



# THE COST AGGREGATION MODEL RESULTS

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PORIRUA WHAITUA

# Synopsis....

- What is life cycle costing and how can we use it?
- Life cycle costing results:
  - Whaitua-wide cost implications
  - Urban stormwater intervention costs
  - Wastewater costs
  - Rural costs
- Take home messages

# What is life cycle costing (LCC)?

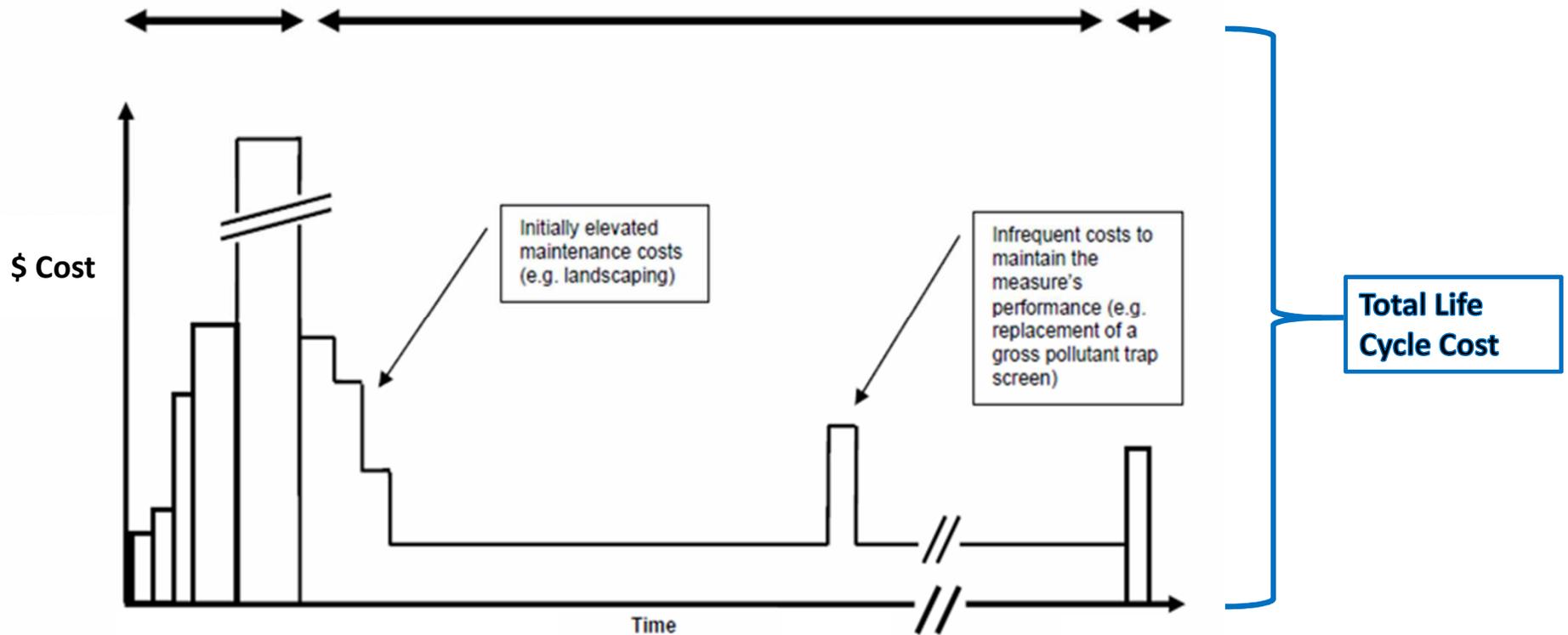
## Definition:

***“.....the process of assessing the cost of a product over its life cycle or a portion thereof.....”***

Ref: Australian/New Zealand  
Standard 4536:1999  
Treasury New Zealand

## What have we produced:

Indicative cost estimates of the total amount of money required to plan and build interventions (total acquisition costs) and maintain interventions (maintenance costs) over a 50 year life cycle.



Phases in the life cycle of a stormwater practice and potentially associated costs (Taylor, 2003)

# Understanding how to use LCCs

- Allows “like for like” comparison of additional costs between scenarios, over and above BAU
- Costs are assigned to particular property types depending on where they are incurred
- We use ranges to express uncertainty
  - Data gaps or large variation in costs for devices
  - Assumptions about the extent and placement of interventions into particular catchments
- Don’t dwell on absolute amounts or comparisons between particular places
- Look for patterns and relative differences between scenarios in each place/activity type

# How the Cost Aggregation Model works

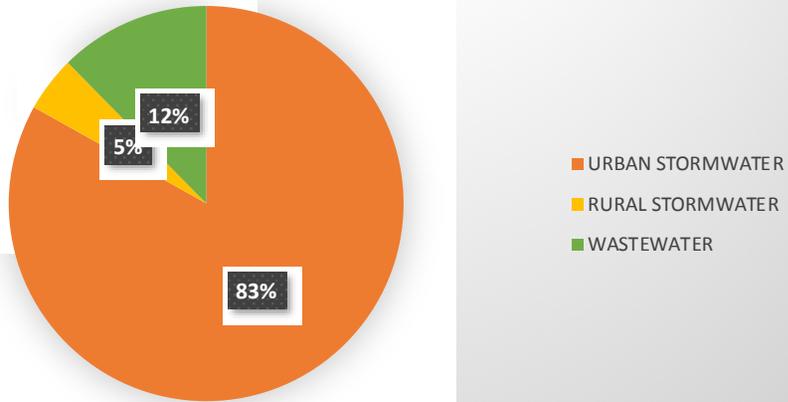
- Builds on existing LCC Work
- Relates to costs:
  - best practice design of the mitigations
  - impervious area treated
  - desired level of treatment



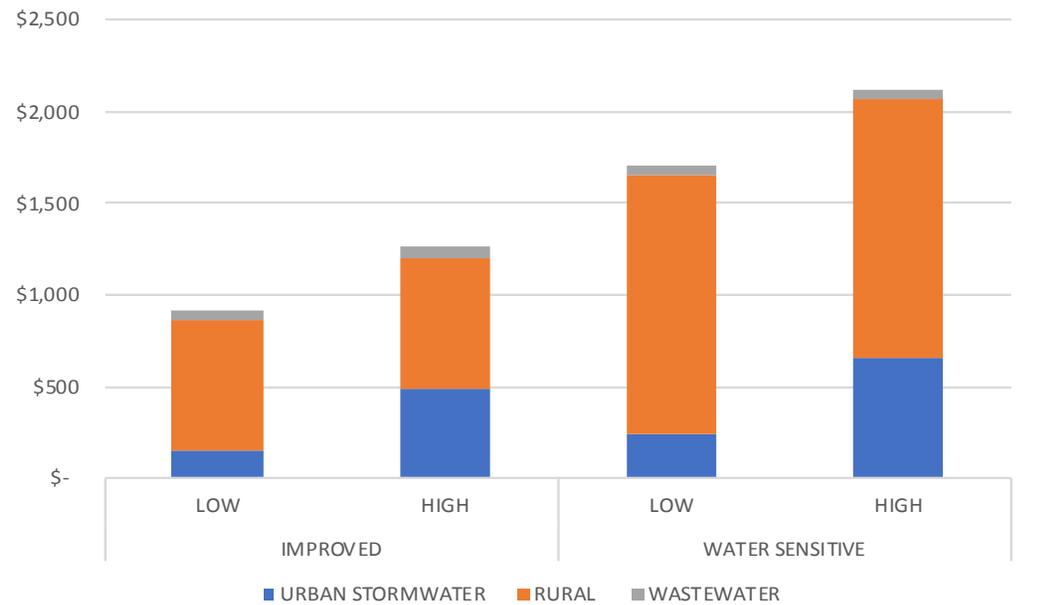
# Urban stormwater costs: Whaitua-wide costs

- Improved scenario: range from approximately \$6.5 - \$21 million per year
- Water sensitive scenario: range from approx. \$10.5 - \$28 million per year
- Wetland costs are a large driver of the wide range of costs in the improved scenario
- Costs associate with greenfield development are expected to be at the lower end of the cost range
- Costs associated with infill/ redevelopment are expected to be at the higher end of the cost range

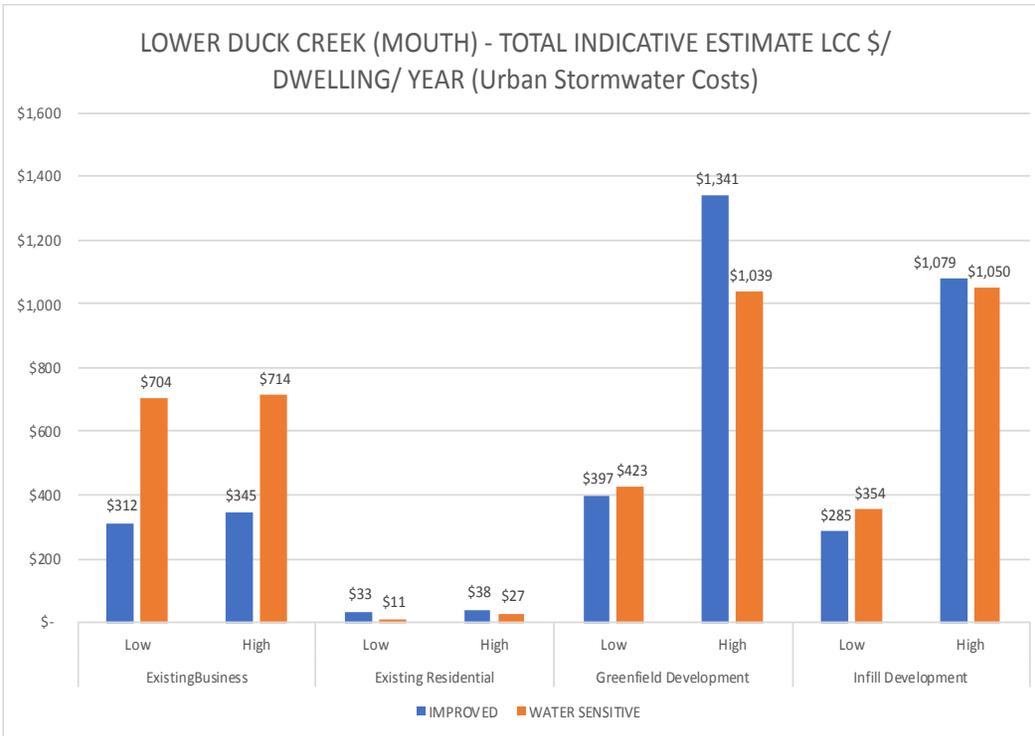
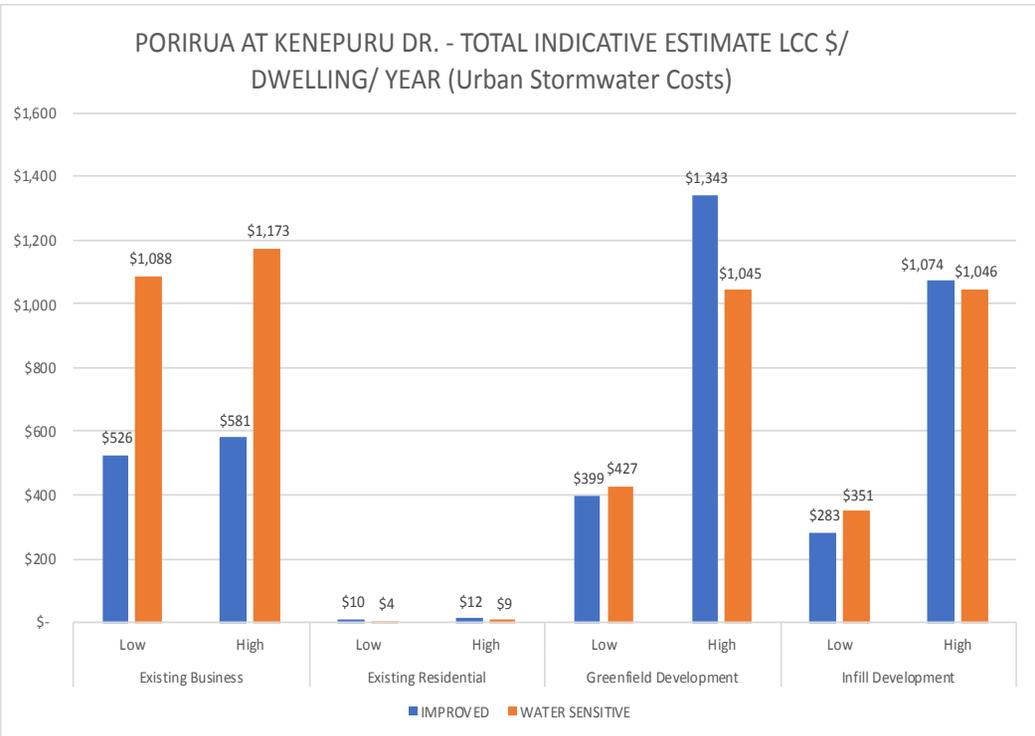
### WHAITUA-WIDE COSTS: PROPORTION OF ANNUAL LIFE CYCLE COSTS FOR THE IMPROVED AND WATER SENSITIVE SCENARIOS



### WHAITUA-WIDE ANNUAL LCC PER DWELLING



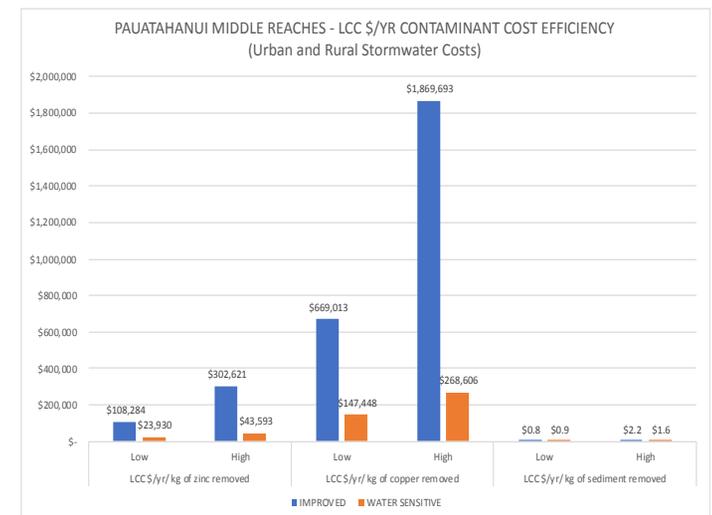
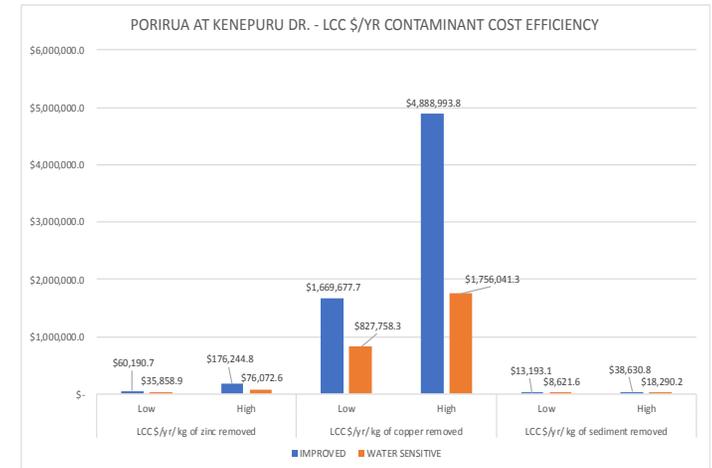
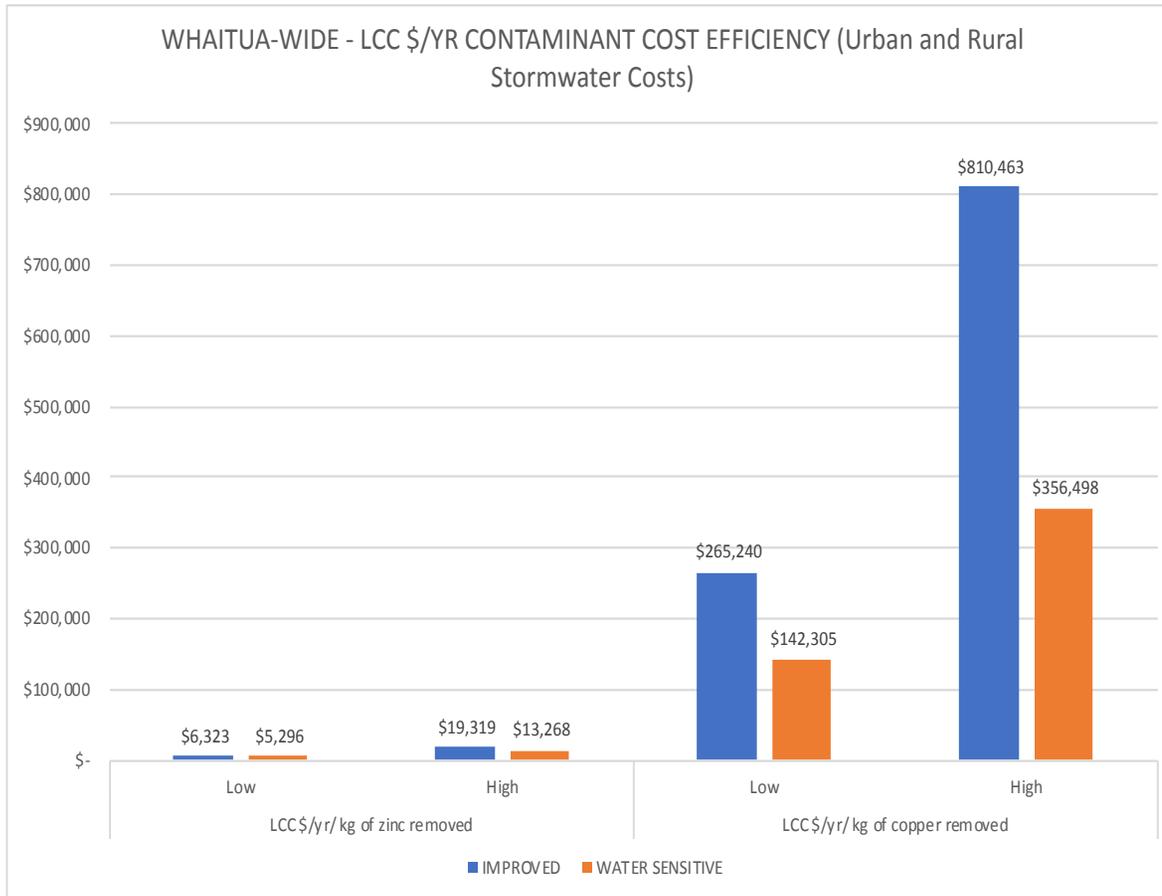
# Cost estimates per dwelling...



Where does the cost fall in the development process (value chain)?



# Which scenario is more cost efficient?

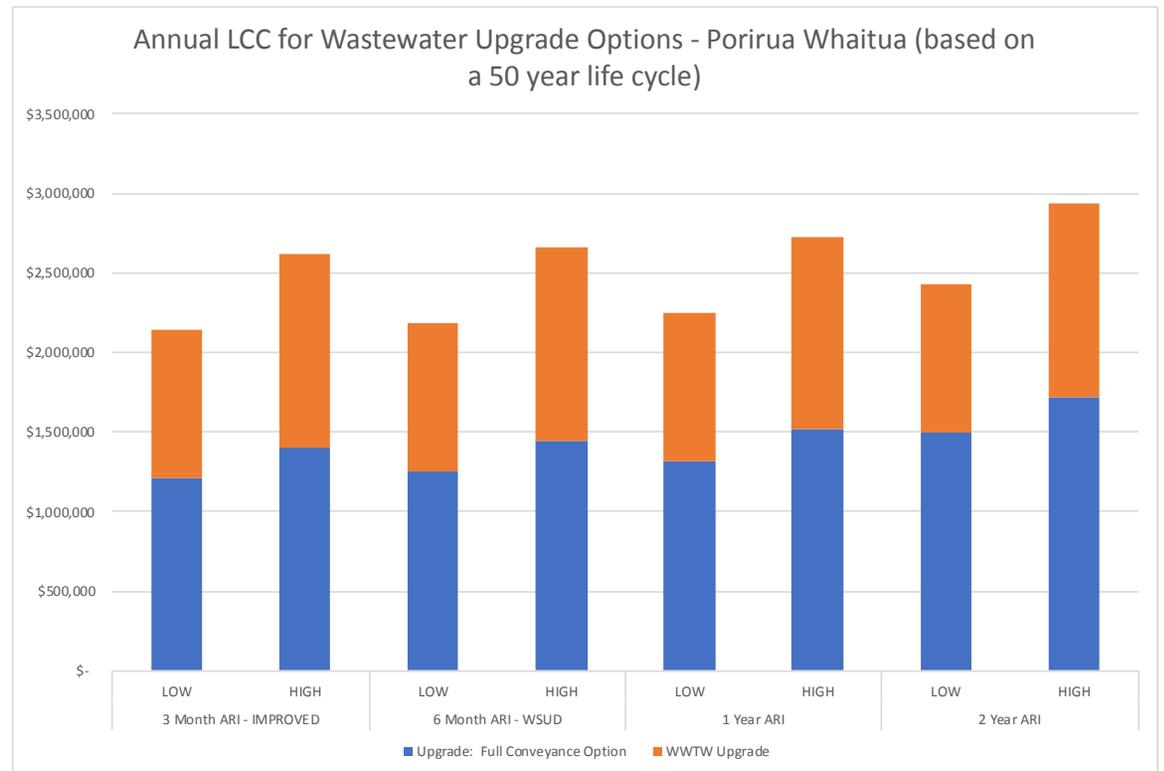


# Potential effect on property costs...

- Both the improved and water sensitive scenarios will lead to increased costs
- Property prices: “green” stormwater interventions may also lead to increases in property prices, particularly for properties bordering or in close proximity to larger scale interventions like wetlands.
- Highly variable but potential range of average increase is 3% and 8%.
- A lack of on-going maintenance can cause property values to decrease in the longer-term.
- Not directly comparable to LCC, but property holding costs are approximately \$22k - \$39k per year. Increased LCC per dwelling per year are around 1 – 6% of these holding costs.

# Urban wastewater intervention costs

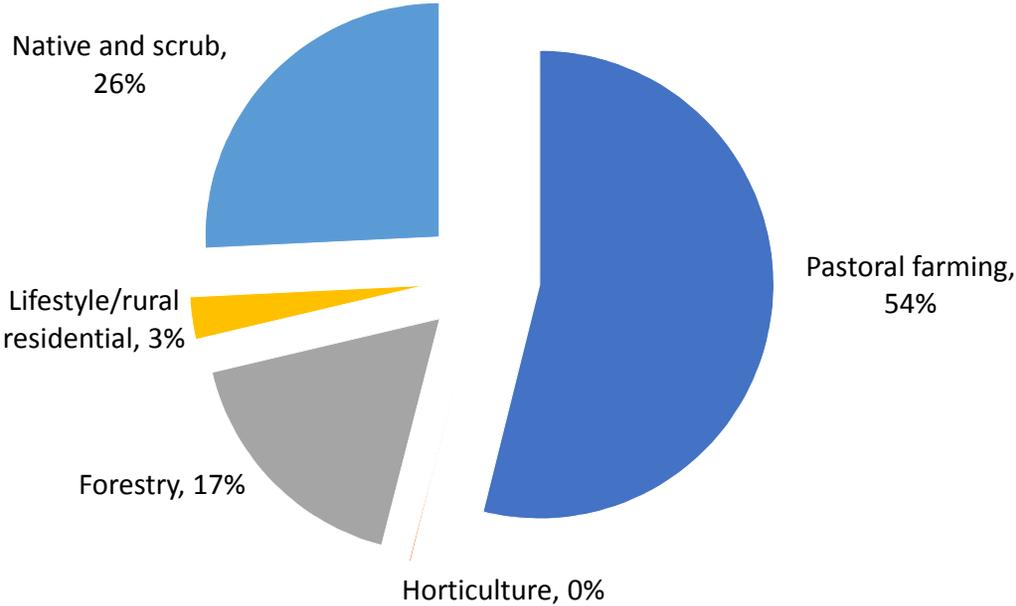
- Wastewater improvements estimated to be between \$2.1 and \$2.7 million per year, or around \$50 - \$60 per dwelling per year
- Over and above existing wastewater costs: ave \$385 per year per residential dwelling for Porirua City)
- Uncertainty as to whether these interventions get us to the level represented in the scenarios – continuing to refine these.
- Costs of improvements to wastewater network to improve leaking pipes, cross, connections – not included as these are uncertain at this time.



## Rural Costs - Approach

- Accessed statistical information from Beef and Lamb NZ, Statistics NZ, GWRC, other sources
- Sourced costings from projects elsewhere, national modelling, rating database, GWRC.
- Worked with stakeholder group to refine information and identify issues.
- Defined sectors
- Developed unit costings for catchment economic modelling

**Catchment rural land use**



# Main sectors

- Sheep and beef
  - 54% of rural area
  - Predominantly sheep but some mixed and one beef only
  - Property size: 55ha up to ~800 ha
  - Primarily rolling to steep, with limited flat land
  - Limited cultivation and winter cropping.
  - Most properties have off farm income
- Range of activities on small blocks, most non commercial
- Horticulture ~13 ha
- Forestry
  - 17% of rural area
  - Large land use, in significant sized blocks.

# Unit Costs

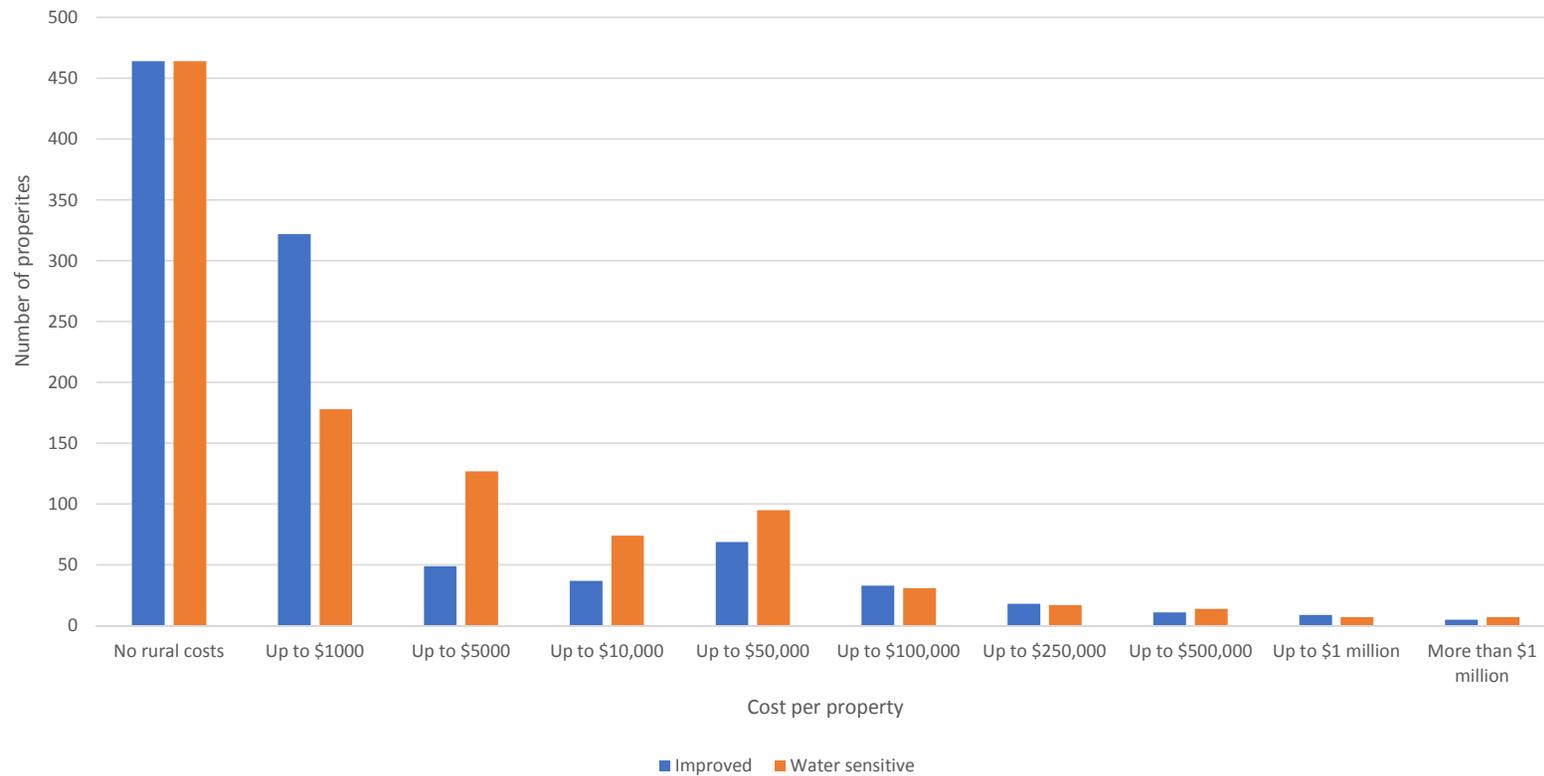
Mitigation	Basis	Unit Cost	Metric
Stream fencing	Fencing one side to exclude sheep and larger animals, flat slope	\$20	\$/linear m
Planting 5m strip	Cost of planting one side of a stream	\$25	\$/linear m
Land retired with 5m buffer strip	From value of retired land	\$5.35	\$/linear m
Planting 10m buffer	Cost of planting one side of a stream	\$50	\$/linear m
Land retired with 5m buffer strip	From value of retired land	\$10.70	\$/linear m
Annual maintenance	All fenced areas	\$2.50	\$/linear m
Pole planting	Cost of planting poplars 15 stems/ha (average for all of 6e land)	\$7.50	\$/ha
Retirement (\$/ha capital costs)	20 <sup>th</sup> percentile of QV per ha values	\$10,700	\$/ha
Fencing of retired areas	Cost of excluding sheep and large animals on steep land, 50% of perimeter/ha from affected GIS polygons	\$2,100/ha for 6e, \$1400/ha for 7e, 8	\$/ha

## How are the costs spread?

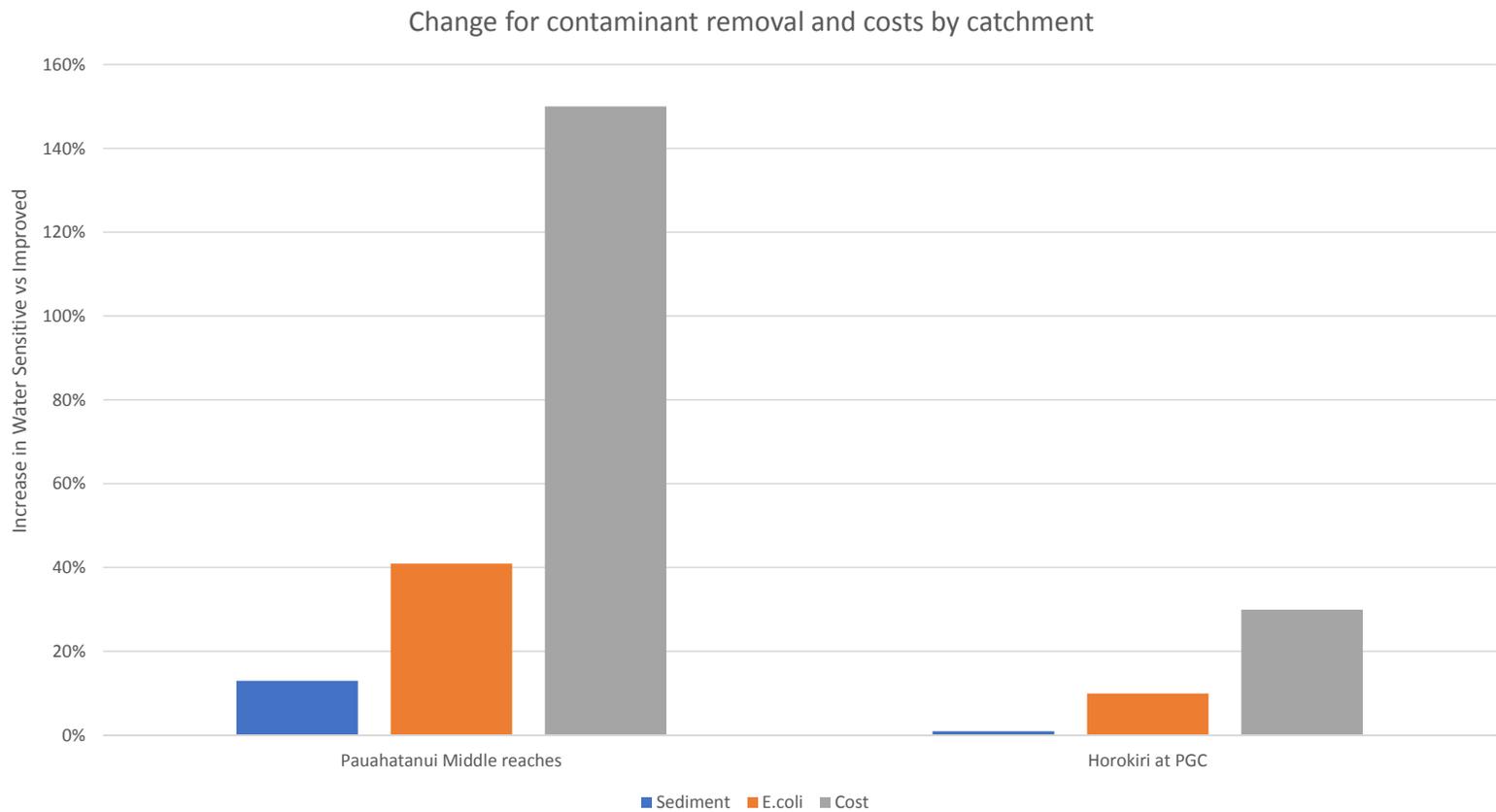
Catchment	Scenario	Rural LCC \$/year	Total LCC \$/year	Proportion of rural costs for land
All	Improved	\$0.6	\$6 - \$21	52%
	Water sensitive	\$1.2	\$11 - \$28	70%
Horokiri at PGC	Improved	\$0.16	\$0.9 - \$1.0	65%
	Water sensitive	\$0.21	\$0.01 - \$0.06	70%
Pauahatanui middle reach	Improved	\$0.1	\$0.39 - \$1.3	19%
	Water sensitive	\$0.3	\$0.4 - \$1.0	64%

# Rural costs will impact significantly on some landholders

Whaitua wide - Number of rural properties with rural mitigation costs (based on a 50 year lifecycle)



# Cost efficiency for rural mitigations - inferred



# Summary: take home messages...

## Urban

- The difference in costs between the 'improved' and 'water sensitive' scenarios are relatively small and the water sensitive scenario is, in general, more cost efficient than the improved scenario.
- The interventions could increase urban property holding costs in the order of 1% - 6%.
- The water sensitive scenario costs for business/ industrial properties are around double those of the improved scenario.
- There is not a great deal of difference between wastewater intervention scenario costs

# Summary: take home messages...

## Rural

- Rural costs are a small proportion of the total costs, but important in rural catchments and likely to be highly variable across different properties.
- There are feasibility issues with some mitigations, and the distributions of rural costs may cause hardship for some landholders. This may impact on the gains achievable.
- While the water sensitive scenarios gives greater reductions in *E. coli*, and for the Pauatahanui catchment sediment, it may not be as cost efficient as the improved scenario