



Report to:

Taranaki Regional Council

COMMUNITY INVESTMENT IN ENVIRONMENTAL IMPROVEMENTS IN TARANAKI

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June 2008

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BERL ref #4632

Community investment in environmental improvements in Taranaki

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1 Executive summary

This report is an update of our previous work on “Community Investment in Environmental Improvements” completed in 2002. The 2002 report quantifies the investments made by the broad Taranaki community in improvements to the environment, as well as the annual costs of making and maintaining these improvements.

The scope and the method used in this project remains the same as the previous project. Estimates of expenditure were obtained by a postal and email survey of main industries and district councils, supplemented by information from the Taranaki Regional Council (TRC)’s annual reports and plans of the district councils. We verified and extended key information with field visits.

Information on agriculture was obtained from the records held at the TRC. Costings were updated from the 2002 report using price indexes published by Statistics New Zealand (SNZ) and Quotable Value (QV). Costings of the 2002 report were from suppliers and cross-referenced to expenditure data from agricultural industry sources.

Table 1.1 summarises capital investment and annual operating cost of community, industry, and agriculture in the Taranaki region over the period 2002 to 2007.

Over the last five years, capital investments have been on surface water management (\$106.8 million), air quality management and noise reduction (\$48.7 million), and land management (\$49.1 million). There has been nearly two and half times as much capital spending on the environment recorded in the Taranaki region in the five years 2002 to 2007 as there were in 1997-2002.

Table 1.1 Summary of investment on environmental improvements 2002-2007

TARANAKI REGION (\$ Million)	Capital Cost		Annual Operating Cost	
	1997-2002	2002-2007	1997-2002	2002-2007
SURFACE WATER	\$47.9	\$106.8	\$12.6	\$24.5
AIR & NOISE	\$18.2	\$48.7	\$1.6	\$0.8
LAND MANAGEMENT	\$21.9	\$49.1	\$5.7	\$10.2
ENERGY EFFICIENCY	\$0.0	\$7.1	\$0.0	\$0.8
ENVIRONMENT SERVICES	\$3.2	\$4.9	\$8.9	\$5.5
TOTAL	\$91.1	\$216.7	\$28.8	\$41.8

Source: TRC estimates, BERL

The estimations are comparable to those of our previous report except that investments on surface water quality and air quality management, which have doubled. The expansion of the energy sector has contributed the most to the regional economy in terms of business investment. It has also made the greatest investment in environment mitigations and enhancement. Therefore, we will take a look at this sector specifically in Section 6.6.

There is a disparity between capital investment and annual operating costs as illustrated in Table 1.1 above. This is perhaps due to the fact that significant investments only occurred in recent years. Therefore, some of the projects in the energy sector are still in the development phase, whereas others may not have been operated to full capacity. We would expect considerable operating cost increases in the next five years when those new investment projects are fully operational.

There are likely to be costs omitted due to the nature of the survey and, therefore, the estimates derived in this report are conservative. It is possible that a future survey would find significant expenditure in areas where this survey has recorded little. However, as these estimates have been cross-checked with key stakeholders in Taranaki, they are sufficient to indicate the magnitude of investments and expenditures over the five-year period as we.

This report does not include in the main analyses the investment or operating expenditure in Taranaki on the bio-physical environment made by central government, in particular by Department of Conservation (DoC). Nor does it include spending by the Councils on community amenities. These aspects are discussed at a broad level only in Section 8.

2 Taranaki: economy and prospects

This section is a summary of an earlier report by BERL undertaken for Venture Taranaki¹.

There are 104,000 people who live in the Taranaki region. From this, 45,200 Full Time Equivalents (FTEs) were employed in 12,800 businesses in 2006 producing \$4.38 billion in GDP. Taranaki makes up 2.5 percent of national employment and contributes 2.8 percent of national GDP².

The key industries that drive the Taranaki economy are the oil and gas, and agriculture sectors, and their associated secondary industries such as food processing and engineering. As such, the region employs a far larger proportion of workers in these industries than the New Zealand national average.

Taranaki has achieved steady rises in employment and GDP over the last five years despite flat population growth. On a GDP per capita basis, Taranaki is well ahead of the national average, although regional employment and GDP growth (where population is not taken into account) has not been as rapid. Based on the region's industry structure, we project the Taranaki economy to grow at a faster rate than nationally over the next 20 years.

The Taranaki region is benefiting from a fundamental shift in the global economy. The effects of globalisation and the addition of an extra two billion people into the global workforce via India and China has driven down manufacturing prices. Increased activity, along with a growing middle class has seen the demand for energy and commodities increase significantly over the last five years. The Taranaki region, with its agriculture, food processing (meat and dairy) and energy focus, is well placed to take advantage of this shift.

This positive shift cannot rely solely on increases in labour participation or productivity. It will require an increase in employment, which should encourage population growth in the region. Increased population will flow through to the population-based industries (education, health, cultural and personal services). There are glimpses of this in the latest census numbers where the population arrested a decline from the previous five-years and actually increased by 2,000 people.

¹ BERL, "*Taranaki Industry Projection: 2006-2026*", project ref#4597, November 2007

² Source: 2006 census; BERL Regional Database

3 Scope and methodology

This report aims to quantify the investments and spendings made by the broad Taranaki community in environmental improvements, enhancements or protection over the period 2002 to 2007.

3.1 Scope of the report

This report is an update of the project BERL undertook in 2002. The 2002 report estimates the total amount of investment and annual expenditure of the broad Taranaki community, including the agriculture sector, industry (industrial, processing, and energy), and the community (the TRC, district councils and public entities).

While the 2002 report looks at investment and spending both over the last 20 years and the last five years, this project only focuses on the latest five years (ie. 2002-2007).

The scope of the report is to estimate the investment and expenditure of the Taranaki community on environmental improvements, enhancement or protection. It excludes the expenditure by central government (ie. DoC). The report outlines a global order of the value of cultural and recreational assets, which the local authorities have created to improve the social conditions in the region, however, these assets and investments are not included in the main analyses.

3.2 Method of estimation

Agriculture

Information on agriculture was provided by the TRC, supplemented by the costing information from the 2002 project. Costings of the previous report were from agricultural suppliers for construction or purchase of effluent treatment systems, riparian protection, various services, and site works. To incorporate price increases over the five year time period, we updated the costings using the price indexes published by Statistics New Zealand (SNZ) and Quotable Value (QV). The following list details the sources of the price indexes:

- farm expenses price index (SNZ) - electricity, maintenance cost of hill country plans, weed and pest control, culvert construction, electrical works, earthmoving and site work, irrigation and land drainage, and reclamation and river control
- capital goods price index (SNZ) - fencing, land clearing and establishment

- freehold open market land cost by district (QV) – opportunity costs of effluent systems

We also gathered information through a meeting with Randal Gordon, General Manager of PKW Farms. The meeting helped us to verify the cost adjustments and the estimates of investment and spendings by the agriculture sector.

Community and industrial

Information on investment and expenditure in environmental improvements were obtained from a survey of main resource users and district councils, supplemented by information from annual reports and plans of the three district councils³ in the region and the Taranaki Regional Council.

Compared to the 53 survey results received in 2002, we received a total of 111 responses. Some companies and organisations responded that they have no record of investment or expenditure on environmental improvements since 2002, while others had concerns about the issue of confidentiality and were unable to disclose actual figures. Consequently, our calculation was based on 98 responses, including district councils, public entities, and companies of various industries, which is a good representation of the broad community in the Taranaki region.

Interviews and meetings were arranged with some of the major resource users to understand the investment trends in Taranaki. This information supplements the survey results and is incorporated into the analysis.

3.3 Assumptions

There are a number of assumptions we made while examining the survey responses.

- Financing costs (ie. cost of borrowing to finance a particular project) are excluded;
- Sunk costs are excluded. Ideally, incremental cost will be the best measure here;
- TRC monitoring costs are included.

3.4 Limitations of estimates

Although the survey went to approximately 160 companies and organisations, of which 111 responded, the contact list was not exhaustive. The research predominantly relied

³ New Plymouth District Council, Stratford District Council and South Taranaki District Council.

upon survey respondents and therefore, depending on their interpretations, there would be gaps and omissions in some areas.

In addition, due to the confidential nature of the information we sought, several organisations and companies did not respond or would not provide estimates of their investment and expenditure.

Consequently, the estimates derived in this report are conservative, although the results of this year's survey show significant increases in investment and spendings compared to our previous report.

The report focuses on investment and spendings on maintenance and improvement of the biophysical environment. Thus, the report does not include in the main analyses the investment or operating expenditure by central government, in particular by the Department of Conservation (DoC). Nor does it include spending by the Councils on community amenities such as parks and libraries. These aspects are discussed at a broad level in Section 8.

4 Environment investment by the community

The environmental investment by the community consists of expenditure by the three district councils in the region and the Taranaki Regional Council. The information obtained from the district councils and the TRC indicates that investment by these community organisations was mainly made in regard to:

- maintaining and improving the quality of surface water including riparian margins and planting
- flood and erosion control works
- land sustainability including weed and pest control
- solid waste collection, recycling, and disposal
- maintaining and improving air quality and noise attenuation
- environmental services including policy and planning, environmental monitoring and research, consent processing, compliance monitoring, and staff training.

Table 4.1 summarises the investment and spending by community in the Taranaki region over the last five years from 2002 to 2007.

Table 4.1 Summary table - community investment 2002 - 2007

Community (\$ Million)	Capital Cost		Annual Operating Cost		Environmental Services		Other Mitigation	
	1997 - 2002	2002-2007	1997 - 2002	2002-2007	1997 - 2002	2002-2007	1997 - 2002	2002-2007
SURFACE WATER								
Water Quality	\$15.5	\$67.0	\$7.9	\$18.4	...	\$1.7	...	\$0.1
Riparian Protection	...	\$0.0	...	...	...	\$0.0	...	\$0.0
River, flood control	\$0.6	\$16.4	\$2.1	\$3.3	...	...	...	...
Sub-Total Surface Water	\$16.1	\$83.4	\$10.0	\$21.7	...	\$1.7	...	\$0.1
AIR								
Air Quality	...	\$0.0	...	\$0.01	...	\$0.0	...	\$0.0
Noise Reduction	...	\$0.0	...	\$0.0	...	\$0.0	...	\$0.0
Greenhouse gas	...	\$0.0	...	\$0.0	...	\$0.0	...	\$0.0
Sub-Total Air	...	\$0.0	...	\$0.01	...	\$0.0	...	\$0.0
LAND								
Land Erosion, Management	\$1.6	\$0.0	\$1.1	\$3.0	...	\$0.0	...	\$0.0
Solid Waste	\$6.3	\$4.7	\$3.1	\$5.7	...	\$0.1	...	\$1.5
Sub-Total Land	\$7.9	\$4.7	\$4.2	\$8.7	...	\$0.1	...	\$1.5
ENVIRONMENT SERVICES								
Monitoring, Research, etc	...	\$0.0	\$5.9	\$4.1	...	\$6.1	...	\$0.0
Staff	...	\$0.0	...	\$0.1	...	\$0.0	...	\$0.0
Sub-Total Environ't Services	...	\$0.0	\$5.9	\$4.2	...	\$6.1	...	\$0.0
TOTAL	\$24.0	\$88.1	\$20.1	\$34.6	...	\$7.9	...	\$1.6

Source: TRC estimates, BERL

The capital investment in Taranaki over the last five years totalled \$88.1 million compared to around \$24 million from 1997 to 2002. In addition, expenditure on maintenance associated with the environmental works, facilities, and processes reached \$34.6 million per year, while the previous report recorded an annual operating spending of \$20.1 million over the five year period 1997 to 2002.

The main increases in capital cost and annual operating cost related to surface water.

4.1 Surface water

Surface water quality

The measures to protect and improve surface water quality mainly related to stormwater handling, wastewater, and sewage collection, treatment and discharge. From 2002 to 2007 capital investment recorded was about \$83.4 million, considerably higher than the \$15.5 million reported for the period 1997 to 2002.

For example, New Plymouth District Council (NPDC) upgraded the Fitzroy beach camp stormwater discharge system, costing approximately \$80,000. In addition to that, the NPDC invested more than \$15 million on wastewater collection, treatment, and disposal.

Other examples include more than \$2 million invested on stormwater, and wastewater treatments in Stratford District Council; and around \$17 million from South Taranaki District Council. The investment was solely on maintaining and improving water quality; with no capital investment for riparian protection, consistent with the estimation in the 2002 report.

There are also contributions to the activities of the Taranaki Tree Trust on riparian work, which is reflected in the spendings of the agriculture sector. Repairs, pipe upgrades, and water treatment projects undertaken by the district councils were also substantial.

Expenditures on environmental services (environmental technical, and professional staff or consultant services) regarding water quality were \$1.7 million over the last five years. Expenditure on other mitigation was around \$100,000 over the same period.

Rivers and flood control and stormwater

The TRC's responsibility for river and flood control includes advising and assisting landholders on matters relating to the control of rivers and flooding in order to minimise and prevent damage by floods and erosions, as required by the Soil Conservation and Rivers Control Act 1941.

The information from the survey indicates significant investment in river and flood control of \$16.4 million compared to the \$0.6 million from 1997 to 2002. Operating cost was kept around the same level at \$3.0 million annually over the last five years. The TRC alone expended around \$1.6 million (which averaged around \$0.32 million annually) on river control and flood control. The main areas of expenditure were on the Lower Waitara and Lower Waiwhakaiho River Flood Control Schemes.

4.2 Air quality and noise control

Spending in the areas of air quality and noise control was minimal by the community. The majority of the investments in these areas were from industry, which is detailed in Section 6.

4.3 Land erosion and management

Land management and erosion control

The TRC provides property planning services to landowners, including comprehensive, agroforestry, and conservation farm plans, as well as riparian management plans. It also provides environmental enhancement grants for protection of wetlands and other aspects of the environment identified as regionally significant. Annual spending by the Council of \$8.7 million was estimated for the last five years.

Solid waste

The measures by community organisations to collect solid waste and to operate landfills, recycling, and transfer stations are significant parts of their environmental protection operation. The investment in solid waste handling in the last five years was \$4.7 million and the average annual cost of operating the waste collection, recycling, and disposal was \$5.7 million per annum over the period 2002 to 2007.

Over the last five years three landfills have closed, including the Patea landfill in the South Taranaki District. Colson Rd regional landfill is now the main centralised landfill in the region. Transfer stations were built over the five-year period to facilitate collection for the central landfill.

4.4 Environment services

The category 'environmental services' includes environment planning and policy, monitoring and research, consent processing, and monitoring. The three district councils and the TRC spent annually on environmental monitoring and research. This activity costs

about \$10.3 million per annum (\$6.1 million environmental services and \$4.2 million operating expenditure) to deliver.

Resource investigations, monitoring and enhancement is another sub category under environmental services. Over 70 percent of the expenditure is spent on. This is followed by resource investigation and projects, making up around 20 percent of the total⁴.

⁴ TRC Annual Report (2007).



5 Environment investment by agriculture

The agricultural sector in Taranaki is predominantly pastoral, relying on the year-round growing conditions for vegetative production as a base for dairying on the ring plain and other lower areas. In the hill country, there is sheep and beef production, dry stock grazing, and expanding forestry production. This sector has always been the largest employer, with around 7,300 FTEs employed in 2007.

The main environmental attribute requiring protection under dairying is the surface water quality, and control of pests and weeds. The sheep and beef production in the hill country requires protection measures to reduce soil erosion, and also pest and weed control, especially in gullies and bush remnants.

Therefore, categories examined include:

- effluent systems - oxidation ponds, tertiary ponds etc
- riparian planting
- land management – hill country protection
- pest control
- bridge construction
- culvert installation
- underpass construction.

Note that not all bridge and culvert installations are required to obtain resource consents due to small size etc and of the others not all are consented. Similarly not all underpass constructions are consented. This contributes to underestimations of the actual investment presented in this report.

Table 5.1 details the capital investment and expenditure for the latest five years.

Table 5.1 Summary table – agriculture investment 2002 - 2007

AGRICULTURE (\$ Million)	Capital Cost		Annual Operating Cost	
	1997 - 2002	2002-2007	1997 - 2002	2002-2007
SURFACE WATER				
Dairy Effluent Treatment	\$4.0	\$3.6	\$0.9	\$1.5
Riparian Protection	\$1.1	\$3.6	...	...
Sub-Total Surface Water	\$5.1	\$7.2	\$0.9	\$1.5
LAND				
Hill Country Erosion	...	...	\$2.9	\$3.9
Pest & Weed Control	...	...	\$3.3	\$3.7
Sub-Total Land	...	...	\$6.2	\$7.7
SITE WORK				
Bridge	...	\$2.1	...	...
Culvert	...	\$1.5	...	...
Underpass	...	\$8.7	...	...
Sub-Total Site Work	...	\$12.3	...	...
TOTAL	\$5.1	\$19.5	\$7.1	\$9.2

Source: TRC estimates, BERL

5.1 Surface water

In 2003, the Dairying and Clean Streams Accord was signed by the Minister of Agriculture, Minister for the Environment, Fonterra and Local Government New Zealand (on behalf of regional councils). The Accord is a voluntary programme to promote sustainable dairy farming in New Zealand. It focuses on the quality of New Zealand's streams, rivers, lakes groundwater and wetlands. In 2004, the Taranaki Regional Council prepared a Regional Action Plan to implement the Accord in Taranaki. Important measures to protect and improve the quality of surface water on farms is treatment of dairy effluent, riparian management – the fencing and protection of the margins of streams and rivers to reduce the effects of pasture runoff into the surface water, and the construction of bridges or culverts to exclude direct access by cattle to watercourses.

Farm dairy effluent treatment

Initially, simple oxidation ponds treated the effluent, then discharged watercourses, streams, and rivers. Farm dairy effluent treatment by discharge to land is also an option and many farmers have invested in effluent irrigation systems to do this. Tertiary oxidation ponds and tertiary treatment systems such as constructed wetlands are further options that have been developed.

Over the period 2002 -2007 there were approximately 31 dairy effluent treatments installed in Taranaki and, over the same period, 184 were upgraded. Among the 31 newly installed

treatments, six of them were oxidation pond systems, seven were tertiary oxidation ponds, and 18 were effluent irrigation systems. Our previous report recorded around 2,400 oxidation pond systems up to year 2002, which cost around \$32 million to install.

The last five years saw significant farm mergers in Taranaki, which resulted in reduced operating costs for each individual farm due to a larger scale of production.

Total installation and upgrade costs reached \$3.6 million over the last five years; and annual cost of running and maintaining all systems was estimated to be around \$1.5 million.

Riparian protection and enhancement

Water quality is protected by treating farm dairy effluent, by protecting rivers and streams by fencing their riparian strips, and by on-farm bridging or culvert construction for cattle crossings.

There were 412 kilometres of fencing completed from 2002 to 2007 compared to 139 kilometres from 1997 to 2002. The estimated cost of this fencing and planting was approximately \$1.2 million as part of the \$3.6 million investment on riparian protection. The cost of fencing has been adjusted using the Capital Goods Price Index from Statistics New Zealand.

The calculation of riparian planting excludes the opportunity cost of production lost from the land in the riparian margins retired, following the method we used for the 2002 report. It is likely that, in the absence of the fencing retirement, not all of this land would be available for grazing.

The TRC has been working with landowners to develop property (riparian) plans and implement them. Up to 2007, 62 percent of all dairy farms in the region had a riparian management plan in place. Over 1,000,000 riparian plants in total have been supplied to riparian plan holders – some 780,000 in the last five years - which is evidenced by the investment in riparian planting seen over the last five years

5.2 Land erosion and management

In the agriculture sector in Taranaki there is a need for soil erosion prevention measures in the hill country, as well as pest and weed control on both dairy farms and sheep and beef farms. These costs are generally covered from the operating budgets on the farms.

Hill country erosion

Over the period 2002-2007, there were 161 new hill country farm management plans, of which 158 were comprehensive farm plans and three were agroforestry plans. The average farmer expenditure is over \$13,400 per year on implementation of sustainable land management practices such as environmental planting, forestry/agroforestry development, or fencing and retirement of erosion-prone land. The annual cost was adjusted according to the Farm Expenses Price Index published by Statistics New Zealand. The total annual farmer expenditure under this programme is thus \$2.2 million per annum on hill country protection.

Dairy farm pest and weed control

The TRC carries out initial control for a three-year self-help possum control programme. Therefore, the first year cost is not charged to farmers (these costs are included in the community investment and spending in the previous section). Farmers subsequently undertake their own maintenance or employ a contractor to carry out the maintenance. The total cost in the next two years to the farmers is estimated at about \$2.1 million and \$1.7 million for each year thereafter.

5.3 Site work

According to the TRC's "Regional Action Plan for Taranaki, Dairying and Clean Streams Accord, Annual Report for 2006/2007", 93 percent of regular stream crossing points are adequately bridged and/or culverted, which covers a total of 1,186 properties (62 percent of dairy farms with plans). This keeps dairy cows out of streams, reducing soil erosion and stream pollution.

The TRC monitors the progress and provides resource consent advice and information in terms of the construction of bridges and culverts. The dairy farming community have managed to achieve the year 2007 target set by Taranaki's Regional Action Plan under the Dairying and Clean Streams Accord.

A number of road underpasses have also been installed in the region. The underpasses keep solid waste from the public roads and contribute to preventing disease transfer by vehicles.

Bridges, culverts & underpasses

The costs of bridges, culverts, and underpasses were not estimated in the 2002 report due to the unavailability of data. Therefore, no year 2002 estimation is available for comparison. In addition, the numbers presented below indicate the minimum amount of

investment as not all bridges and culvert installations are required to obtain resource consent due to small size etc and not all installations are consented. Similarly, not all underpass constructions are consented.

Bridges

There were 57 bridges built during the period 2002 – 2007. Although the cost of the bridges vary depending on the length/size, the average cost for a 6 to 8.5 metre bridge is approximately \$30,000; that of a 10 to 16 metre bridge is around \$50,000; and the cost of a bridge of 18 metres and above in length averages \$121,000. Applying these estimates to the 57 bridges built between 2002 and 2007, the total cost of bridge construction was \$2.1 million.

Culverts

Over the period 2002-2007 there were 171 new culverts installed in the Taranaki region. Of these there were around 123 average-size culverts, 7 box culverts, and 41 road culverts. Taking consideration of the difference in size, we estimate the average cost of installation averages at around \$3,300 per culvert, and materials cost of around \$5,700 for each culvert. Therefore, we report a total of \$1.5 million capital investment in culvert over the last five years.

Underpasses

Information on the number of underpasses installed between 2002 and 2007 was gathered from the three district councils. A total of \$8.7 million was used to install approximately 120 underpasses in Taranaki. Costs of material and installation vary depending on the size (width and length) of the underpasses, ranging from \$50,000 to \$95,000.

6 Environment investment by industry

There is a broad range of investments made by industry in environmental improvements to mitigate any effects on the environment.

With substantial industrial plants, the environmental measures are designed into the equipment and supplied as elements in the overall plant configuration and/or construction. Most of the investment over the period 2002-2007 reported in this section is thus extensions, upgrades, and new technology measures applied to long-established plants to protect and enhance the environment.

The major substantial investment has been the environmental projection components of the new plants and pipelines established by the energy sector.

Industrial firms in Taranaki were contacted to obtain information on their investments in measures to protect or enhance the environment over the past five years.

Table 6.1 compares the capital investment and annual operating costs of the periods 1997-2002 and 2002-2007.

Table 6.1 Summary table - industry investment 2002 - 2007

Industry (\$ Million)	Capital Cost		Annual Operating Cost		Environmental Services		Other Mitigation	
	1997 - 2002	2002-2007	1997 - 2002	2002-2007	1997 - 2002	2002-2007	1997 - 2002	2002-2007
SURFACE WATER								
Water Quality	\$25.4	\$12.4	\$1.6	\$1.2	...	\$1.7		\$0.1
Riparian Protection	\$1.3	\$3.9	\$0.1	\$0.0	...	\$0.0	...	\$0.0
Sub-Total Surface Water	\$26.7	\$16.3	\$1.7	\$1.3		\$1.7	...	\$0.1
AIR								
Air Quality	\$14.0	\$27.5	\$1.4	\$0.1	...	\$0.0	...	\$0.0
Noise Reduction	\$4.2	\$4.0	\$0.2	\$0.0	...	\$0.0	...	\$0.0
Greenhouse gas	...	\$17.2	...	\$0.6	...	\$0.0	...	\$0.0
Sub-Total Air	\$18.2	\$48.7	\$1.6	\$0.8		\$0.0	...	\$0.0
LAND								
Land Erosion, Management	\$0.2	\$28.6	...	\$0.1	...	\$0.0		\$0.0
Solid Waste	\$13.7	\$3.5	\$1.5	\$1.4	...	\$0.1	...	\$1.5
Sub-Total Land	\$14.0	\$32.0	\$1.5	\$1.5	...	\$0.1	...	\$1.5
Energy								
Energy Efficiency	...	\$7.1	...	\$0.8	...	\$0.0	...	\$0.0
Sub-Total Energy	...	\$7.1	...	\$0.8	...	\$0.0	...	\$0.0
ENVIRONMENT SERVICES								
Monitoring, Research, etc	\$3.2	\$4.9	\$0.5	\$1.2		\$6.1		\$0.0
Staff	...	\$0.0	\$2.5	\$0.1	...	\$0.0	...	\$0.0
Sub-Total Environ't Services	\$3.2	\$4.9	\$3.0	\$1.3	...	\$6.1	...	\$0.0
TOTAL	\$62.0	\$109.1	\$7.8	\$5.7	...	\$7.9	...	\$1.6

Source: TRC estimates, BERL

The main environmental attributes which industry overall invests in are air quality and noise control, land management (in particular, land erosion), and surface water quality including riparian protection. To manage this process, industry increasingly spends on

monitoring and research, which is evidenced by doubled annual operating costs of this category compared to the previous period.

Taranaki is home to almost all New Zealand's oil and gas production. Indeed, it accounted for 90 percent of the oil and gas sector's GDP in New Zealand in 2006. The demand for domestic oil and gas will continue to increase in the next 20 years, according to the Energy Outlook published by the Ministry of Economic Development⁵, which expects continuing investment and sustainable growth in Taranaki in the next few years.

Because the key energy projects remained at the development stage, we found a considerable amount of spending on capital investment but little on operating expenditure. However, we anticipate annual operating cost to rise in the next five years once these new projects are fully operating. We discuss the energy sector in more detail in Section 6.6.

6.1 Surface water

Surface water quality

The main types of investment undertaken by industry in surface water quality are in waste water and effluent treatment. These include bio-filters, effluent irrigation, water re-use, truck wash systems, and stormwater management including ponds.

The total investment by surveyed industries in Taranaki in surface water quality measures in the last five years was \$12.4 million, a 50 percent decline compared to the 1997-2002 period. The annual operating costs for industry associated with these environmental measures totals \$1.2 million per annum, which is comparable to the \$1.6 million annual operating cost from 1997 to 2002.

Therefore, the fall in investment may be the result of significant capital improvements having been made in wastewater and stormwater treatment and disposal by many industries in the preceding five year period.

Riparian protection and planting

There were a number of firms investing in riparian margin protection and planting on their own properties, whereas others contributed to the Taranaki Tree Trust to support riparian planting on other properties. The total investment by industry in this field was \$3.9 million in the last five years, a two percent increase from the previous five-year period. Annual operating cost of riparian planting remained low.

⁵ Ministry of Economic Development, *New Zealand's Energy Outlook to 2030*, September 2006.

6.2 Air quality and noise control

Measures taken to improve air quality include various processes to reduce plant emissions and dust control. Over the last five years, capital investment in air quality control almost doubled from \$14.0 million (1997-2002) to \$27.5 million (2002-2007).

As an example, Contact Energy undertook a large scale investment to upgrade their air compressor, improving output by 3.8 percent and efficiency by 1.3 percent. This is expected to reduce CO₂ emission by 13,000 tonnes annually in the future. Other major air discharge projects include a plant with more efficient combustion technology; low plume cooling tower by Stratford Power Ltd and a 200MW "Peaking" plant proposed by Contact Energy.

Air quality related projects were predominantly undertaken by the energy sector because of expansion in the sector. With the development of large scale energy projects reducing engine noise is one of the environmental issues faced by this sector. In addition to investments to improve air quality, there was in total \$4.0 million investment in noise reduction compared to \$4.2 million from 1997 to 2002.

Annual operating cost for air quality recorded was \$100,000 per annum over the last five years. The large difference between capital investment and operating costs is primarily due to the fact that some of the projects are still at the initial stage.

6.3 Land erosion and management

Land erosion

Investment in land management totalled \$28.6 million over the last five years. In 1997 to 2002, total investment in this area was only around \$0.2 million. The majority of the capital investment was from the energy sector.

The items in this category include landscaping, weed control, pest plant management, and other land development. Land erosion management is especially required for projects that are located close to the sea. This includes, for example, affected party compensation and property purchases; and planting and general land management.

Solid waste

The measures here included cleaning dumpsites, collecting solid waste, and establishing a recycling depot. Although the total capital investment in solid waste management was substantially below the total for 1997-2002, most of the investment in solid waste collection, recycling and disposal is handled by the district councils.

The total investment in solid waste treatment reported for the last five years was \$3.5 million, and annual operating costs were \$1.4 million per annum. This compares to capital investment of \$13.7 million and annual operating costs of \$1.5 million over the period 1997-2002.

Also noticeable is the \$1.5 million spent by several companies on other mitigations regarding solid waste management.

6.4 Energy efficiency

Our previous report (1997-2002) showed zero investment and spending relating to energy efficiency. However in the last five years the capital investment on energy efficiency enhancement totalled around \$7.1 million; and annual operating cost averaged around \$0.8 million.

Both the energy and industrial sectors undertook upgrades of their equipment with energy saving functions, such as water and electricity saving. Note that we have included incremental costs of the equipment upgrade where possible. For some items incremental costs are not available. Thus, the result tends to be a conservative estimation of the total spending on energy efficiency.

6.5 Environmental monitoring, research, and staff

Apart from regular expenditure on monitoring services (\$4.9 million capital investment and \$1.3 million annual operating cost), industry also increased their capability to undertake their own environmental research and monitoring. This is evidenced by an impressive amount of \$6.1 spent million on environmental services, hiring environmental, technical, and professional staff or consultant services.

The energy sector spent a significant amount on research and monitoring. These costs are capitalised due to the direct impact of the research and monitoring on production.

Furthermore, we noticed that there were a few companies investing to improve the environmental awareness of their staff. Full time staff are also being hired to manage environmental matters.

6.6 The energy sector

Table 6.2 highlights the significant capital investments and annual operating expenditures over the period 2002-2007 by the energy sector.

Table 6.2 Summary table – the energy sector 2002 - 2007

Energy (\$ Million)	Capital Cost		Annual Operating Cost	
	Energy	Total Industry	Energy	Total Industry
SURFACE WATER				
Water Quality	\$4.4	\$12.4	\$0.5	\$1.2
Riparian Protection	\$3.1	\$3.9	\$0.0	\$0.0
Sub-Total Surface Water	\$7.6	\$16.3	\$0.5	\$1.3
AIR				
Air Quality	\$26.7	\$27.5	\$0.0	\$0.1
Noise Reduction	\$4.0	\$4.0	\$0.0	\$0.0
Greenhouse gas	\$16.6	\$17.2	\$0.0	\$0.6
Sub-Total Air	\$47.3	\$48.7	\$0.0	\$0.8
LAND				
Land Erosion, Management	\$27.5	\$28.6	\$0.0	\$0.1
Solid Waste	\$2.5	\$3.5	\$0.1	\$1.4
Sub-Total Land	\$30.0	\$32.0	\$0.1	\$1.5
Energy				
Energy Efficiency	\$3.7	\$7.1	\$0.1	\$0.8
Sub-Total Energy	\$3.7	\$7.1	\$0.1	\$0.8
ENVIRONMENT SERVICES				
Monitoring, Research, etc	\$2.8	\$4.9	\$1.1	\$1.2
Staff	\$0.0	\$0.0	\$0.0	\$0.1
Sub-Total Environ't Services	\$2.8	\$4.9	\$1.1	\$1.3
TOTAL	\$91.3	\$109.1	\$1.9	\$5.7

Source: TRC estimates, BERL

The energy sector's capital investment totalled \$91.3 million over the last five years compared to \$109.1 million invested by industry. Thus, the energy sector represents almost 84 percent of the total investment in environmental protection and enhancement. The majority of the spendings were on land management and air quality management, representing 96 percent of investment on land management and 97 percent of that on air quality. The energy sector also spent heavily on riparian protection, reducing greenhouse gas emission, and environmental monitoring and research.

On the contrary, annual operating costs were relatively insignificant compared to other industries, such as processing and manufacturing. Most of the energy sector projects are still under development or at the very initial stage of operation. Therefore, we expect notable increases in operating expenditure in the next five years.

Exploration and development remain active in the energy sector in the region. The Energy Data File (2007) from the Ministry of Economic Development reported the development of two appraisal/development wells from the Maui-A platform in 2006. Four wells were drilled

in the Kauri field and a number of onshore production wells were developed in the same year.

Looking ahead, the MED's "New Zealand Energy's Outlook to 2030" projected about 35 percent oil and gas supply growth between 2005 and 2030.

Apart from the investment on large scale energy related projects, this sector also invested significantly on human resources. In the past, the work force was usually been sent overseas to receive relevant job training. In recent years, work education and training facilities have been established to assist the development of the energy sector. The Taranaki Drilling School was founded to meet the skill and labour demand in the oil exploration industry. In addition, M & O Pacific (in the Taranaki region) is one of the leading providers of marine and drilling personnel to the oil and gas industry world-wide.

The expansion of the energy sector in Taranaki also helps the development of industries and sectors that provide services to the energy sector. For instance, the number of FTEs in the business services sector in the region increased by 17.7 percent over the last five years, with the number of business units up by almost 50 percent. Moreover, manufacturing and building also enjoyed a 30 percent increase in its business unit numbers from 2002 to 2007⁶.

⁶ BERL Regional Database.

7 Total investment in the environment

The analyses in the previous sections give conservative order-of-magnitude estimates of the investment and annual spending on the environment by the Taranaki community in the last five years, as well as comparing it with the previous five years. This section draws together the information to show the overall pattern of investment and the annual operating costs spent on the environment in Taranaki.

7.1 Summary table

The total pattern of community investment in the environment is shown in Table 7.1

Table 7.1 Summary table – total investment and spending 2002 - 2007

TARANAKI REGION (\$ Million)	Capital Cost		Annual Operating Cost	
	1997-2002	2002-2007	1997-2002	2002-2007
SURFACE WATER				
Community	\$16.1	\$83.4	\$10.0	\$21.7
Agriculture	\$5.1	\$7.2	\$0.9	\$1.5
Industry	\$26.7	\$16.3	\$1.7	\$1.3
Sub-Total Surface Water	\$47.9	\$106.8	\$12.6	\$24.5
AIR				
Community	...	\$0.0	...	\$0.01
Agriculture	...	...	...	...
Industry	\$18.2	\$48.7	\$1.6	\$0.8
Sub-Total Air	\$18.2	\$48.7	\$1.6	\$0.8
LAND				
Community	\$7.9	\$4.7	\$4.2	\$8.7
Agriculture	...	\$12.3	...	...
Industry	\$14.0	\$32.0	\$1.5	\$1.5
Sub-Total Land	\$21.9	\$49.1	\$5.7	\$10.2
ENERGY				
Community	...	...	...	...
Agriculture	...	...	...	...
Industry	...	\$7.1	...	\$0.8
Sub-Total Energy	\$0.0	\$7.1	\$0.0	\$0.8
ENVIRONMENT SERVICES				
Community	...	\$0.0	\$5.9	\$4.2
Agriculture	...	...	...	...
Industry	\$3.2	\$4.9	\$3.0	\$1.3
Sub-Total Environ't Services	\$3.2	\$4.9	\$8.9	\$5.5
Total Community	\$24.0	\$88.1	\$20.1	\$34.6
Total Agriculture	\$5.1	\$19.5	\$0.9	\$1.5
Total Industry	\$62.0	\$109.1	\$7.8	\$5.7
TOTAL	\$91.1	\$216.7	\$28.8	\$41.8

Source: TRC estimates, BERL

In total, the Taranaki region spent in total \$216.7 million in capital investment and \$41.8 million in annual operating costs over the period 2002-2007. By comparison, the

preceding five year period saw a total of \$91.1 million capital investment and \$28.8 million annual operating costs.

Industry in Taranaki was the largest capital investor over the last five years. It invested \$109.1 million, which is more than half of the total regional spending. Annual operating cost reported by the industry sector was \$5.7 million. These are compared to the \$62 million capital investment and \$7.8 million annual operating cost of the preceding five year period.

Community organisations closely follow the industry sector with capital investment of \$88.1 million. This is far more impressive than the \$24 million invested over the preceding five year period. On average community organisations spent around \$34.6 million on maintenance and management, which was around 72 percent higher than the last five year period (\$20.1 million).

The agriculture sector managed capital investment of almost \$20 million on environment protection or enhancement, compared to \$5.1 million five years ago. Although this sector spent the least on capital investment, it was the main contributor to surface water quality management and land management. Annual operating cost, on the other hand, grew by almost 67 percent compared to the previous five years, reaching \$1.5 million over the period 2002-2007.

The capital cost figure of \$216.7 million for the period 2002-2007 shown in Table 7.1 is the total investment by the different sectors over the 5 year period. This equates to an average annual capital expenditure of \$43.3 million for all sectors. Adding to this figure the annual operating cost from Table 7.1 will give an estimate of the total spending on the environment per annum.

Total spending on the environment per annum by the Taranaki community over the period 2002 to 2007 is therefore conservatively estimated at \$85.1 million per annum. This compares to a figure of \$57.1 million per annum from our 2002 report – an increase of \$28 million per annum.

8 Environment spending omitted

This section looks at the expenditure by the Department of Conservation (DoC) on the conservation estate in Taranaki and spending on community amenities. These estimates are broad level investment and thus, are excluded from our main calculation.

8.1 Government Spending on the Environment

The main spending by central government on the bio-physical environment in Taranaki is through the annual expenditure of the Department of Conservation (DoC) on the conservation estate in Taranaki. We understand that DoC, within the broader Wanganui Conservancy, manages approximately 145,000 ha or about 20 percent of the Taranaki region under the Reserves Act, National Parks Act, and the Conservation Act. This area is approximately half of the land administered by DoC in the whole Wanganui Conservancy.

During 2002-2007, DoC spent, on average, \$12.6 million per annum⁷ in the Wanganui Conservancy compared to the \$9.5 million per annum over the period 1997-2002. This spending by DoC in promoting the environmental sustainability and biodiversity restoration on conservation estate in the Taranaki region is a relatively small sum when compared with the operating expenses by the broader Taranaki community.

Over the last five years two marine reserve sites in Taranaki, Parininihi and Tapuae, were fully approved by DoC. Tapuae will be fully surveyed and gazetted during 2007-08.

In terms of possum control, nationally, 995,158 ha were targeted by a possum control program during 2002-2003. Egmont National Park was treated with aerial 1080 for possum control.

8.2 Value of Community Amenities

The main amenities, which the Taranaki community use in the social, cultural, and recreational pursuits include stadium, regional gardens and parks⁸; pools and aquatic centres; museums and libraries; and halls and community centres. In addition, there are a large number of recreational reserves around the districts, esplanade reserves, beautification areas, and children's playgrounds, which improve the living environment for the communities. As well, there are cemeteries for use of the communities.

⁷ \$9.58m in 2007; \$9.98m in 2006; \$11.34m in 2005; 10.91m in 2004; \$11.71m in 2003; and \$9.65m in 2002, according to the DoC Annual Report (2002-2007).

⁸ For example, Pukeiti Rhododendron Trust gardens, Hollard Gardens, and Tupare.

There is sufficient information in the annual reports, plans of the district councils, and other sources, to be able to estimate the total value of community facilities available to the Taranaki community. Apart from the district councils, the TRC alone spent around \$773,700 on the maintenance of regional gardens during 2006/07, compared to \$384,900 during 2005/06 and \$431,700 during 2004/05.

The main assets in the region include parks and domains such as King Edward Park, Victoria Park, and Midhirst Domain in Stratford District; Hicks Park, King Edward Park, and the Powerco Aquatic Centre in Hawera; and the domains and pools in other South Taranaki centres. In New Plymouth District the facilities include Pukekura Park, Coastal Walkway, Brooklands Park and Zoo, the New Plymouth Aquatic Centre, and the Govett-Brewster Art Gallery, Taranaki museum, and the district libraries.

Investment and annual spending on these community facilities are omitted from the estimates in this report.

9 Appendix: PKW Farms Limited case study⁹

Parininihi Ki Waitotara Incorporation (PKW) is a Maori land incorporation formed in 1976 to protect and promote the interests of the owners of rural land totalling 22,000 hectares, leased in perpetuity under Reserve Land leases known as West Coast leases. PKW is based in Taranaki and manages the interests of its 8,000 shareholders, who are widely spread around New Zealand and offshore¹⁰.

A subsidiary, PKW Farms Ltd, owns the land and improvements on approximately 2,400 hectares, operated as 13 farms with 50:50 sharemilkers milking about 7,000 cows. On the remaining 19,600 hectares PKW owns the unimproved value, or 'everything below the roots of the grass'. We understand that about 13,000 hectares of this land would be suitable for dairying. The remaining 6,000 hectares plus would be suitable for dry-stock farming or other extensive uses, including presumably some appropriate for indigenous bush regeneration.

PKW commitment to the environment

PKW is showing strong commitment as kaitiaki of their land, resources and all taonga.

PKW is committed to be a leader in the field of on-farm environmental protection and restoration. It works closely with the Taranaki Regional Council on a range of environmental investments funded by PKW Farms. PKW Farms' recent projects are summarised below:

- fencing and planting indigenous plants in riparian strips along all rivers, streams and waterways on their farms.
- replacing on-farm fords through streams with substantial bridges, including investment of \$120,000 in a centre pier bridge of about 22 metres length on one farm visited by BERL.
- installing culverts, underpasses, and other measures to reduce degradation of waterways and soils on the farms.
- upgrading older effluent settling ponds on the smaller farms

⁹The appendix only includes the key points of the case study. For the details of this case study, refer to the supplementary case study report.

¹⁰Information from company website: www.pkw.co.nz

PKW and the Dairying and Clean Streams Accord

In the overall national picture, the Dairying and Clean Streams Accord between Fonterra, Ministry for the Environment, Ministry of Agriculture, and Regional Councils envisages 90 percent of farms complying with the Accord by 2015.

PKW is committed to a standard of environmental performance faster than this. We understand they are intending to enter a Memorandum of Understanding (MoU) with Taranaki Regional Council (TRC) that will see all PKW farms fully complying with the Accord by 2012. PKW will undertake to make best endeavours to have their lessees on the remaining land also comply.

PKW is becoming a leader in dairy production

PKW is demonstrating that protecting the environment can also increase production. PKW Farms Ltd and its sharemilkers are producing at well above the region's average. Its dairy production in the coming season 2008-09 will come from 13 farms run by 50:50 sharemilkers on the 2,400 hectares of land and improvements directly owned by PKW.

PKW Farms Ltd is showing that by amalgamating farms it is achieving economies of scale in production. To this end it has a specific Land Management Plan and within that Plan stands ready to purchase key properties. The profile of farms in 2008-09 is shown in Table 9.1.

Table 9.1 PKW farm profile

Farm size	Number of farms	Average size	Number of cows	Production 07-08
Small	2 farms	66 ha	150-240	857 kgs MS/ha*
Medium	4 farms	137 ha	300-500	861 kgs MS/ha
Large	7 farms	245 ha	500-900	927 kgs MS/ha

* Milk solids

Potential broader role for PKW

PKW is a very substantial incorporation by any measure, with Net Assets of the PKW group, as at 30 June 2007, \$185.5 million. Of these assets, \$156.4 million were Property, Plant and Equipment. PKW has a specific Land Management Plan and continuation of that Plan will see it become a state-of-the-art on-farm dairy producer, with a scale that will make it potentially significant in the international market. It can be expected that PKW's commitment to be a sound kaitiaki of the taonga in their on-farm production will continue as they will presumably move into participation in processing, research and the higher aspects of the dairy industry.



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