

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of proposed Plan Change 2 for the One Plan

JOINT WITNESS STATEMENT OF EXPERTS

MACRO ECONOMICS

19 August 2020

INTRODUCTION

1. This joint witness statement relates to expert conferencing on the topic of Macro Economics.
2. This joint witness statement relates to proposed Plan Change 2 (PC2) of the One Plan;
 - (a) Macro economic effects of Plan Change 2;
3. The expert conferencing was held on 19 August 2020 at Wellington.
4. Attendees at the conference were:
 - (a) **Dr Graeme Doole;**
 - (b) **Stuart Ford;**
 - (c) **Peter Clough;** and
 - (d) **Laetitia Leroy de Morel.**

CODE OF CONDUCT

5. We confirm that we have read the Environment Court Practice Note 2014, and in particular Appendix 3 – Protocol for Expert Witness Conferences, and agree to abide by it.

PURPOSE AND SCOPE OF CONFERENCING

6. The purpose of conferencing was to identify, discuss and highlight points of agreement and disagreement on macro-economic issues arising from PC2, and the submissions received on the proposed plan change.
7. In addition, questions arising from pre-hearing meetings between submitters and Horizons have been circulated for our consideration as part of conferencing. We have addressed those relevant to our areas of expertise.
8. The scope of the issues covered at this conference included:
 - (a) **Macro Economics impacts from Horizons One Plan - Plan Change**

KEY FACTS AND ASSUMPTIONS

9. Scenario 1 no consent pathway for exceedance and Scenario 2 consent pathway for exceedance with partial compliance by year 20
10. Use of static TERM-NZ (before / after)
11. No data available for dairy in Manawatu and Horowhenua under Scenario 1 (took an average approach from the dairy cluster farms in Tararua)
12. NZ Stats 2013 IO tables, benchmarked to 2019 with latest National Accounts data
13. Focus on four districts: Rangitikei, Manawatu, Tararua and Horowhenua
14. Focus on Dairy and Commercial Vegetable Growing industries
15. Sheep and beef and arable/grain industry not modelled (only 5 unconsented farms)

METHODOLOGIES AND STANDARDS

16. Computable General Equilibrium Modelling
17. To model shock, Percentage change is used with non NPV data

AGREED ISSUES

18. Refer to Annexure A.

DISAGREEMENT AND REASONS

19. Refer to Annexure A.

PRIMARY DATA

20. Stats NZ 2013 IO table and 2019 National Accounts
21. NZIER. 2018. The macroeconomic impacts of the One Plan's intensive land use provisions. NZIER report to Horizons Regional Council.
22. McNally S., Jolly A.M., Mayes K. (2020), Horizons PC2 farm scale cost implications for commercial vegetable production – Provisional modelling outputs for expert caucusing
23. Parminter, T. 2018. Regional macroeconomic report, memo from KapAg Ltd for Horizons Regional Council

RESERVATIONS

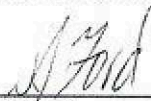
24. Question regarding Scenarios – Are there consistent scenarios across the expert streams?
25. We have assumed that all data used to measure shocks has assumed a non-discounted financial outcome. This is a question for WSP Farm Scale Experts.

Date: 19 August

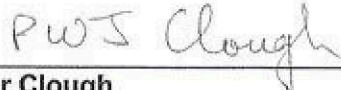
Dr Graeme Doole



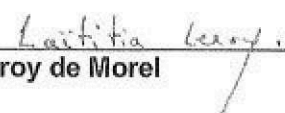
Stuart Ford



Peter Clough



Laetitia Leroy de Morel



ANNEXURE A

In the matter of Proposed Plan Change 2

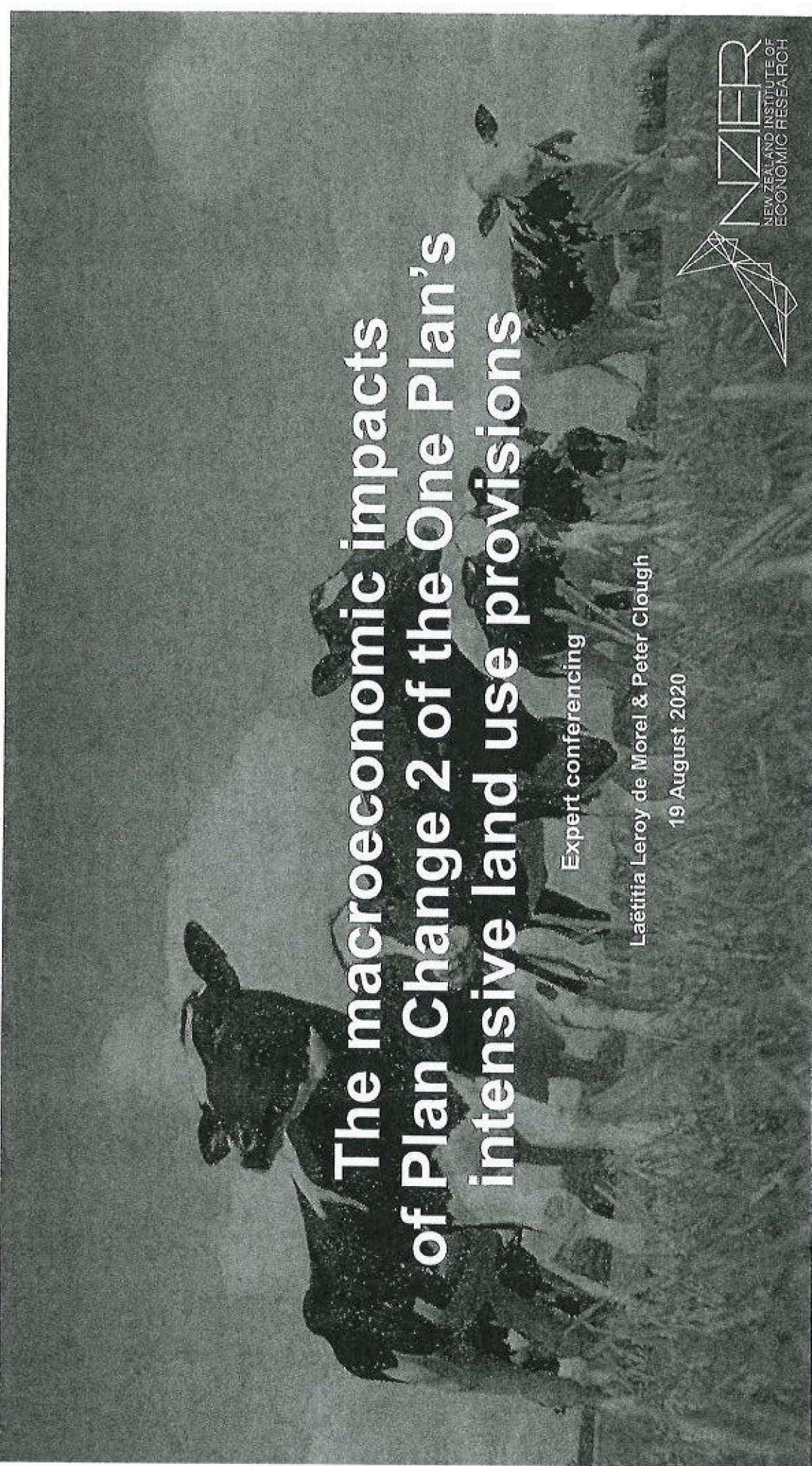
Expert conferencing – Macro Economics

Issue	Statements	Agreed Position	Disagreements, with reasons
1. Are the scenarios appropriate for estimating macro-economic effects of the potential implementation of Plan Change 2?	The previous report for Horizons (2018) modelled the original shock of original table 14.2 of the One Plan. That showed compliance with this table had greater cost than the recalibrated table 14.2. We have not remodelled, but could. It would still be stronger than impact of scenario 1 in this report. SF, GD: considers that the original table should be the baseline. GD added that the CGE has been updated since this time. The conclusion of that is that the original Table 14.2 should be remodelled.	All agreed	The 10 year dairy scenario, put forward by DNZ and Fed Farms has not been modelled? GD: The CGE scenario is modelled on a 20 year scenario. This way of configuring the model has decreased our ability to truly assess how costs, due to environmental policy, impact on the community, during transition. Don't agree with the assumption that we can ignore the transition PC: 20 year of assumption and data as to how it is going to unfold. Data required for that is very large and we don't think it is a practical alternative, given the timeframe and methodologies available for this work. SF: Outside the scope of expertise. LL: The relative magnitude of the impact of complying with the original Table 14.2 and the recalibrated Table 14.2 will remain the same.

Issue	Statements	Agreed Position	Disagreements, with reasons
If not, what amendments would be feasible to improve macro-economic estimates?			GD: Considers that a diverse range of scenarios put forth by submitters should be modelled using a consistent framework to provide additional information. SF: It would be best practice to model the most appropriate submitters' position using the same methodology, to enable fair comparisons between them.
2. Is the computable general equilibrium modelling appropriate for estimating macro-economic effects of the potential implementation of Plan Change 2?	LL: This is the most robust model; it allows us to capture all of the different effects that could happen, e.g. industry and households that cannot be captured by any other model. LL: Whether we talk about change in profit or change in revenue, this will have small impact in the CGE model on the macro economic outputs. The CGE model includes a lot of the capital adjustments in all of the sectors that are impacted. The cost and revenue is captured by the CGE framework because it captures some price change.		GD,SF: Data from WSP, only using Gross margin, has excluded capital costs. This reduces the scale of estimated costs because we know that mitigation activity fundamentally changes the capital structure of farms, but especially dairy farms GD, SF: It is a very unstructured way of modelling the costs of farm level mitigation at the macro economic level. My issue with this approach is that all economic costs have been converted to a revenue effect and this bundling clouds how the effects on farm flow onto other sectors. GD, SF: Operating profit is industry standard. Are change of expenses included in the CGE? GD, SF: Mitigation affects both farm revenue and expenses. The shock in the CGE has only been done on the revenue side. Detailed farming modelling would have shown impacts on both revenue and expenses. My concern is that we have excluded almost half of the costs of

Issue	Statements	Agreed Position	Disagreements, with reasons
If not, what amendments would be feasible to improve macro-economic estimates? What alternative modelling approaches could improve the macro-economic estimates?			farm level mitigation by focussing only on revenue costs. SF: A lot of mitigations have little impact on revenue but a significant impact on costs GD: How has the magnitude of the revenue shock, determined by WSP, considered changes in the costs facing a farm that is mitigating? GD: The CGE model can be an appropriate framework, if the input data is sound. I believe other frameworks can also be used to provide insight at the regional level. The input / output framework has been noted by NZIER as being inappropriate. Yet, for several reasons, I believe it can be useful. Benefits include: • Clarity around assumptions • Clarity around the framework • Consideration of flow-on impacts for communities • Easier integration with farm level modelling For these reasons, input / output modelling remains one of the primary forms of economic modelling used worldwide.

3. Are the assumptions in the computable general equilibrium modelling appropriate for estimating macro-economic effects of the potential implementation of Plan Change 2? If not, what alternative assumptions could improve the macro-economic estimates?	GD, SF: With regard to the assumptions, excluding the use of static CGE, on Slide 14 (Appendix 1) there is agreement that these assumptions are appropriate. LL: will provide detailed documentation for CGE modelling assumptions.	GD: Have raised concerns about the static assumption in the use of CGE. GD: It is difficult to assess the suitability of the assumptions because most of them haven't been presented. SF: Without access to the report which details the key assumptions and how they are modelled, it is impossible to comment.
4. Are there other impacts on macro-economic outcomes not reflected in the current modelling that are thought to have a potentially material impact on the macro-economic estimates? If so, what specific data is available for making macro-economic estimates, and what reliability can be placed on the data and sources?	GD: At a high level, the detail provided is in line with what would be expected.	All agreed
5. Are there other matters or specific questions which attendants want raised in the caucusing meeting?		



The macroeconomic impacts of Plan Change 2 of the One Plan's intensive land use provisions

Expert conferencing

Laëtitia Leroy de Morel & Peter Clough

19 August 2020



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A bit of background



Work commissioned by Horizons Regional Council



Estimate the economic impacts on farmers and orchardists of different degrees of compliance to the recalibrated Table 14.2 as part of Plan Change 2 of the One Plan



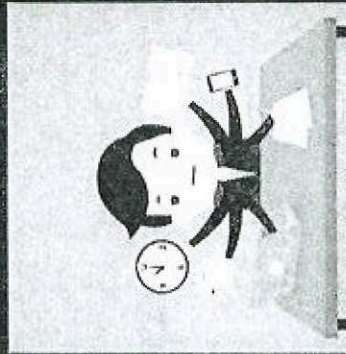
Use our bottom-up regional CGE model



Results in terms of direct impacts and flow-on effects at the district, regional and national levels

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Our Methodology



Estimate the local and regional macroeconomic impacts on farmers and commercial vegetable growers of different degrees of compliance to the recalibrated Table 14.2 as part of Plan Change 2 of the One Plan.



Use our regional bottom-up CGE model



Scenario design & modelling



Results & implications
(In 2019 \$ value and in %)

Scenarios

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Scenario design

Scenario 1 – No consent pathway for exceedance

- All vegetable growers and dairy farmers comply with the recalibrated Table 14.2 of the One Plan.
- Estimate the effects of meeting nitrogen targets in the absence of any discretionary activity consent pathway for exceedances.

Scenario 2 – Consent pathway for exceedances with partial compliance by Year 20

- Discretionary activity consent pathway for exceedances of the recalibrated Table 14.2 with only partial compliance by Year 20.
- As such, 'most' farms comply in Year 20.
- Those who do not comply by Year 20 are on an improving trend and have been reducing their nitrogen loss using good management practices (GMP).

Shock values

Annual changes to 2019 baseline in Year 20, in percent (total gross margin for cluster farms at district level)

Scenario 1 – No consent pathway Scenario 2 – Partial compliance in Year 20

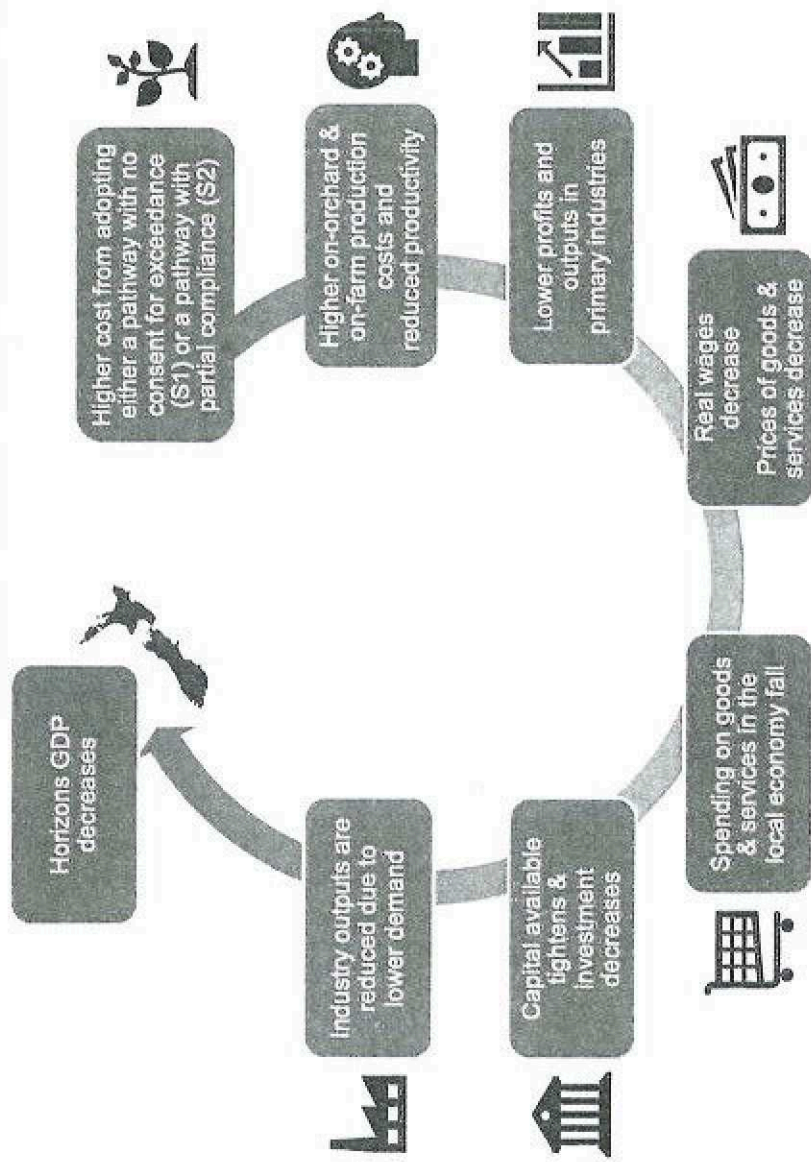
Sources	Vegetables	Dairy	Vegetables	Dairy
	WSP (2020)	Terry Parmenter (2018)	WSP (2020)	WSP (2020)
Rangitikei	0	-4.64	0	-2.44
Manawatu	0	-4.64	0	-2.44
Tararua	0	-4.71	0	-2.30
Horowhenua	-18.83	-4.64	0.20	-2.44

Source: NZIER, derived from data provided by WSP (2020) and Terry Parmenter (2018)

HEADLINE RESULTS

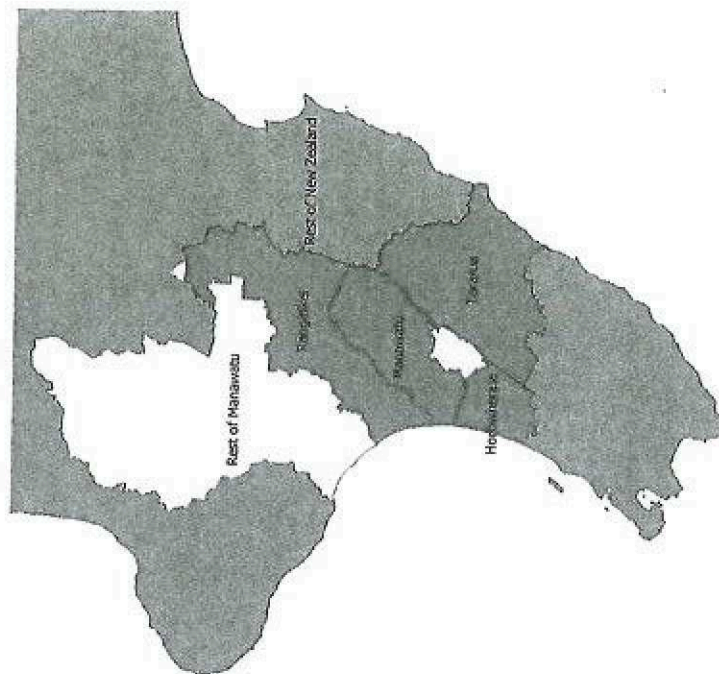
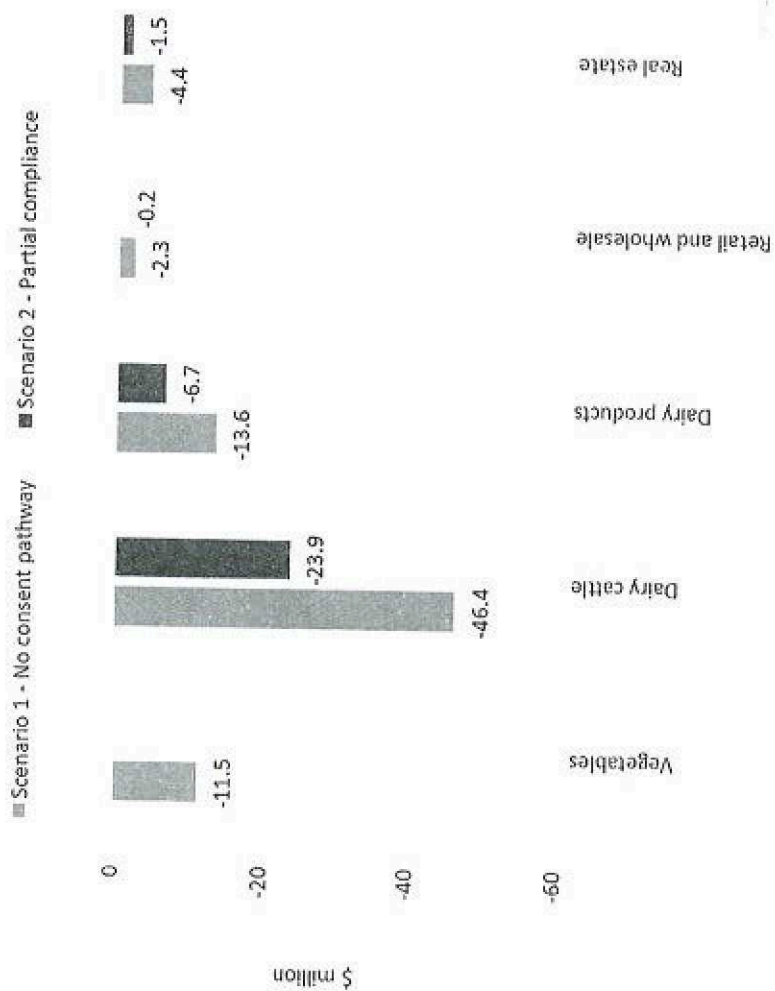
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Main economic flow-on effects at play for both scenario



Outputs in dairy, vegetables and related industries for all 4 districts

Annual changes to 2019 baseline in Year 20, in \$ million and percent

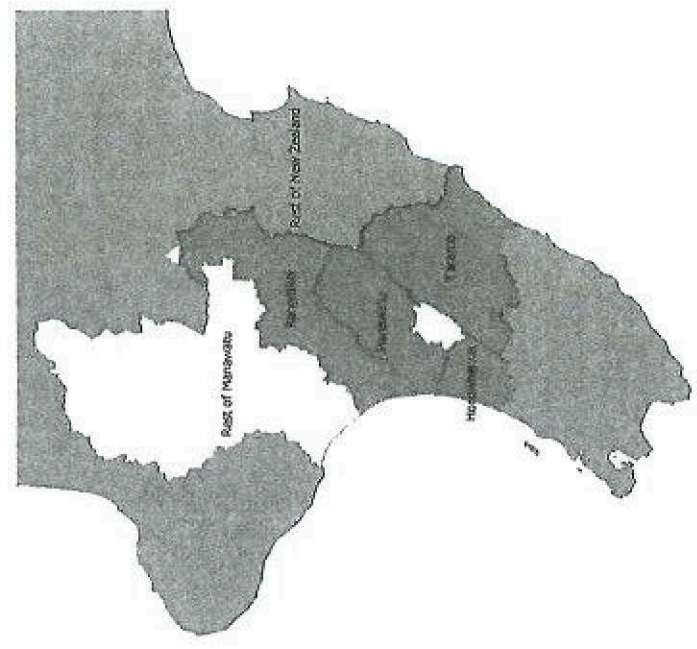
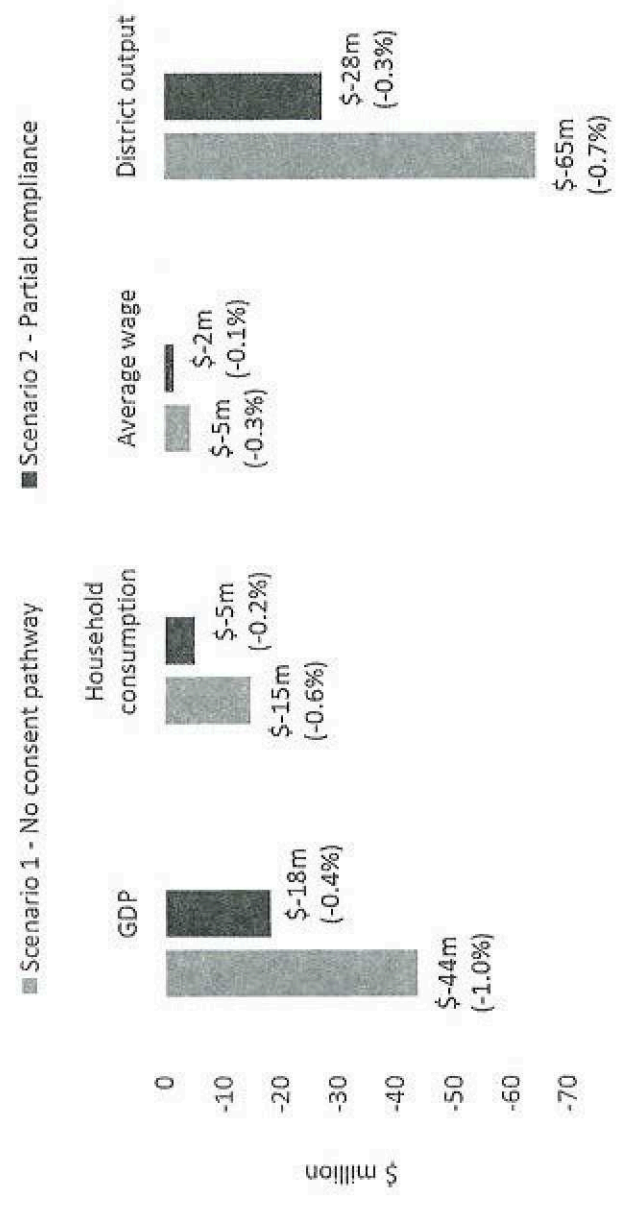


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Macroeconomic impacts for all 4 districts combined

Annual changes to 2019 baseline in Year 20, in \$ million and percent

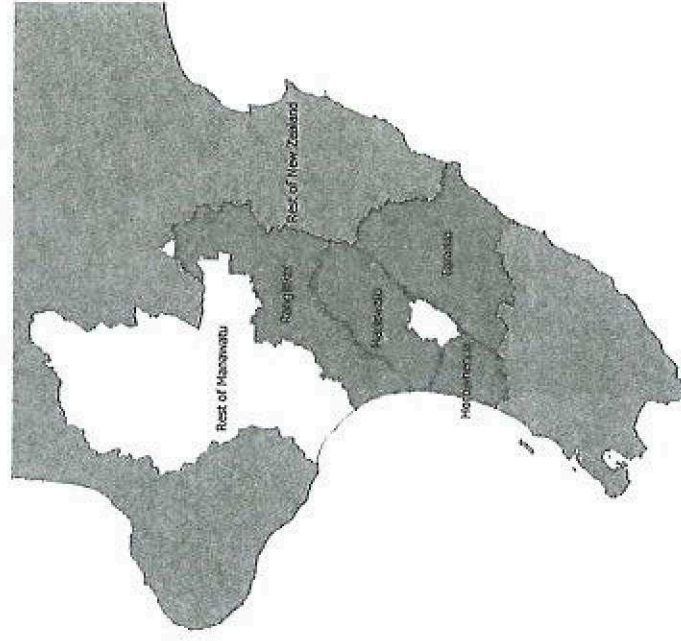
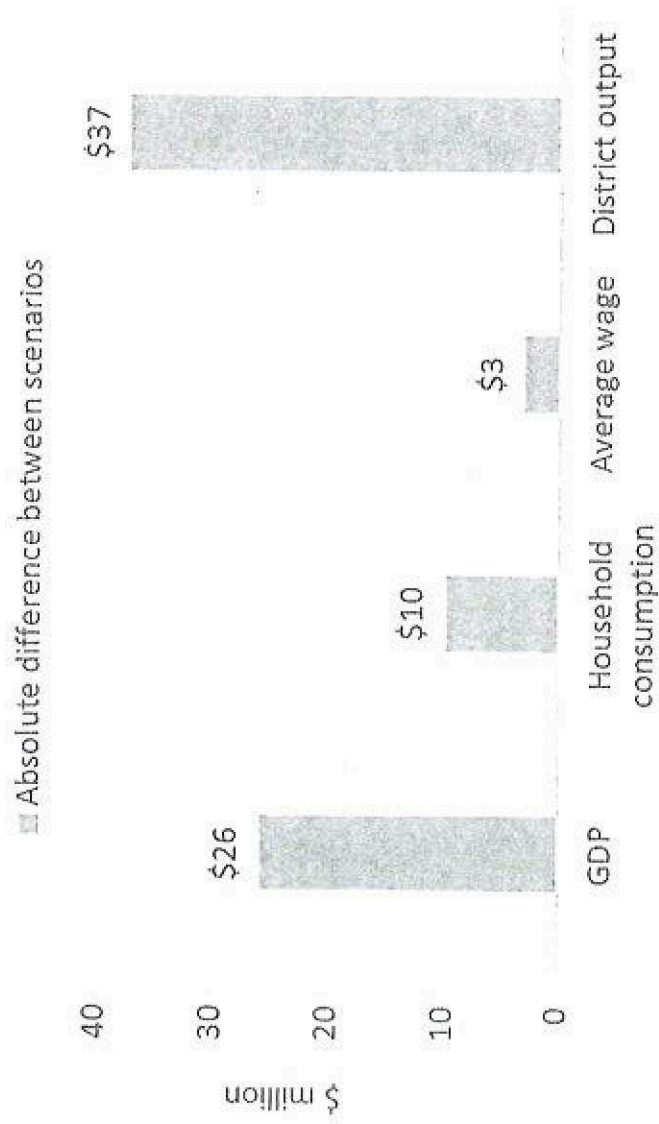


Note: Figures presented in this graph combine changes for Rangitikei, Manawatu, Tararua and Horowhenua districts.

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Providing a consent pathway with partial compliance (scenario 2) leads to lesser economic impacts than a pathway without consent for exceedance (Scenario 1)

Annual changes to 2019 baseline in Year 20, in \$ million – All 4 districts combined

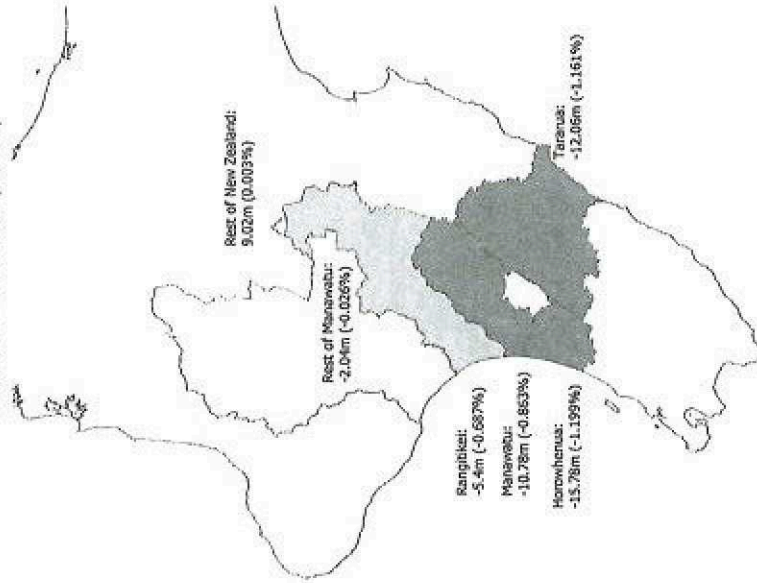


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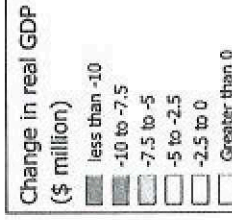
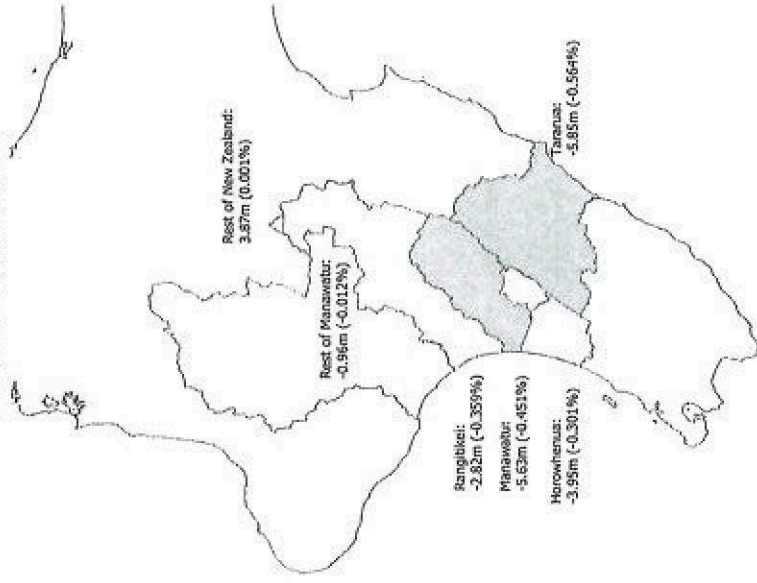
Impacts on real GDP at the district and regional levels

Annual changes to 2019 baseline in Year 20, in \$ million and in percent

Scenario 1 - No consent pathway



Scenario 2 - Partial compliance



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Assumptions

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Sheep & beef and arable/grain industry not modelled (only 5 unconsented farms)



Scenario 3 "Consent pathway for exceedances and full compliance by Year 20" not modelled (same end point as Scenario 1)



Use of static TERM-NZ (before / after)



No data available for dairy in Manawatu and Horowhenua under Scenario 1
(We took an average approach from the dairy cluster farms in Taranua)

- ~~data not available~~
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Our CGE model

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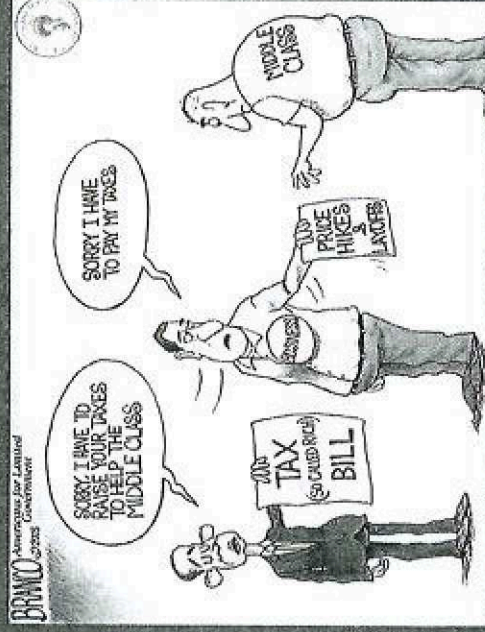
Numerous tools exist for policy analysis

Technique	Strengths	Limitations
Descriptive	Can cover wide range of effects; not constrained by data or capability	Lacks persuasive numbers on trade-offs
Financial modelling	Simple; RoI	Hard to get to trade-offs
Econometrics	Gets to drivers; can forecast	Regional interactions and sector impacts tricky
Cost benefit analysis	Widely used; considers impacts over time; RoI; non-market effects	Regional spill-overs and distribution hard
Multipliers	Cheap; easy to do; big numbers	No resource constraints; no regional spill-overs; limitations widely known
Computable general equilibrium (CGE) modelling	Robust; internally consistent; resource, region & sector trade-offs	Requires investment; data-intensive



Focus of this presentation

CGE is our preferred method for economic impact analysis



Price and quantity effects from policy or industry changes



Constraints on availability of production factors (land, labour, capital) – No free lunch



Opportunity cost of using additional resources in one industry on the rest of the economy (winners / losers)



Sector interdependencies accounted for via (cross) elasticities instead of technical coefficients

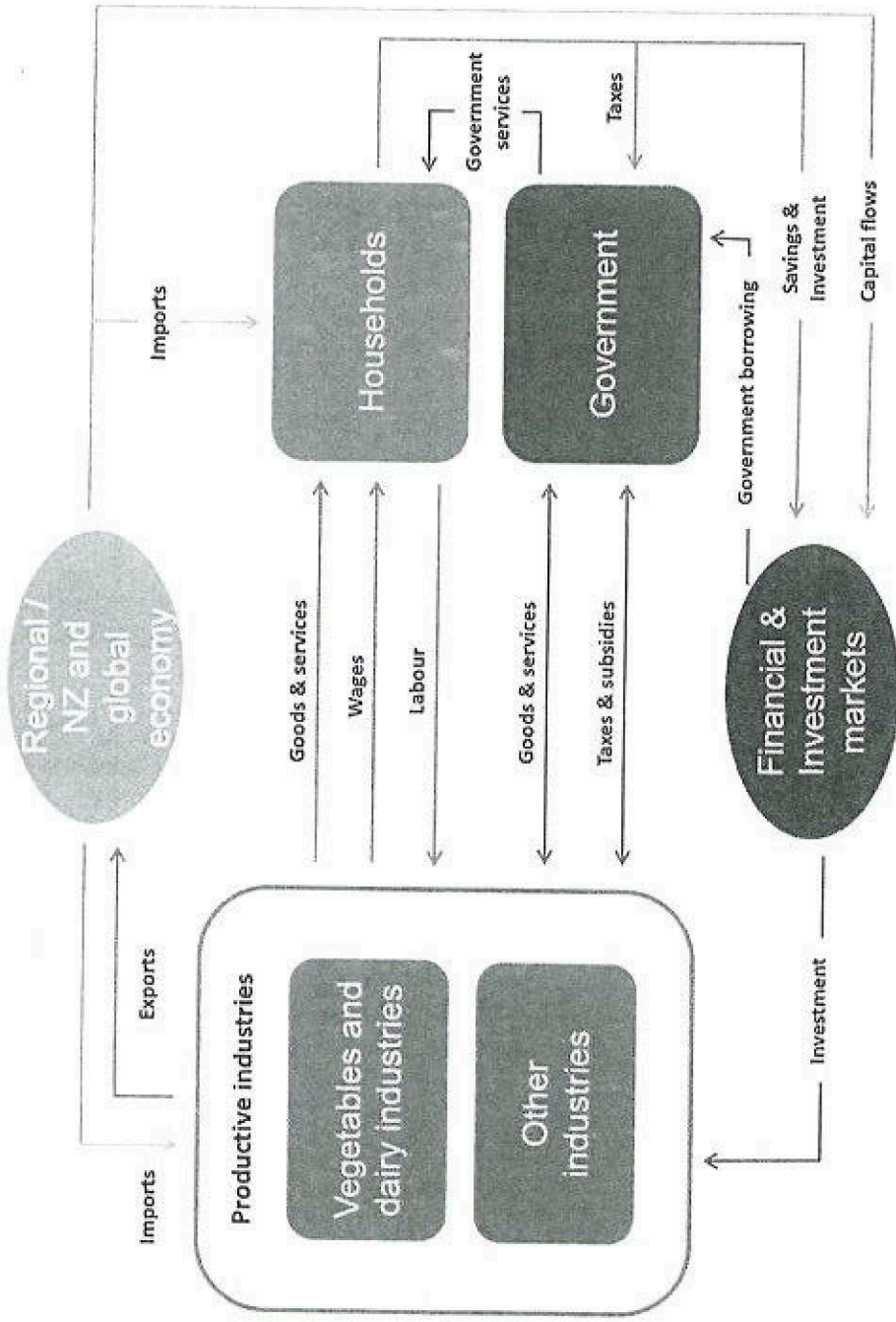


All markets clear



Short, medium and long-run approaches

CGE models represent flows in the whole economy



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Our regional CGE model

Assumptions

Source

- NZ Stats 2013 IO tables
- Benchmarked to 2019 with latest National Accounts data

Regions

- Inter-regional trade in goods and services
- Movement in labour and capital between regions

Trade

- Imports are imperfect substitutes for domestically produced commodities
- Exports face a foreign demand curve inversely related to the commodity's price

Inputs

- Intermediate commodities (both domestic and imported)
- Primary factors (land, labour and capital)

Our CGE model is data driven

Stats NZ 2013 IO table

- 106 industries
- 201 commodities

2019 National Accounts

- CGE database is benchmarked to latest data on GDP's components on the expenditure and income sides

Regional dimension

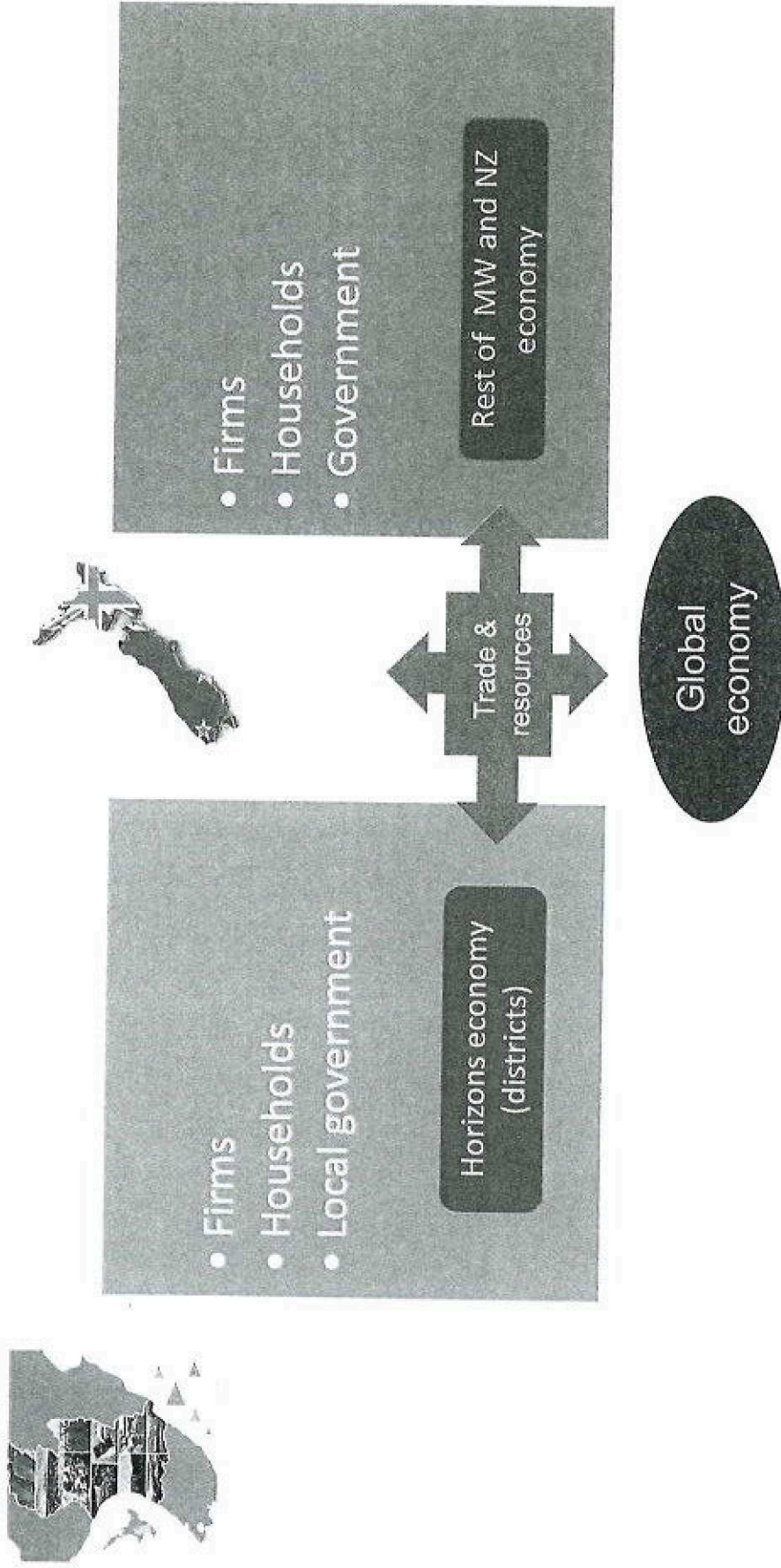
- 88 'districts' which can be aggregated into regions (67 TLAs, 20 local boards in Auckland, 1 outside territory)
- Inter and intra-regional effects are captured (trade)
- Movement in labour and capital between industries and regions

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Our regional CGE model captures inter-regional flows from the bottom up



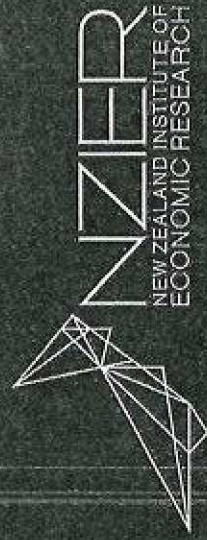
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References

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- NZIER. 2018. The macroeconomic impacts of the One Plan's intensive land use provisions. NZIER report to Horizons Regional Council.
- McNally S., Jolly A.M., Mayes K. (2020), Horizons PC2 farm scale cost implications for commercial vegetable production – Provisional modelling outputs for expert caucusing.
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THANK YOU



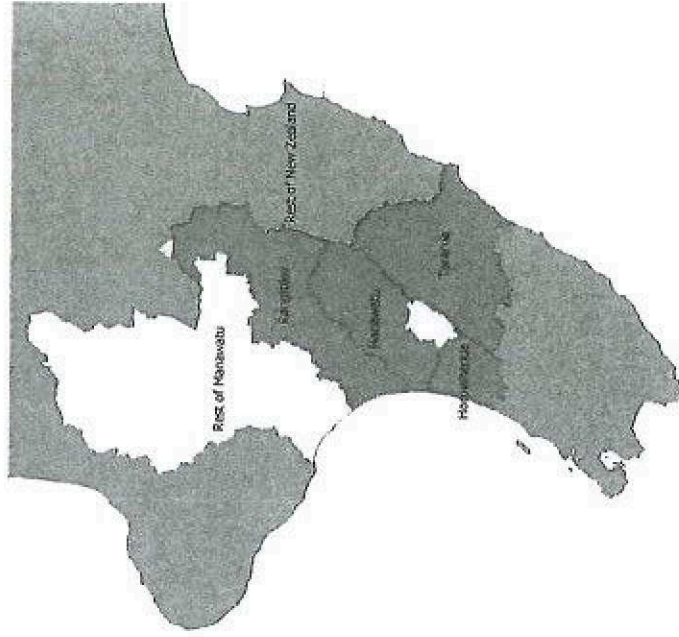
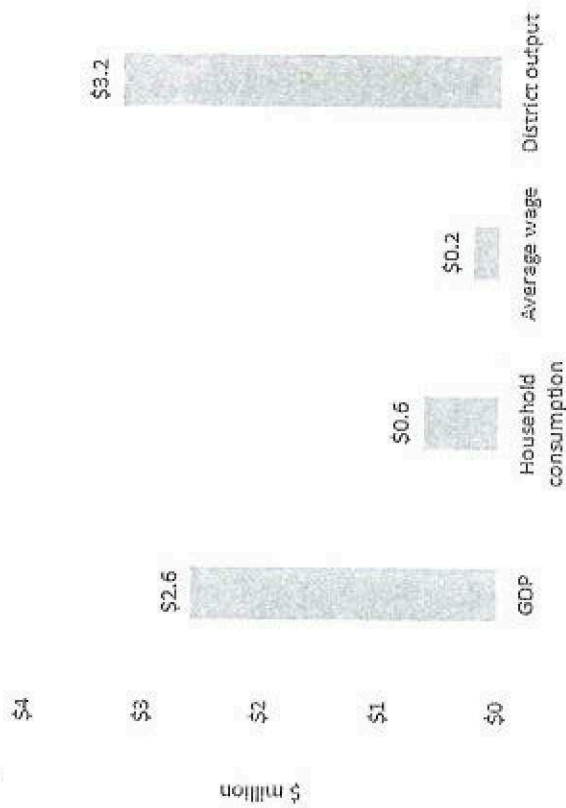
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Additional slides

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Providing a consent pathway with partial compliance (scenario 2) leads to lesser economic impacts than a pathway without consent for exceedance (Scenario 1)

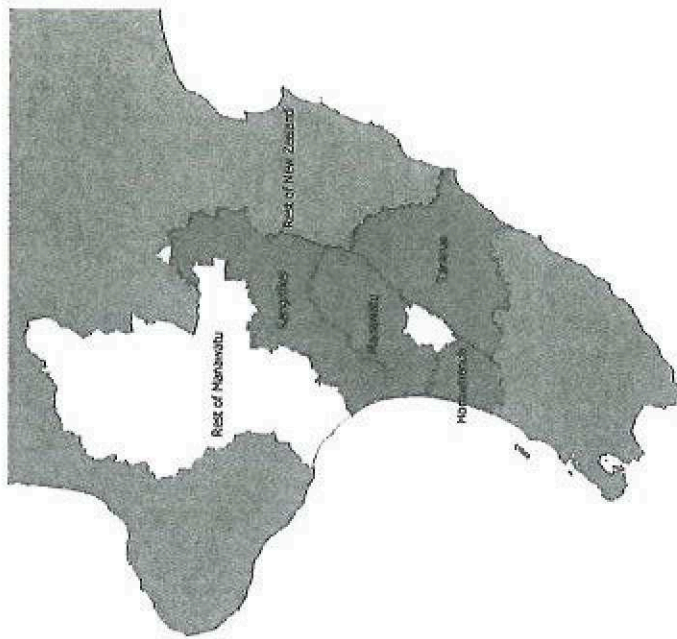
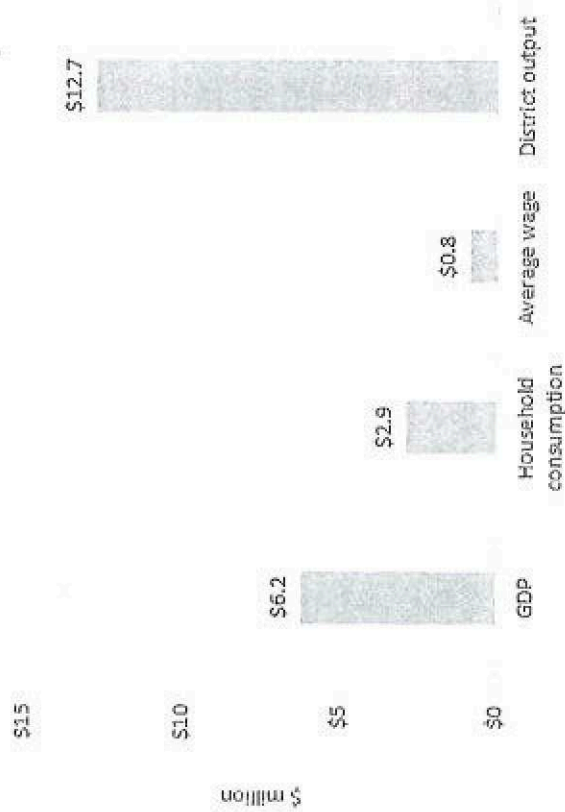
Annual changes to 2019 baseline in Year 20, in \$ million – Rangitikei



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Providing a consent pathway with partial compliance (scenario 2) leads to lesser economic impacts than a pathway without consent for exceedance (Scenario 1)

Annual changes to 2019 baseline in Year 20, in \$ million – Tararua



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Providing a consent pathway with partial compliance (scenario 2) leads to lesser economic impacts than a pathway without consent for exceedance (Scenario 1)

Annual changes to 2019 baseline in Year 20, in \$ million – Horowhenua

