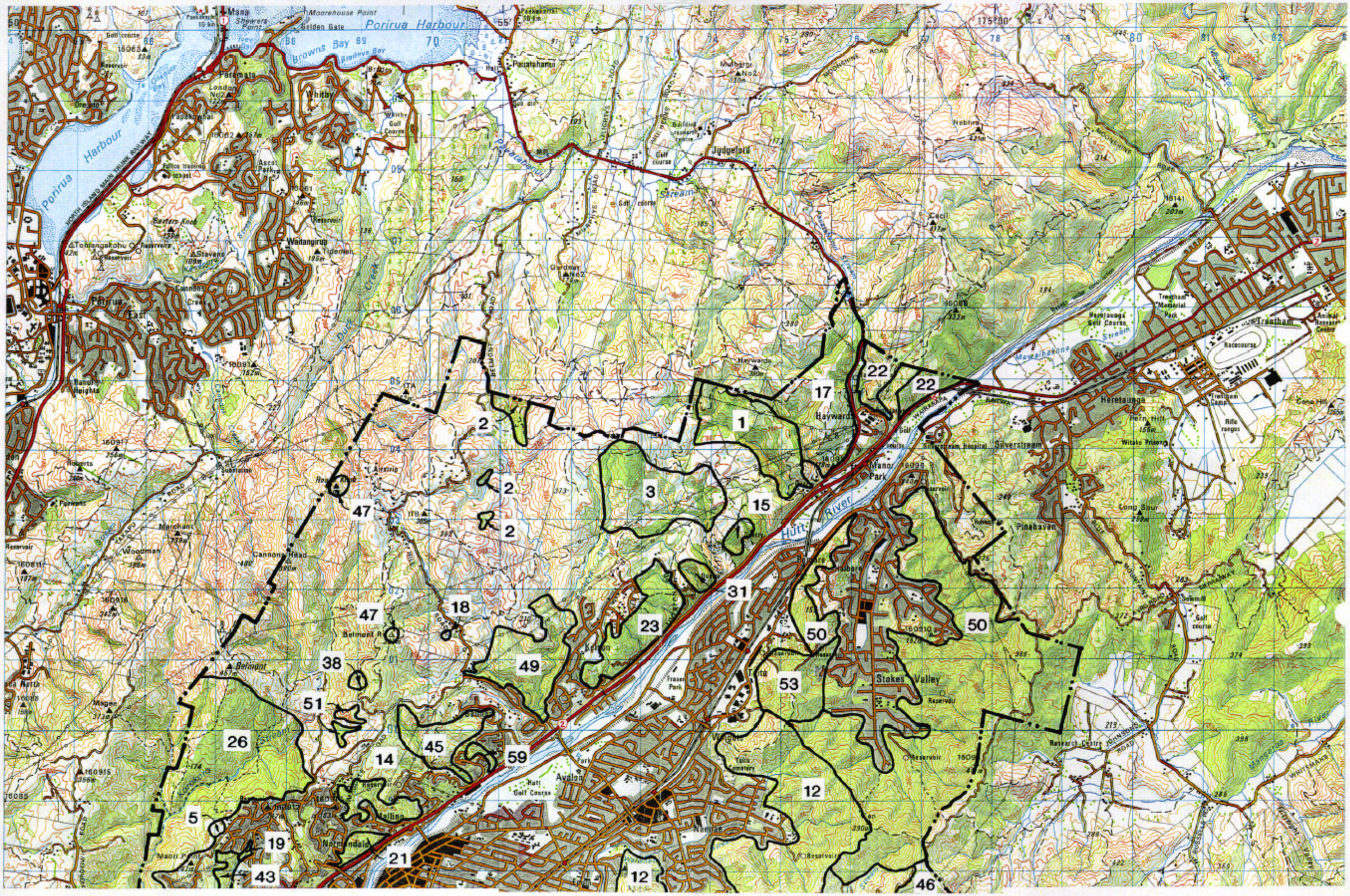
Wellington Regional Council





Significant Natural Resources MAP APPENDIX 2.2

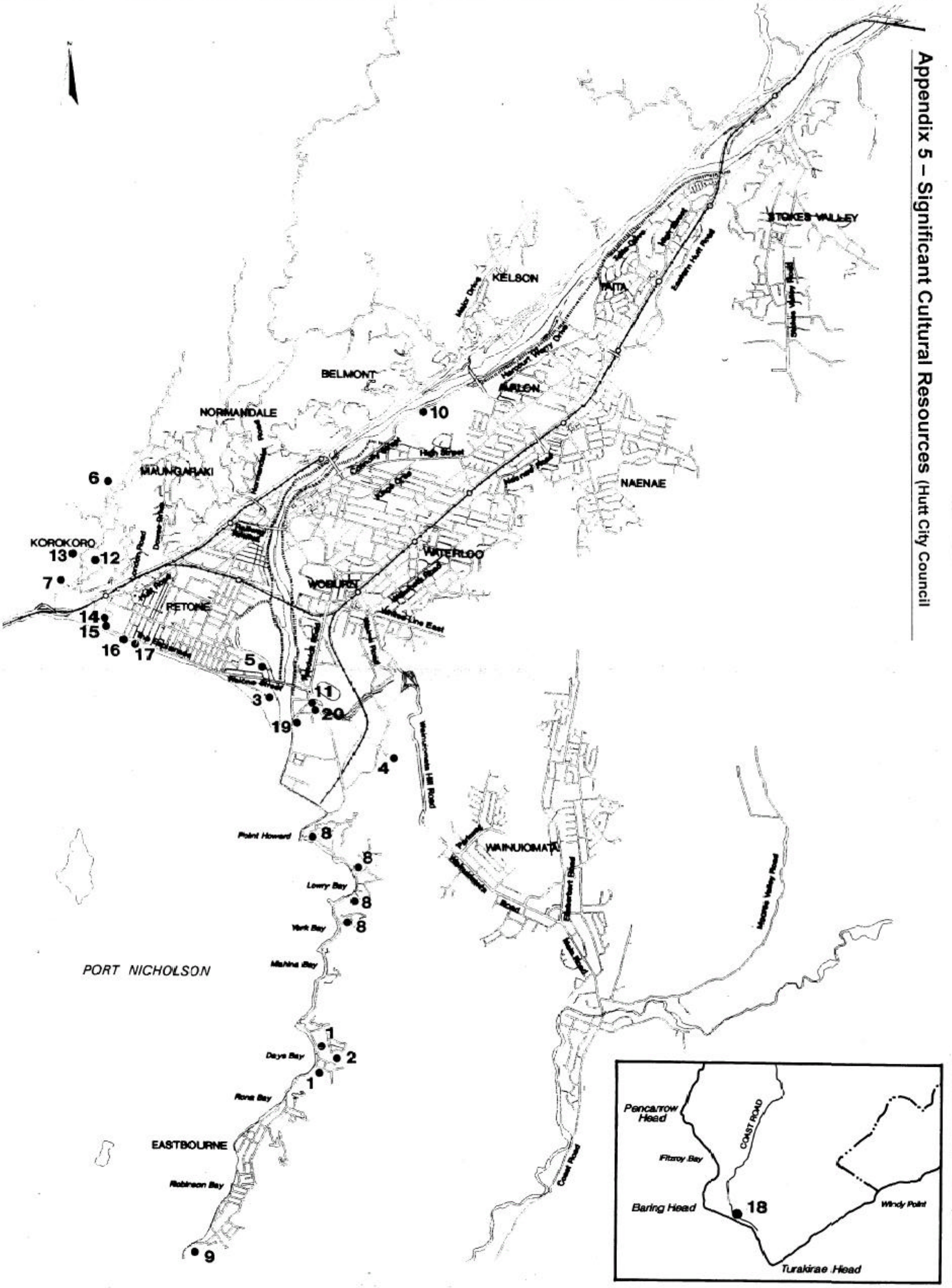
SEE MAP APPENDIX 2.3



SEE MAP APPENDIX 2.2

Significant Natural Resources

MAP APPENDIX 2.1



Significant Cultural Resources

MAP APPENDIX 3