

# **REVIEW OF FLOOD PROTECTION SCHEME MAINTENANCE**

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## 1 SUMMARY

Eight river control and flood protection schemes in the Bay of Plenty, Southland and Waikato regions were reviewed. For only one scheme, the Lower Waikato Waipa Catchment scheme, north of Taupiri, (Lower Waikato) is there clear evidence that the scheme works are no longer being maintained to the design standards. For the Lower Waikato this deterioration is due to the divided responsibility that exists over the maintenance of the works. This is not new, and has been a potential problem since completion of the scheme, and with maintenance commencing in 1983.

There is a clear need for Regional Councils to develop asset maintenance plans for the long term maintenance of river control and flood protection schemes. These schemes have been built, in most cases with a significant taxpayer contribution.

Listings have been made of the key factors to be considered for the maintenance of river control and flood protection schemes. Outline procedures are developed for preparing asset management plans.

## 2 RECOMMENDATIONS

That Regional Councils establish the direct cost of maintaining river control and flood protection schemes. Excluded from consideration are those costs that will continue even if the schemes are not maintained. Section 6.2

That Regional Councils should collectively investigate a means of extracting a contribution, from the utilities organisations, towards the cost of maintaining river control and flood protection schemes. The contribution to be evaluated in terms of benefit received. Section 6.3

That with its national responsibilities for the Soil conservation and Rivers Control Act, the Ministry for the Environment give consideration to ways in which support can be given to encourage the continued maintenance of the flood protection schemes. For a start the Ministry for the Environment should coordinate and facilitate a workshop, for attendance by Regional Council staff, which is dedicated to flood protection scheme maintenance. This workshop should address amongst others the following issues:

1. Level of contributions from all beneficiaries of flood protection schemes.
2. Asset maintenance planning and procedures.
3. Eligibility for government assistance through the Recovery Plan for Natural Disasters and Emergencies Section 6.3

That the Ministry for the Environment consider all options for supporting the Regional Councils in the maintenance of river control and flood protection schemes. Section 6.3

That because of benefits received to the region, regional rates should make a contribution of river control and flood protection scheme maintenance. In the absence of any better figures, it is recommended that in terms of the benefit received, the proportion of regional rate provided to maintenance should be a minimum of 15% for river control and flood protection work and 5% for drainage work.

Section 6.3

That the Waikato Regional Council, as the overall organisation responsible in terms of the Deed and with its responsibilities under the Soil Conservation and Rivers Control Act 1941, confirm its intention to establish a system for the adequate and sustainable maintenance of the Lower Waikato flood protection scheme.

Section 6.7

That the Ministry for the Environment become involved and support the Waikato Regional Council to establish a system for the adequate and sustainable maintenance of the Lower Waikato flood protection scheme.

Section 6.7



### 3 BACKGROUND TO THIS REVIEW

The Soil Conservation and Rivers Control Act 1941 introduced an interventionist approach to flood protection schemes that prevailed for 48 years until 1989. To undertake flood control, drainage and soil conservation work in the various districts, the Soil Conservation and Rivers Control Council established under the 1941 Act, set up Catchment Boards, or Catchment Commissions. These Catchment Authorities were empowered to levy rates for soil conservation and rivers control, but received a large percentage of their funding from central government. Grants and subsidies, usually well in excess of 50%, were the key factor in the initiation of flood protection schemes. This was reflecting a widely held belief that if the government wanted private landowners to do something about the flooding, drainage or soil conservation problems then it should help pay the landowner to do it. The New Zealand taxpayer has provided substantial financial inducements, to construct these comprehensive flood protection, drainage and soil conservation schemes. Subsidy rates of 70% to 75% were common, with some rates being as high as 87.5%. The subsidy system continued into the maintenance of some works.

This all changed with a Treasury paper on land use issues in 1984. Dealing with government assistance for catchment works, it characterised the principal benefits as, improved returns to the landowners, either through production or flood damage avoided. There are also identifiable secondary benefits. Regional benefits are in saved roading maintenance and reduced inconvenience, and the smallest category being national benefits to the general taxpayer such as affecting communications, eg. state highways, railways. The Treasury paper concluded that "as the benefits from catchment works are almost wholly confined to the individual regions, we are of the view that the costs for these works should also lie within the region"....."contributions should be distributed according to the benefits (ie. user pays)".

The course of reform continued with:

- The abolishing of the system of grants and subsidies in 1987. Some grants towards the construction and maintenance river control and flood protection schemes have continued because of contractual obligations.
- The incorporation of catchment authorities into Regional Councils, as part of the local government reforms in 1989.
- The revocation of the regulatory controls in the 1959 Amendment of the Soil Conservation and Rivers Control Act 1941 and the Soil and Water Conservation Act 1967 by the Resource Management Act 1991.

The intention of the government funding policy for river control and flood protection schemes (prior to 1987) was that it would contribute to the capital construction. The "community" would then maintain the integrity of the scheme works and levels of protection at its own cost. With some exceptions, the scheme deeds of agreement set out this intention. The payment of subsidies of 50% and later reducing to 25%, towards the annual cost of maintaining many of the schemes clearly compromised this intention.

Regional Councils in October 1989 inherited the functions of the Catchment Authorities including the statutory responsibility under the Soil Conservation and Rivers Control Act "to prevent damage by flood". This carried an explicit responsibility to provide an adequate level of funding to ensure the proper maintenance of the river control and flood protection schemes. Now in 1994, there is a concern as to the adequacy of the maintenance of river control and flood protection schemes in some regions, catchments and situations.

The intention of this review is to provide information on the recent and present scheme maintenance programmes, and the adequacy of these programmes in maintaining design standards.

## **4 PROJECT OBJECTIVES**

The project objectives were:

1. "To identify the key components and factors of a good asset management programme.
2. To present a framework for the development of a good maintenance programme including its funding.
3. To test this framework against a sample of current maintenance programmes for significant flood protection schemes.
4. To identify maintenance funding shortfalls/impediments and options available to address these."

## **5 METHODOLOGY**

The methodology used was to:

1. Identify the key factors to be considered in establishing a scheme maintenance programme.
2. Review the maintenance programmes of a selection of river control and flood protection schemes for two Regional Councils, Bay of Plenty and Southland. Later two schemes within the Waikato region were included in the review. The desk top study covered the maintenance of eight catchment schemes.
3. Compare the approaches made towards the programming, funding and execution of the maintenance work by each of these three regions. Test the key factors already identified against what is happening in the regions.
4. Establish guidelines for the development of a good asset maintenance programme.

At each region, the views of both staff and regional politicians were obtained. Contact was made with the Audit Office and the Local Government Association. A listing was prepared of the key factors to be considered in the preparation of an asset management plan. A detailed scheme questionnaire produced. Copies were sent to the Operations Manager of each of the three regions prior to the visits.

Because of the time and financial limits, a physical review of the maintenance standards of each scheme was not undertaken. Reliance was placed on responses gained from the questionnaire and interviews with staff and politicians. A desk top examination of the total maintenance funding and its itemised expenditure breakdown over the past eight years was made. From

these comparisons, conclusions were drawn as to the continuance of the level of funding particularly prior to and post 1989 - the Regional Council era.

*This simplistic approach is suspect.* Maintenance expenditure can be expected to increase with the age of the scheme, and while any scheme is in the construction stage there is the opportunity to charge some maintenance costs to construction. The conclusions drawn must therefore be used with some caution.

There is one notable exception to this. The initiative of the Waikato Regional Council in undertaking the "Lower Waikato Structural Audit" provided solid evidence of deficiencies in the maintenance of the Lower Waikato Waipa Catchment Scheme north of Taupiri (Lower Waikato scheme).

At the same time, a second consultant, Gary Williams of G & E Williams Consultants Limited, undertook a similar review project, concentrating on the maintenance programmes of two other regional councils, Hawkes Bay and Canterbury. Although written and telephone communication was maintained between the two consultants, essentially, because of the short time frame allowed, the two reviews had to proceed independently.

## 6 REVIEW OF MAINTENANCE PROGRAMMES IN THE THREE REGIONS

### 6.1 General

Eight river control and flood protection schemes were included in this review.

Bay of Plenty Region	Southland Region	Waikato Region
Lower Kaituna scheme	Mataura scheme	Waihou Valley scheme
Whakatane scheme	Oreti scheme	Lower Waikato scheme
Waioeka-Otara scheme	Invercargill City scheme	

Surprisingly there is no consistency in the approach to scheme asset maintenance among the three regions. There has been little if any exchange of information on the procedures and processes necessary for the production of a good asset maintenance plan. While there has been a small amount of one-off staff liaison, it seems that for river scheme maintenance at least, the regions are not talking to each other. While the Audit New Zealand has been promoting the need for, and the benefits to be gained from asset maintenance planning, there has been limited progress in considering and agreeing the procedures and processes that should be followed.

Only the Waihou Valley scheme has a formal asset maintenance plan, and even for this it is as a preliminary report. The Southland Regional Council has established a formal document, "River Management and Works Control Guidelines" for most of its catchment schemes. These guidelines will make a sound basis for the development of the asset maintenance plans. The Bay of Plenty Regional Council has valued its assets and is producing a formal asset maintenance plan for each river/drainage scheme. Completion of the plans is programmed for June 1994. The Waikato Regional Council has produced a "Regional Asset Management Strategy" discussion paper as an initial step to developing asset maintenance plans. Audit New Zealand have confirmed that this approach is aligned with its thinking. The Waikato Regional Council has made a commitment to producing asset maintenance plans for all major schemes within the next two years.

Politically, there has been a change in "culture" of councils, as they moved in 1989 from narrowly focussed, water and soil issues, catchment authorities to the wider resource management issues facing Regional Councils. The emphasis is no longer towards the construction and maintenance of river control and flood protection works. For the territorial authorities there has also been similar culture change in moving from County Councils to District Councils. Drainage work in particular now holds a lower status in the District Council activities. This has an impact on the Lower Waikato scheme.

All this shows up in political attitudes expressed by a minority of some Regional Council members towards maintenance. There has been questioning as to:

- Is this continuing investment in maintenance giving a good financial return?
- Do the probable annualised losses support this maintenance expenditure?
- If individually or collectively scheme ratepayers do not want to spend money on maintenance then why should they be required to do so?

## 6.2 Direct and Indirect Costs

With the nationwide movement to “user pays”, and also a desire to establish what are the true cost of activities, Regional Councils have been progressively moving to allocate overheads. In making comparisons of the maintenance expenditure between years it is important that there is a consistency in approach. In the analysis of maintenance expenditure contained in Tables A1 to A24, Appendix A, overhead costs have where available been shown separately.

The aim of “user pays” is to ensure that equity results. The question is how much do the scheme ratepayers pay? How much should the scheme ratepayers pay?

Scheme ratepayers pay:

- Scheme rates based on a benefit classification
- In some schemes, an additional drainage rate based on benefit.

Scheme ratepayers are also general ratepayers. The general rate funds other activities of the Regional Council.

Before any decisions are made as to who should pay what, there needs establishing the direct costs of maintaining river control and flood protection schemes. These direct costs, are the costs that are *avoided* if the scheme is not maintained.

Valuation N Z costs, scheme disaster reserves, and direct costs of the rivers and drainage section, are all examples of direct costs. Floodwarning, regional disaster reserves, cost of the Council, the chief executive, operations manager, office operations are not direct costs to scheme maintenance. These costs would exist whether the scheme existed or not. These indirect costs within the regional organisation are such that only by virtually abolishing the council will these indirect costs be significantly be reduced.

The bulk of the council's indirect costs arises from the democratic process that has to be worked through and the laws and rules that govern the way



that the council's business is run. They are costs that exist whether there was a river and flood protection scheme to be maintained or not. Democracy costs should not form part of the indirect costs that are allocated to scheme maintenance.

In the "Catchment Authority days" these indirect costs were met from the general rate. With the advent of the more multi function activities of the Regional Councils, and the greater accountability of procedures now required of councils, a diverse set of charging out policies has arisen.

Of the three regions, staff charge out rate multipliers, applied to scheme maintenance, ranging from 1.56 to 2.2 are in use. The variation in the multiplier, and the higher figure of 2.2 suggests there has been an inclusion to a variable extent of some or all of the indirect costs. The inclusion of some indirect charges can be inequitable, because the scheme ratepayers already contribute through the general rate to the costs of the council's operations. To ask them to pay again through the scheme rate is double charging, and would effectively mean that they are subsidising the other ratepayers.

It has been argued that those overheads that would be appropriate to say a consulting engineer should be loaded on to the charge out rates used for scheme maintenance work. Certainly this is the correct approach if the aim is to compare the cost of doing work in house compared with that of contracting out. But if the aim is establish how much should the scheme ratepayers pay for maintenance then only those costs that are *avoided* if the scheme was not maintained should be included.

As an example, Southland Regional Council charges a share of floodwarning costs to the scheme ratepayers. But where no scheme maintenance rate exists, the floodwarning is accepted as a regional charge. This is inconsistent. Floodwarning should be seen as a regional charge. The flow measuring and floodwarning systems are necessary whether there are stopbanks or not, and all ratepayers including those with property along the river should pay for this service via the general rate.

It is recommended that Regional Councils establish the direct cost of maintaining river control and flood protection schemes. Excluded from consideration are those costs that will continue even if the schemes are not maintained.

### **6.3 Benefits**

Since the Treasury report of 1984 and the reorganisation of regional government in 1989, a common question has been, "who benefits from the continuing maintenance of flood protection schemes, and hence who should pay". Prior to 1987, in addition to scheme rating, there was the maintenance subsidy provided by government, and as a plus, the availability of general Catchment Authority rates. With the formation of the Regional Councils and movement towards greater accountability, there has been much

discussion about who benefits from continuing the maintenance of the scheme. The beneficiaries are:

- The scheme beneficiaries
- The region
- The nation as a whole.

It is argued that scheme beneficiaries/ratepayers should pay all the maintenance costs, for the reason that there were generous subsidies provided by government towards the capital cost. This was on the understanding that the scheme ratepayers would maintain the scheme. The typical scheme deed entered into, required Catchment Authorities on behalf of the scheme ratepayers to maintain schemes, but at that time there were maintenance subsidies being provided by the government to help towards this. The situation being presented today to the scheme ratepayers is different.

As set out in the Treasury paper of 1984, while the principal benefits from river control and flood protection are to the landowner, there are regional and national benefits gained from the continued maintenance of these schemes. The territorial District Councils, utilities organisations and companies such as Transit, Electricorp, Telecom, New Zealand Rail, Natural Gas Corporation, should pay their share based on the benefits received. It is recommended that Regional Councils should collectively investigate a means of extracting a contribution, from the utilities organisations, towards the cost of maintaining river control and flood protection schemes. The contribution to be evaluated in terms of benefit received.

With present government policies, there can be no great expectation for a taxpayer contribution towards the continuing maintenance cost, even if as accepted by the Treasury, there is some national benefit. It can be expected that any assessment will show the extent of this benefit is limited, and there will be difficulty extracting this amount. The principle has to be considered. After investing substantial taxpayer funds in the river control and flood protection schemes, it seems wrong for government to just turn its back on the and see this investment lost through lack of maintenance. Even limited government assistance would reflect the nation's interest in providing security, peace of mind and improved production through the continuing maintenance of flood protection schemes. Alternatives to financial grants may be a solution in providing a support and demonstrating a national interest. For example the development of model procedures for asset maintenance planning and the reviewing of these could be a Ministry for the Environment responsibility.

It is recommended that with its national responsibilities for the Soil conservation and Rivers Control Act, the Ministry for the Environment gives



consideration to ways in which support can be given to ensure the continued maintenance of the flood protection schemes. For a start the Ministry for the Environment should coordinate and facilitate a workshop, for attendance by Regional Council staff, which is dedicated to flood protection scheme maintenance. This workshop should address amongst others the following issues:

1. Level of contributions towards maintenance from all beneficiaries of flood protection schemes.
2. Asset maintenance planning and procedures.
3. Eligibility for government assistance through the Recovery Plan for Natural Disasters and Emergencies

It is further recommended that the Ministry for the Environment consider all options for supporting the Regional Councils in the maintenance of river control and flood protection schemes.

At the regional level there is a strong basis for regional rates being used to support the continuing maintenance. There have been various economic analyses undertaken that identify that between 13% to 30% of the benefits gained are outside the scheme area. These figures relate to rural schemes and are essentially the benefits "beyond the farm gate". While the figure depends upon the circumstances of the individual scheme, this percentage will vary more as the number of economists asked and the brief being worked to. There is no clear cut answer, individually or collectively. In any case there is no need for exact precision, as scheme ratepayers contribute to both scheme and general regional rates.

It is recommended that because of benefits received to the region, regional rates should make a contribution of river control and flood protection scheme maintenance. In the absence of any better figures, it is recommended that in terms of the benefit received, the proportion of regional rate provided to maintenance should be a minimum of 15% for river control and flood protection work and 5% for drainage work.

#### 6.4 Scheme Features

The features of the eight river and flood protection schemes reviewed are summarised and compared in:

Table 1	Frequency of Monitoring
Table 2	Scheme Reviews
Table 3	Scheme Statistics

As can be seen from examination of the tables, there are wide differences in the approach on issues between regions and as well there are differences between schemes within the same region.



TABLE 3 SCHEME STATISTICS

Feature	Kaituna	Whaka-tane	Waioeka - Otara	Mataura	Oreti	Invercar-gill City	Waihou	Lower Waikato
Valuation of scheme in 1993/94 terms	\$27.115M	\$11.868M	\$9.468M	\$2.654M historical cost	\$7.111M historical cost	\$16.078M historical cost	\$97.910M	Approx \$125M
Accumulated scheme reserves	\$17,777	\$20,533	\$9,244	\$223,700	\$109,000	\$18,500	\$1,035,000	?
Regional disaster funds	\$375,054	\$375,054	\$375,054	\$396,800 plus insurance up to \$2M	\$396,800 plus insurance up to \$2M	\$396,800 plus insurance up to \$2M	\$275,000 plus insurance to \$2.5M	\$275,000 plus insurance to \$2.5M
Rating basis	Area	Land	Capital	Land	Land	Land	Land	Complicated
Maintenance share of the rates c/LV	A 0.5419 D 0.2089 samples	A 0.2963 F 0.0148		A 0.7148 F 0.0357	A 0.5757 F 0.05757	U1 0.1801 U2 0.0474	A 0.5209 F 0.00868	Complicated by shared responsibility
Maintenance share of the rates c/CV	A 0.4161 D 0.1679 samples		A 0.3817 E 0.0458					
Maintenance share of the rates c/ha	A 58.48 F 3.51						A 61.9 F 2.7 samples	
Maintenance work undertaken by	20% in house, 80% by contract	60% in house, 40% by contract	75% in house, 25% by contract	5% in house, 95% by contract	1% in house, 99% by contract	32% in house, 68% by contract	33% in house, 2% by District Councils, 65% by contract	Confused by shared responsibility for work.
Consents	Covered by general authorisation	Most by general authorisation, but applying for some unnotified consents	Most by general authorisation	Section 418(3) RMA. Consents were this does not apply.	Section 418(3) RMA. Consents were this does not apply.	Section 418(3) RMA. Consents were this does not apply.	Tran. Reg. Plan plus unnotified consents	General authorisation
Status of maintenance programme	Annual, but will look at 3 year cycle	Annual, but will look at 3 year cycle	Annual, but will look at 3 year cycle	Annual	Annual	Annual	Annual	Annual
Asset maintenance plan	Being prepared for 1995	Being prepared for 1995	To be prepared for 1995	No, but have scheme management and work guidelines	No, but have scheme management and work guidelines	To be prepared for 1995-96	Prelim. plan produced covering period of 60 years	To be prepared
Maintenance prioritised?	Yes but informally	Yes but informally	Yes but informally	List of works prioritised	List of works prioritised	Structural repairs before aesthetics	Not formally	Not formally, but one D C says yes
Risk assessed?	Yes but informally	Yes but informally	Yes but informally	Yes for setting priority	Yes for setting priority	Yes but informally	Not formally	No, but one D C says yes
Inventory of assets including past maintenance costs	No inventory of assets. Record of past maint. costs	No inventory of assets. Record of past maint. costs	No inventory of assets. Record of past maint. costs	Yes Condition, past costs to some extent	Yes Condition, past costs to some extent	Yes New schemes	No. Prelim. collation as part of end of Scheme Report.	No, but one D C says yes with difficulty

## 6.5 Bay of Plenty Regional Council

Traditionally the Bay of Plenty Regional Council has borrowed to fund the local share needed for the construction of their river and flood protection schemes. Borrowing was particularly extensive for the Lower Kaituna River scheme. Interest rates are generally reviewable at 3 yearly intervals. With falling interest rates and with loans repaid, increased ratepayer funds are available to meet the maintenance needs, ie, with the rating level remaining constant.

For the Lower Kaituna, the expenditure on maintenance in real terms has been significantly increasing over the past eight years, Table A1 Appendix A. The analysis of recent maintenance, Tables A2 and A3 show the increase in spending has been in main channel works, with expenditure in all other activities being maintained.

For the Whakatane, Tables A4, A5 and A6, the expenditure on maintenance has increased, but the high expenditures on minor flood damage confuse the overall position. These high expenditures are a result of problems in maintaining control of the river channel in the middle reaches. The current poor state of the bank protection in the middle reaches is a direct result of insufficient maintenance of the protection works put in place during the 1960's and 1970's. The Regional Council has now gained acceptance from the scheme ratepayers, to the funding of catch up maintenance work. The work, estimated to cost \$1.76M, is programmed over three years starting in the 1994/95 financial year. Three loans will finance 85 % of the cost of the work. Many will see this "catch up maintenance work" as correcting some inadequacies in the original work.

For the Waioeka-Otara, Tables A7, A8 and A9, the expenditure in real terms on physical works has been sensibly constant, apart from an increase in spending on bank protection works in 1991/92. The increase was due to a spate of minor flood damage in 1990 and 1991. The annual programme of works involves pole planting, layering of willows and minor groyne work. As a result the Waioeka-Otara rivers are in control.

Considering the information available, and from all actions and reactions, there is no evidence that the Bay of Plenty Regional Council is not adequately and properly maintaining these three river control and flood protection schemes. The actions being taken are appropriate to maintain the assets to their full design intentions.

Appropriate policies are set to build up scheme reserves and a regional disaster fund. Scheme and regional disaster insurance are not favoured. After considering a number of disaster scenarios, Council has agreed to a \$2.1M combined regional disaster damage fund, targeted to be accumulated over 10 years. It has also adopted the procedures set out in section 716A of the Local Government Act to be used to introduce reserve funding for

disaster recovery purposes. This serves to bind Council to an annual reserve contribution.

## **6.6 Southland Regional Council**

In contrast to the Bay Of Plenty, Southland's funding of scheme capital works has been without recourse to loans. Ratepayers were at the time willing to pay cash rather than be involved in loans.

Catchment rating districts are set up for maintenance. These are essentially a club of all ratepayers in the catchment. The argument for all is that "your water is flowing down on us, and you should pay something to the problem even if it is only an indirect charge". The maintenance rate classification is reviewed regularly and depends upon the cost of the work being done. It covers all work including drainage and there is just the one rate charged. (Appendix 2 contains an example.) Established within each catchment is a scheme committee. These committees are working well. Scheme committees comment on the draft annual maintenance plan and budget, before this goes to Council.

The region operates a policy of direct property owner contributions for maintenance work. Land was not purchased for the stopbanks and floodways (fairways) and remains in individual ownership. (Note land was purchased on a willing buyer basis where the property was potentially disadvantaged by other or adjacent catchment works.) The maintenance policy is that "where scheme assets are not at risk, edge protection and bank work, is subsidised by the rating districts on the basis of:

- 25% for live protection,
- 50% for rock work,

and the local property owner pays the balance."

Some scheme liaison committees have asked for alternative percentage deals, and these are now being considered.

For all three schemes examined the catchment rate increased significantly in 1993/94. Note the contributions to other costs. Resulting from a policy decision on cost recovery, the full cost of drainage division and 58% of the river's section is now a charge against the scheme ratepayers.

The Oreti Catchment works commenced back in 1972 and include some recently completed work. The expenditure in real terms on physical maintenance work was at a very high level between 1986-89 and has only increased again over the past three years, Tables A10, A11 and A12. Much of the earlier maintenance work involved preventing regrowth within the cleared fairway of the Oreti River. With the problem under control by 1990, there was a policy change to a two year spray programme, and now this is moving to a spot spraying regime. Maintenance expenditure has remained



essentially constant over the past three years, and this is a significant recovery from the low level in 1990/91.

The year of 1990 saw the completion of the last scheme work on the Maitai River. In real terms the level of spending on maintenance physical work has been sensibly constant since then, Table A13. "Other costs" have risen significantly due to the cost recovery system now operating. Tables A14 and A15 show that apart from some minor flood damage in 1993/94 the work pattern and expenditure have been stable since 1990. There is a concern that some tributaries, on which no work was done, and were classified for indirect benefits are accumulating problems. No financial base exists to finance these new works. The need is seen to alter the classification in certain indirect class areas to an appropriate direct benefit class, that will enable future channel work to be carried out and financed by the rating district. This work is not maintenance.

The Invercargill City flood alleviation schemes were a direct consequence of the disastrous January 1984 floods. The detention dam on the Otepunui creek is the last section, and is currently under construction. Invercargill City paid the local share of the construction costs but opted out of directly providing funds for maintenance. Three years ago the Regional Council set up a separate maintenance rating district for these flood alleviation schemes. City ratepayers now pay a maintenance rate to the region. The City maintains the existing pumping stations. Maintenance expenditure first commenced in the 1992/93 year, Tables A16, A17 and A18. The big cost item is grass mowing of the stopbanks and floodway, undertaken four times per year. The maintenance history is too short to draw any conclusions as to the adequacy or otherwise of the scheme maintenance.

The 1993/94 and 1994/95 financial programmes include itemised "reserves". The estimates make provision for such items as replacing flood monitoring equipment on a five year basis, the mechanical cleaning of the channels on a ten year cycle, spartina grass spraying on a three year basis, and a structural maintenance reserve. This is in effect, an informal system of asset maintenance planning. A formal asset maintenance plan would set out the adequacies or otherwise of these itemised annual allocations.

From the examination of the maintenance programmes, there is no evidence that the Southland Regional Council is not maintaining the three schemes to their design intentions. Appropriate policies are set, and the actions are being taken.

Note: For both the Lower Oreti and Invercargill schemes, the period since construction has been completed is very short and the maintenance record is very short. One would expect, little, if any major maintenance problems to arise over this short time.

The Southland Regional Council has policies in place to establish both scheme reserves and a regional disaster reserve. While there have been

annual increases in the amounts in the scheme reserves, there has been no addition to the regional disaster fund for the past two years. A check should be made of the desirable level of local funds needed for the various regional disaster scenarios and annual contributions made as required to build the reserve funds to this level. A disaster insurance policy was taken out by the Catchment Board many years ago, when reserves were low and is still being continued. With the scheme reserves building up, it is questionable whether this amount of insurance is needed today. Any doubts would be removed by a Council forming a policy agreement to make any additions as required to the regional disaster fund.

Note: It has been suggested that an appropriate percentage of the total regional capital value of river control and flood protection schemes, could be used to set the level of the Regional Disaster Damage Reserve. This may not be appropriate. The best method is to do a series of scenarios of potential disasters and establish the likely total maximum cost of reinstatement for any event. The level of government assistance under the Recovery Plan for Natural Disasters and Emergencies can be determined and deducted and that sets the local share required to meet the disaster. An assessment must then be made as to how much of this local share must be immediately available, and how much can be borrowed from other Council reserve funds or externally.

## 6.7 Waikato Regional Council

The maintenance of the two river control and flood protection schemes considered in the Waikato region area show a direct contrast in approach and their management style.

The Waihou Valley scheme is not scheduled for full completion until 1997, but already there has been a steady build up in maintenance expenditure in the past eight years. A preliminary asset maintenance plan prepared in 1993 predicted an annual maintenance bill made up of:

Total monitoring	\$224,185
Total maintenance, physical work	\$1,609,057
Overheads	\$455,000
Total Waihou Valley scheme maintenance	\$2,288,242

Actual expenditure on physical work in 1993/94 was 43% of the above planned figure, Tables A19, A20, and A21.

Inspection and physical work costs have been costed separately, with the ratio of inspection costs to physical work being between 16% to 24%. From the maintenance plan the planned figure is 14%. A review of the preliminary asset maintenance plan suggests that the planned activities and assumptions have been arrived at by way of a pessimistic approach. The expectation is

that with the preparation of the final plan, both the monitoring and physical cost will be reduced.

Without doubt, and from the involvement of the WVS Technical Advisory Committee, the Waihou Valley scheme is being maintained to the full design standards. From the preliminary maintenance plan, the intention is that this will continue to be so.

The Lower Waikato river scheme is an older scheme, completed in 1983, and differs from all the other schemes considered, as management of parts of the maintenance work, including the rating is by the local territorial authorities. It thus forms an interesting comparison.

Construction of the scheme commenced in 1961 as a joint undertaking between the then Waikato Valley Authority and the various territorial councils (the former Counties of Franklin, Raglan and Waikato). The Waikato Valley Authority acted as the overall coordinating and planning agency for the scheme and was responsible for the design and construction of the "Community and Main Channel" works. The County Councils had responsibility for the design and construction of works within their respective territorial limits.

Since the completion of the scheme in 1983, maintenance of the works has been undertaken on the same basis except that with the local government reform, maintenance has fallen to the successors of the former organisations. With this division, the responsibility for the maintenance of the scheme is not at all clear, and is subject to the differing cultures and levels of concern that operate within the separate organisations.

During 1993, and directly because of concerns over the structural integrity and adequacy of maintenance practices, the Waikato Regional Council engaged consultants, Tonkin and Taylor to:

- Complete an audit of structural conditions and integrity of flood defences of the Lower Waikato Waipa Catchment Scheme north of Taupiri.
- Identify the adequacy of maintenance practices
- Develop a framework for rationalising maintenance practices and future expenditure.

While Tonkin and Taylor in their report of August 1993 concentrated on the structural stability of the stopbanks under flood and earthquake conditions, they did a general review the maintenance condition of the stopbanks, pump stations and flood gates. The main points are as follows:

**Stopbanks.** While the 150km of stopbanks surveyed were generally in a sound reliable condition with an overall good standard of maintenance, a



number of areas or items were identified as needing attention. Those items with ratings of "poor to very poor" comprised 0.4% of all stopbank items assessed. The majority (some 75%) of the poor to very poor ratings concerned poor grass cover and or erosion and the presence of trees and roots on the stopbanks.

Pump Stations. In all, 18 pump stations were identified as being in poor to very poor condition.

Floodgates. Ten major flood gates were identified as being in poor to very poor condition and requiring attention.

Drawing from the Tonkin and Taylor report, while the overall condition of stopbanks, pump stations and flood gates is still generally sound, there are items that require maintenance upgrading. The understanding is that most of the stopbanks, pumps and flood gates are currently being maintained by the local farmers who lease the land. The extent of maintenance carried out by leaseholders is unknown, but for the stopbanks little maintenance is needed, provided care is taken when stock are allowed to graze the stopbanks. District Councils undertake the clearing of vegetation from the drains. The Waikato District regularly checks on flood gates and pumps and has an annual reporting system on the condition and performance of pumps. Franklin District does a brief monthly pump inspection and approximately four monthly inspections of the flood gates. The Waikato Regional Council maintains three control gates.

The presence of a significant number of areas and features rated by the consultants as being in "poor to very poor" condition raises doubts as to the overall standard of maintenance of the Lower Waikato flood scheme. The absence of extreme flooding conditions in the catchment during the past 25 years appears to have created a false sense of security. This complacency exists among the beneficiaries of the scheme, the ratepayers in particular, and within the councils themselves. The fact that significant floods, in 1986 and 1991, have been routed through the river system without problem has encouraged this complacency.

The consultant's reports "of ploughing of stopbanks, denial of council access to inspect work, and the poor condition of some point defences", raises doubts as to the appropriateness of the existing divisions of responsibility in the organising, undertaking and management of the maintenance. If this divided responsibility for maintenance were to continue, then there is a need to define the management and maintenance roles and responsibilities of the leaseholders, the District Councils and the Waikato Regional Council. A recent, 1994 decision of the Waikato District Council that its staff cooperate with the Waikato Regional Council in the hand over of full management in respect of stopbanks indicates that progress is at last being made.

In the 1960's the Lower Waikato was seen as a river of national and local importance. In terms of the deed that was renegotiated in 1977, "the minister

will pay the Authority the full cost of construction and maintenance of the main channel works in the third schedule..." . There is no extinguishing date for this requirement for the taxpayer to provide the main channel maintenance funding. According to the Ministry for the Environment, funding will cease when the loan which is covered in the Deed is paid off in 2003.

Since 1988, \$90,000 to \$100,000 per annum has been funded via the Ministry for the Environment, for maintenance of the main channel. These funds are used for groyne maintenance, clearing of vegetation on islands, banks and berms. Whether \$90,000 is an appropriate level of funding is not clear. This is a good example why there is a need for an asset maintenance plan.

A 30 cent share of the sand extraction fee in terms of the same deed is used for repayment of loan outstanding for the local share of the scheme. This repayment will be completed by March 2003. The balance of the sand extraction fee, presently 50 cents, is applied in terms of the deed to "the management of the sand resource and for planning within the Authority's area as a whole." Part of this balance is used for main channel surveys and inspections.

A further agreement, relating to the Tongariro Offset Works in the Lower Waikato expires in the year 2000. This agreement covers channel and drainage works required in the Lower Waikato as a result of diversions of water from the Tongariro power project. Electricorp provides funding as and when required and agreed. Electricorp's contribution is discretionary.

Because of the local government reorganisation of 1989, it was not possible to gain early maintenance cost information for the Lower Waikato scheme. Further with the number of parties involved, the reliability and completeness of later information is itself open to doubt. Table A22, gives the combined funding and expenditure figures and is included mainly for completeness. Deducting loan repayments, the total maintenance expenditure for the 1993/94 year was \$596,000, of which only \$184,000 was for physical work. This ratio is very low. The Waikato Regional Council state that there is a large requirement to monitor the cross section of the main channel of the Waikato River to confirm that the design capacity of the channel is being maintained. Inspection costs also include routine servicing and lubrication of community floodgates.

Table A23, give the Regional Council funding and expenditure on main channel and community works. Note the existence of the government subsidy for maintenance work referred to previously, the input of regional rates and the sand extraction fee contribution to loan repayments and to "management of the sand resource". The resource user's contribution is gained from Electricorp. Apart from the Tongariro Offset Works that are met as they arise, the expenditure on physical works has been around \$50,000 each year for the past three years.

Table A24, give the funding and expenditure by the Franklin District Council. This council spending on maintenance is not very much.

Table A25, gives the same information from the Waikato District Council. Expenditure on works increased over the past two years, but drainage is seen as the poor relation within council in comparison with its other activities.

Table A26, gives the same information for drainage works in the Mangawara River valley. Maintenance spending on physical work increased significantly, and yet scheme rates have fallen.

In summary with the divided responsibility that presently exists, and the differing objectives and priorities of the three parties involved, it is not at all surprising that the "Tonkin and Taylor" report uncovered serious maintenance deficiencies in the Lower Waikato river scheme.

It is recommended That the Waikato Regional Council, as the overall organisation responsible in terms of the Deed and with its responsibilities under the Soil Conservation and Rivers Control Act 1941, confirm its intention to establish a system for adequate and sustainable maintenance of the Lower Waikato flood protection scheme.

It is recommended that the Ministry for the Environment become involved and support the Waikato Regional Council to establish a system for adequate and sustainable maintenance of the Lower Waikato flood protection scheme.

## 7 ASSET MANAGEMENT (MAINTENANCE) PLANS

Important "key factors" need to be decided prior to the preparation of an asset management (maintenance) plan. These are the issues and policies that need to be set before the plan can be developed. As an example the Waikato Regional Council's Regional Asset Management Strategy has been developed by that Council as the forerunner of their proposed asset management plans.

The following in "note form" sets out a check list of the key factors that require consideration in the preparation of a maintenance plan for river control and flood protection schemes.

### 7.1 Key Factors

**Attitudes** - set the emphasis given to maintenance of the scheme assets. Does maintenance have first priority for funding? Establish the "culture of the Council" towards maintenance.

**Responsibility** - set out the legal requirements for continued maintenance and establish where the responsibility lies in the event of a failure or disaster that may be attributable to inadequate maintenance.

**Standards** - set a policy to continue to maintain the scheme at 100% or at some lesser standard? The public participation processes that will be worked through to agree to any standard change need definition. Have to allow for depreciation of assets if maintenance is to be less than 100%.

**Maintenance** - make the distinction between what is routine, periodic and deferred maintenance, and what is capital work that is being done to raise the standard of the scheme.

**Funding** - establish who pays? If "user pays" policy is to apply, identify who are the beneficiaries of the continuing maintenance of the scheme. This may mean establishing a fresh rating classification for the maintenance work. The rating impact of the maintenance classification may be different from that used for the construction. A fresh rating classification should be considered, when all the original capital costs, including loan repayments, have been met.

**Affordability** - in terms of the on the property benefits received, versus what the property is paying to continue to maintain the scheme.

**Consistency of rating level** - maintenance funding levels should be "smoothed" to achieve a rating level that is sensibly constant in real terms. Set the desired level for the annual carryover of funds.

Off property benefits - Establish the extent of the "off property" benefits, both regional and nationally and hence the level of the regional and national contributions that should be made towards the maintenance of the scheme?

Replacement maintenance strategy - at what times will it be necessary to replace items or rebuild the capital works?

Specific item replacement policy - how is the cost of replacement of major items to be met? By an annual carry over of funds, special replacement funds, loans, or ratepayer funding at the time of the event? The aim should be to achieve an equitable distribution of costs between generations. As an example of the variation in expenditure, Figure 1 shows the draft Asset Maintenance Funding Distribution for the Waihou Valley Scheme. A policy is needed as to how to fund the peak expenditures.

Direct costs - what costs are solely a flood protection/drainage function and hence a charge to the scheme?

Indirect costs - what costs independent from the presence of, and the need to maintain the scheme? Keep separate the indirect costs that continue whether the scheme is being maintained or not?

Carry over of maintenance funds - set targets and/or limits on maintenance funds that may be carried forward in the maintenance account? Establish holding accounts for replacement items or periodic maintenance items. Is interest paid to these funds?

Over expenditure - if this happens are regional funds available to meet any maintenance over spending in a particular year due to unplanned or exceptional maintenance?

Means of service delivery - how is the maintenance work to be done? Should the work be delegated or contracted out? Should the day to day inspection and monitoring be made the responsibility of the beneficiaries, ie the local ratepayer?

Dedicated scheme disaster reserves - what risks are covered by the regional disaster fund and what by the scheme? What is the acceptable risk level, and hence the level of funding needed? When and how is the scheme disaster fund to be used? Is interest paid?

Shingle, sand extraction fee - how is this to be used?

Regional disaster assistance - is this to be provided by a dedicated regional fund and or insurance. Establish risk level by a series of disaster scenarios and hence the amount of financial protection

## WVS Maintenance

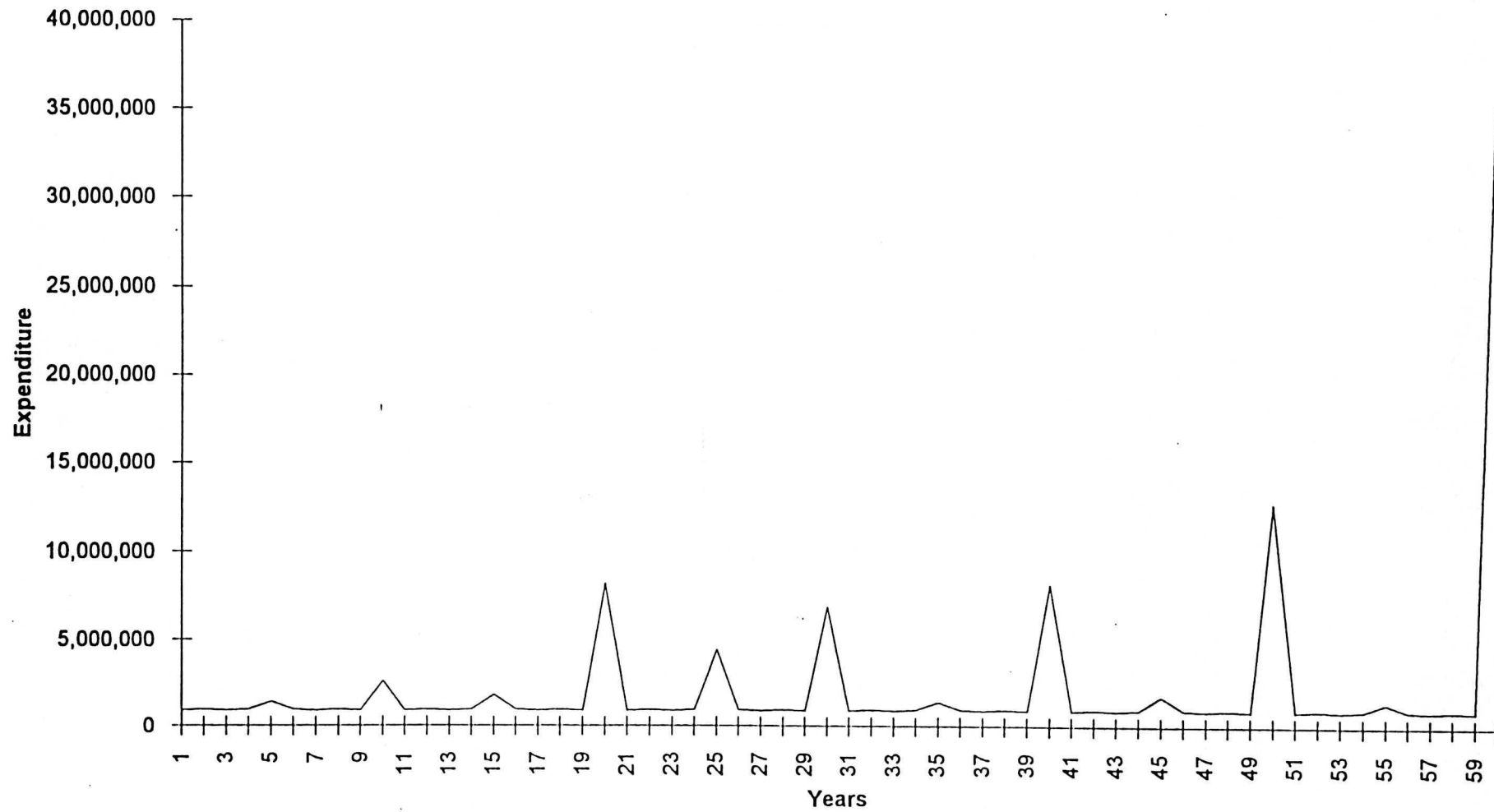


FIGURE 1

WAIHOU VALLEY SCHEME - ASSET MANAGEMENT FUNDING DISTRIBUTION

required. Establish a policy as to repayment conditions to the regional disaster fund following a draw off by an individual scheme,

Government disaster assistance - confirm the rules and their continuance, particularly the level of assistance and permanence of this support.

Set formal review periods, say every 3 years, for formally reviewing the asset maintenance plan.

## **7.2 Inventory of Assets**

Records - establish details of the location, age, condition and service history of each asset. The records include the full maintenance history, and details of the maintenance expenditure over the past five years.

Future - maintain and review, the updated end of life predictions and optimised replacement cost for major items.

Deferred maintenance - make assessments of the level of deferred maintenance for each major item. This includes the cost of bringing the asset up to the agreed standard of service.

Periodic maintenance - make an itemised assessment of the level of periodic maintenance expenditure, how much and when.

## **7.3 Standards of Service**

Realism - check that realistic performance standards are set eg. floodway sprayed on a 3 year cycle, water in drains maintained at 0.5 metres below ground level. Ensure that standards set are not too conservative, ie check that the maintenance work is not being done too soon, or is not achieving the maximum economic life from the asset, or there is a existence of "gold plating".

Inspection frequency - Set the inspection and monitoring frequencies. Decide whether the more routine inspections can be handled locally by those who directly rely on the protection being available, eg the local farmer.

Risk - Make a risk assessment of the consequence from a failure for each item. From this establish a priority for maintenance.

## **7.4 Asset Maintenance Work Planning**

Options - consider the options available for the continuing maintenance of the asset, eg. consider any possible disposal or transfer of assets, or transfer to a community basis of control.



**TABLE 5**

Monitoring Programme. (From the Waihou Valley scheme with amendments)

Reach or section	Work	Frequency years	Supervision/ Design days	Cost	Labour hours	Cost	Other costs, vehicles contracts etc	Total Cost	Annual Cost
20km - 29.6 km									
Channel	Overview	1	1	300			30	330	330
	Cross-section survey	10	2	600			1800	2400	240
Stopbank	Inspection	1	2	600			60	660	660
	Survey	10	3	900			2000	230	223
Flood gate	Operating check	monthly			4	100	20	120	1440
	Annual inspection	1			8	200	40	240	240
Pump station	Operating check	monthly			4	100	20	120	1440
	Annual inspection	1			12	300	100	400	400
Sub total									

## Work Programme

Reach or section	Work	Frequency years	Supervision/ Design days	Cost	Labour hours	Cost	Other costs, vehicles contracts etc	Total Cost	Annual Cost
20km - 29.6 km									
Channel	Berm	1	1	300	16	400	700	1400	1400
	Erosion protection	As reqd. Say 5 yearly	5	1500			25000	26500	5000
	Channel excavation	10	10	3000			50000	53000	5300
Stopbank	Toe drain	1	1	300	20	500	1200	2000	2000
	Miscellaneous	1	1	300	40	1000	3000	4300	4300

## Long Term and Capital Replacement Items (frequency greater than 10 years)

Reach or section	Work	Frequency years	Supervision/ Design days	Cost	Labour hours	Cost	Other costs, vehicles contracts etc	Total Cost	Annual Cost
20km - 29.6 km									
	Stopbank reconstruction	25						250000	10000
	Replace pump units	20						70000	3500
	Flood gate ancillary	20						10000	500
	Replace flood gate structure	70						70000	1000



**TABLE 6** Maintenance Programme (an example)

Scheme.....

Years 1994 to 1997

**MAINTENANCE OF WORKS**

Costs are in \$1000

REACH..... ..... Work item	Priority 1=high 2=med 3=low	Est. optimised replacement cost	Est. design life remaining years	Av. maint. Cost, for each of last three years	Est. cost of any maintenance backlog	Exp. program 1994/95	Exp. program 1995/96	Exp. program 1996/97	Comment on item
Berm maintenance	1	n/a	n/a	10.2	0	4.0	4.0	4.0	
Channel excavation	2	n/a	n/a	0	12		15		
Murphy's floodgate	1	100	5	5	10	15			Replace floodgate in 1999
Patrick's pump station	3	400	10	20	0	1	1	15	Switch and electrical replacement in 1996
Total									

A replacement/periodic works programme may be needed, especially if these items are to be funded separately. Inspection and monitoring costs plus any direct and indirect costs should be shown separately as total costs.

**INSPECTION and OTHER COSTS**

Item	1994/95	1995/96	1996/97	Comments
Inspection				
Direct costs of river drainage section				
Flood warning				
Valuation New Zealand				
Scheme disaster reserve				
Contribution to replacement/periodic works				
Overheads? Specify if charged				
Total				

## **8 SOME RELATED ISSUES**

### **8.1 Maintenance versus Capital Works**

One particular problem encountered in comparing annual maintenance costs is making the distinction between maintenance and capital works. When is the work improving the standard of the work, or is just maintaining it? For some schemes so called "Capital replacement reserves" have been established out of maintenance funds for the replacement of items. Usually the new work or equipment will perform better and be to a higher standard than what existed. There is a need to recognise separately both the capital and maintenance contributions in the work. They may be funded from different sources.

### **8.2 Land Maintenance and Leases**

Regional Councils on behalf of their ratepayers manage land holdings purchased as part of the river control and flood protection schemes. This land is leased out, generally for farming purposes. The income is utilised to pay for any capital or maintenance costs associated with the land management, and the costs of administration of the leases. The surplus, excess of income over expenditure should be used for:

- Loan repayments relating to the purchase of the land or the scheme work.
- Maintenance of the scheme
- New capital works relating to the scheme.

Lease income should not be used to offset increases in the general rate. The general ratepayer did not contribute to the cost of the land. Invariably the scheme ratepayer and the taxpayer met the purchase cost.

A separate asset management plan is required for the leased land holdings and this should be kept entirely separate from that for the maintenance of the scheme. Only the excess of income over expenditure should appear as a payment in the asset maintenance programme for the scheme.

### **8.3 Scheme Rating**

The classification of land under the Soil Conservation and Rivers Control Act 1941 and the River Boards Act 1908 has been repealed and replaced by a system of differential rating as allowed under the Rating Powers Act 1988. The Rating Powers Act does not give Councils power to amend the classification lists inherited from the former Catchment Authorities. The new provisions, allow the retention of most of the principles used to establish classification rating but require the introduction of a differential system of rating and change the method of dealing with any disputes that may arise.

The Southland Regional Council has developed a simple classification of benefit for maintenance purposes using a computer programme for adjusting the rating impact based on the expenditure and benefits received by each class. This has been accepted by their ratepayers. The work sheets are included in Appendix B.

#### **8.4 Ratepayer and Community Liaison**

The Southland Regional Council has a policy, to encourage the formation and maintenance of catchment Liaison Committees, consisting of ratepayers evenly distributed throughout the major river catchments. Council meets formally with each Liaison Committee, on at least an annual basis, to receive expressions of opinion and to give such explanations as may be requested. Each Liaison Committee holds an annual general meeting of catchment ratepayers. The meeting is publicly advertised, and an election by ratepayers is held to appoint membership on the committee. Funding to service the Liaison Committee is from the scheme rates. Liaison Committees are given the opportunity to consider and comment on the draft annual budget before it is approved by Council.

Within the rural scene in Southland, there appears to be a good relationship established between the scheme beneficiaries and Council. Council works with the farmers and farmers see the scheme as their scheme. Much of the monitoring and minor maintenance is handled by farmers, and now the Southland Regional Council is preparing a protocol for farmers setting out their responsibilities in a, "Code of Practice for the Maintenance of Stopbanks".

To date there has been no effective input or participation from scheme ratepayers and beneficiaries in Invercargill City into the management and maintenance of the various Invercargill flood control schemes. These schemes have just been completed, but a form of community liaison should now be established.

The Bay of Plenty region does not operate a system of formal liaison. The Rangitaiki Drainage Committee has been abolished. This committee created too many problems and tried to operate independently. Instead there are key scheme liaison people, appointed by Council and reported in the local papers. These are the key contacts and the system generally works well. A local caretaker system operates for such items as flood gates and pumps. Communal pumps are "maintained" by a dedicated farmer who is paid an annual fee set by the pumping area ratepayers. For a payment of about \$500 to \$750 a year, the pumps are given operating checks and the screens are kept clear. The flood warning manual also lists key property owners/occupiers for each scheme. They are contacted as part of the early warning system during flood events. They also contact their neighbours

On the Waihou Valley scheme, there has been until recently, little if any input or involvement from the scheme beneficiaries. Unfortunately many

beneficiaries/ratepayers see the scheme as either a regional or government scheme in which they have no involvement. The general impression gained from discussion with ratepayers is they "do not see it as their scheme". The Waikato Regional Council is making moves to correct the situation it inherited. Meetings are held annually with Federated Farmers, District Councils, and other key interested groups in regard to annual work programmes. A Southland style catchment liaison committee may be appropriate.

With the confused management responsibilities of the Lower Waikato scheme there can be little input from the scheme ratepayers with regard to the performance or the maintenance programme. This seems to be supported by the questionably high inspection and monitoring costs.

## 9 CONCLUSIONS

Within the Bay of Plenty, and Southland regions, all the evidence supports the view that the financial input into maintenance of river control and flood protection schemes is being maintained or has been increased during the past four years. The questionnaire and interview responses from staff and politicians were all positive towards maintenance of the schemes. Both Councils have established policies providing for both scheme reserves and regional disaster reserves. The available evidence all supports the conclusion that the schemes are being fully maintained. The conclusions being drawn, are however based on a simplistic approach which is suspect. Absolute certainty in respect to maintenance standards for any of these schemes would require a more detailed review, and would include a physical inspection.

Within the Waikato region, maintenance of the Waihou Valley scheme is being kept to standard. The fact that construction work is still not complete and the work, including the maintenance, has been subject to detail scrutiny by a Technical Advisory Committee over the past four years allows this assurance to be given.

For the Lower Waikato Waipa catchment scheme north of Taupiri the maintenance position is of some concern. The Waikato Regional Council have taken the initiative in the use of a consultant to undertake a structural audit of the scheme. Based on the recent consultant's report, some parts of this scheme need urgent work to bring them up to standard. The present confused funding arrangements and divided responsibilities for maintenance are proving to be an obstacle to an integrated flood scheme maintenance programme. Responsibility must rest with one authority, the Waikato Regional Council, and this Council must have a commitment to adequately fund and maintain the scheme.

The need for better planning of river control and flood scheme maintenance has been accepted by all three Regional Councils. Longer term, greater than one year maintenance, is currently being managed on an informal basis. Various reserve funds are being established. The production and use of scheme asset maintenance plans will formalise the provisions for future maintenance. There is a need for some consistency in the regional approach to the production of scheme asset maintenance plans. The Ministry for the Environment could provide an important role in coordinating and facilitating this approach.

## ACKNOWLEDGEMENT

This review project was undertaken with the assistance of the staff of the Bay of Plenty, Southland and Waikato Regional Councils.

Thanks are due to staff for making time available to complete the questionnaire, and particularly providing the financial information for the past eight years.

Staff made a further time commitment during the interview process.

Reviewing of the draft and checking of the funding and expenditure tables was again undertaken by staff of the regions and of the Ministry for the Environment. My special thanks are due to those who contributed and made corrections and suggestions on the draft that resulted in improvements in the final report.

The assistance of all is acknowledged with thanks.

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TABLE A1

## Lower Kaituna River Scheme, Funding and Expenditure

Year	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000								
Govt. subsidy	3064	2503	1908	980	1010	380		
Regional rates								
Scheme rates	407	436	440	508	551	652	681	644
Regional contributions	129	32	31	20	22	10	24	20
Royalties and rentals								
Resource users levies								
Capital accum. funds								
Loans	134	185	268	288	311	177	215	370
Interest	4							
Total	3738	3156	2647	1796	1894	1219	920	1034

Expenditure History, adjusted to December 1993 values. Costs are in \$1000								
Loan repayments	273	284	396	465	441	495	534	417
Capital works	3573	2960	2079	1285	1103	600	336	449
Maintenance								
1 Inspection	Not recorded separately							
2 Physical work	19	33	135	154	176	147	188	222
Contribution to								
overheads	Incl. in charge out rate, with charges for rate collection, bad debts etc.							
Other costs								
Contribution to reserves								25
Total	3865	3277	2610	1904	1720	1242	1058	1113



**TABLE A2****Lower Kaituna River Scheme****Estimated Proportion of Maintenance Expenditure Spent On**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Routine maintenance incl inspection & monitoring	169.9	100	141.2	100	183.5	100	222	90
Minor flood damage		0		0		0		0
Major flood damage								
Replacement								
Contribution to o/heads								
Contribution to reserves							25	10
Other								
<b>TOTAL</b>	<b>169.9</b>		<b>141.2</b>		<b>183.5</b>		<b>247</b>	

**TABLE A3****Recent Maintenance Expenditure Classified by Assets**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works	68	40	44	31	83.5	46	109.2	50
Stopbanks								
Flood gates	5	3	4	3	5	3	5	2
Pump stations	32	19	27	19	20	11	20	9
Upper river channels							20	9
Drainage canals	40	24	42	30	50	27	40	18
Overheads	24	14	24	17	25	14	25.8	12
<b>SUB TOTAL</b>	<b>169</b>	<b>100</b>	<b>141</b>	<b>100</b>	<b>183.5</b>	<b>100</b>	<b>220</b>	<b>100</b>
Contribution to reserves							25	
<b>TOTAL</b>	<b>169</b>		<b>141</b>		<b>183.5</b>		<b>245</b>	

Overheads include insurance, rate remission and commission, Valuation New Zealand charges computer charge, radio charge.

TABLE A4

## Whakatane River Scheme, Funding and Expenditure

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000								
Govt. subsidy	163	258	191	270	153	148		
Regional rates								
Scheme rates	267	286	391	387	324	323	329	343
Regional contributions	5			31		9	13	
Royalties and rentals	29	28	22	42	34	31	34	
Resource users levies								
Capital accum. funds								
Loans			128	122	83			
Interest								
Total	464	572	732	852	594	511	376	343

Expenditure History, adjusted to December 1993 values. Costs are in \$1000								
Loan repayments	91	80	76	133	100	132	129	112
Capital works	261	422	338	480	202	156	12	
Maintenance								
1 Inspection	Not recorded separately							
2 Physical work	115	102	125	252	228	162	269	239
Contribution to overheads	Incl. in charge out rate, with charges for rate collection, bad debts etc.							
Other costs								
Contribution to reserves								25
Total	467	604	539	865	530	450	410	376

**TABLE A5****Whakatane River Scheme****Estimated Proportion of Maintenance Expenditure Spent On**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Routine maintenance incl inspection & monitoring	34.3	16	36.5	23	152	58	179	68
Minor flood damage	186	84	120	77	110	42	60	23
Major flood damage								
Replacement								
Contribution to o/heads								
Contribution to reserves							25	9
Other								
TOTAL	220.3		156.5		262		264	

**TABLE A6****Recent Maintenance Expenditure Classified by Assets**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works								
Stopbanks								
Flood gates	1.5	1	0	0	2	1	2	1
Pump stations	10	5	14	9	12	5	16	7
Training works and bank protection works	186	84	112	72	182	69	152	63
Layering/planting	2.8	1	6.5	4	40	15	42	17
Overheads	20	9	24	15	26	10	29.6	12
SUB TOTAL	220.3	100	156.5	100	262	100	241.6	100
Contribution to reserves							25	
TOTAL	220.3		156.5		262		266.6	

Stopbanks have been recently upgraded

Overheads include insurance, rate remission and commission, Valuation New Zealand charges computer charge, radio charge.

TABLE A7

## Waioeka Otara River Scheme, Funding and Expenditure

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000								
Govt. subsidy				49	255	303		
Regional rates								
Scheme rates				246	362	275	276	285
Regional contributions							1	
Royalties and rentals								
Resource users levies								
Capital accum. funds								
Loans								
Interest								
Total	0	0	0	295	617	578	277	305

Expenditure History, adjusted to December 1993 values. Costs are in \$1000								
Loan repayments				39	83	81	78	64
Capital works					395	518	236	139
Maintenance								
1 Inspection	Not recorded separately							
2 Physical work				95	95	131	112	103
Contribution to overheads	Incl. in charge out rate, with charges for rate collection, bad debts etc.							
Other costs								
Contribution to reserves								12
Total	0	0	0	134	573	730	426	318

TABLE A8

## Waioeka - Otara Scheme

## Estimated Proportion of Maintenance Expenditure Spent On

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Routine maintenance incl inspection & monitoring	42	46	86.2	68	108.8	100	102.8	89
Minor flood damage	50	54	40	32	0	0	0	0
Major flood damage								
Replacement								
Contribution to o/heads								
Contribution to reserves							12.2	
Other								
TOTAL	92		126.2		108.8		115	

TABLE A9

## Recent Maintenance Expenditure Classified by Assets

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works								
Stopbanks								
Flood gates	3	3	2	2	5.2	5	5	5
Pump stations	0	0	0	0	5.2	5	5	5
Bank protection works	50	54	60	48	20	18	18	18
Upper river channels								
Layering/planting	31	34	45	36	56	52	54	53
Spraying			10	8	12	11	10	10
Overheads	8	9	9	7	10	9	10	10
SUB TOTAL	92	100	126	100	108.4	100	102	100
Contribution to reserves							12.2	
TOTAL	92		126		108.4		114.2	

Stopbanks have been upgraded 4 to 5 years ago as part of the review

Overheads include insurance, rate remission and commission, Valuation New Zealand charges computer charge, radio charge.

TABLE A10

## Oreti River Scheme, Funding and Expenditure

Year	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000								
Govt. subsidy	158	893	630	1710	1942	2439	423	
Regional rates								
Catchment rate*	326	276	273	270	363	295	308	361
Direct								
contributions	0	197	111	427	405	493	425	177
Royalties and								
rentals								
Resource users								
levies								
Capital accum.								
funds								
Loans	0	0	0	0	0	0	0	0
Other								
Total	484	1366	1014	2407	2710	3227	1156	538

\* \$53,200 brought forward from 1985/86

Expenditure History, adjusted to December 1993 values. Costs are in \$1000								
Loan repayments#	0	0	0	0	0	0	65	65
Capital works	0	938	660	2330	2723	3388	605	0
Maintenance								
1 Inspection	Not recorded separately							
2 Physical work	294	444	312	145	135	229	218	242
Contribution to								
overheads	Nil until 1993/94 when direct overheads were incl. under Other costs							
Other costs *	58	57	38	36	36	12	13	91
Contribution to								
reserves			16	11	13	10	10	5
Total	352	1439	1026	2522	2907	3639	911	403

\* Balance of catchment rating district expenditure insurance, valuation, flood warning and the cost recovery of river and drainage staff commenced 1993/94

# Regional Council is carrying the debt on local share outstanding, will quit in 1996

**TABLE A11****Oreti River Scheme****Estimated Proportion of Maintenance Expenditure Spent On**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Inspection & monitoring						1		2
Routine maintenance*		93		95		94		86
Minor flood damage								10
Major flood damage								
Replacement								
Contribution to o/heads								
Contribution to reserves		7		5		5		2
Other								
TOTAL		100		100		100		100

\* Routine maintenance includes flood damage insurance, flood warning/monitoring

**TABLE A12****Recent Maintenance Expenditure Classified by Assets**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works	34.5	21	36.1	16	45	21	64	25
Stopbanks							24	9
Floodway veg. ctrl.	78.4	49	79	36	80	36	73.7	29
Drainage	48	30	105	48	87.5	40	80.6	32
Flood warning					4.5	2	7.9	3
Overheads*					2.5	1	2.5	1
SUB TOTAL	160.9	100	220.1	100	219.5	100	252.7	100
Insurance					6		20.7	
Contribution to reserves	13		10		10		5	
TOTAL	173.9		230.1		235.5		278.4	

\* Valuation and consent charges

Recovery of the direct costs of river and drainage section was \$64,600 but is not included.



TABLE A13

## Mataura River Scheme, Funding and Expenditure

Year	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	1233	1085	856	460				
Regional rate								
Catchment rate	349	365	345	328	474	390	390	459 #
Regional contributions								
Direct contributions	119	105	68					
Resource users levies								
Capital accum. funds								
Loans	0	0	0					
Interest								
Total	1701	1555	1269	788	474	390	390	459

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments								
Capital works	1644	1467	1154	613				
Maintenance								
1 Inspection	Not recorded separately							
2 Physical work	26	60	57	72	371	337	333	395
Contribution to overheads	Nil until 1993/94 when direct overheads were incl. under Other costs							
Other costs *	31	28	26	64	71	33	37	108
Contribution to reserves				39	31	21	21	20
Total	1701	1555	1237	788	473	391	391	523

# Capital work expenditure covered some maintenance up until completion of scheme 1990

\* Balance of catchment rating district expenditure, incl. insurance, valuation, flood warning and the cost recovery of river and drainage staff commenced 1993/94

^ 1993/94 forecast over expenditure

**TABLE A14****Mataura River Scheme****Estimated Proportion of Maintenance Expenditure Spent On**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Inspection & monitoring		1		1		1		1
Routine maintenance		92		94		94		76
Minor flood damage								18
Major flood damage								
Replacement								
Contribution to o/heads								
Contribution to reserves		7		5		5		5
Other								
TOTAL		100		100		100		100

**TABLE A15****Recent Maintenance Expenditure Classified by Assets**

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works	251.9	70	186	57	181	53	248.3	60
Stopbanks								0
Floodway veg. ctrl.	72	20	88	27	85	25	87.5	21
Drainage	33.8	9	49.5	15	58.3	17	59	14
Flood warning					16	5	21.8	5
Overheads*								
SUB TOTAL	357.7	100	323.5	100	340.3	100	416.6	100
Insurance					15		15	
Contribution to reserves	31		21		21		20	
TOTAL	388.7		344.5		376.3		451.6	

\*Recovery of the direct costs of river and drainage section was \$68,920 but is not included in the above figures.

TABLE A16

## Invercargill City Flood Alleviation Scheme, Funding and Expenditure

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	0	1030	2872	5052	2868	754	169	
Regional rates								
Maint. rate	0	0	0	0	0	0	183	178
Direct ICC								
contributions		117	1282	2637	1399	761	150	
Royalties and								
rentals								
Resource users								
levies								
Capital accum.								
funds								
Loans								
Interest								
Total		1147	4154	7689	4267	1515	502	178

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	0	0	0	0	0	0	0	0
Capital works		671	1184	7050	4127	1329	7	314
Maintenance								
1 Inspection	Not recorded separately							
2 Physical work	0	0	0	0	0	0	132	118
Contribution to								
overheads	Incl. in charge out rate, with charges for rate collection, bad debts etc.							
Land purch.		476	2971	639	140	186	313	307
Contribution to								18.5
reserves								
Total	0	1147	4155	7689	4267	1515	452	757.5

Credit balances retained within the maintenance rating district for 1992/93 and 1993/94 \$49581 and \$41598. These credit balances are retained for works required in the 5 -10 year cycle, channel clearing, spartina grass spraying.

**TABLE A17**

## Invercargill City Flood Alleviation Scheme

## Estimated Proportion of Maintenance Expenditure Spent On

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Inspection & monitoring#						16		18
Routine maintenance*						77		65
Minor flood damage								
Major flood damage								
Replacement								
Contribution to o/heads						7		4
Contribution to reserves						0		13
Other								
TOTAL						100		100

# Includes minor maintenance work that can be handled during the inspection.

\* Routine maintenance includes flood damage insurance, flood warning/monitoring but does not include maintenance funds set aside for works reqd. 5-10 yearly.

**TABLE A18**

## Recent Maintenance Expenditure Classified by Assets

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works					6.2	8	13.8	17
Stopbanks					55.3	68	50.4	62
Flood gates/culverts					1.8	2	1.5	2
Dams						0	1.2	1
Flood warning					9.2	11	8	10
Overheads					9.4	11	6.6	8
Other costs*								0
SUB TOTAL	0		0		81.9	100	81.5	100
Disaster Insurance					35		13.5	
Contribution to reserves					0		18.5	
TOTAL	0		0		116.9		113.5	

\* Valuation and consent charges. Recovery of direct costs of operations river section was \$21398 for 1993/94. but is not included.

TABLE A19

## Waihou Valley Scheme, Funding and Expenditure

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	3496	3328	4656	5536	4982	5272	5175	4606
Regional rates	Not specified -provision of overhead charges till 1992						250	427
Scheme rates *	1626	1821	1870	2367	1976	2123	2112	2085
Direct								
contributions					138	201	198	170
Royalties and								
rentals	?	?	?	?	176	148	169	186
Resource users								
levies								
Capital accum.								
funds								
Loans	1172	1111	1553	1846	1662	1783	1725	1535
Interest								
Total	6294	6260	8079	9749	8934	9527	9629	9009

\* In 1990/91, 10% maintenance surcharge applied to rate as maintenance subsidy eliminated

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	1220	1366	1403	1776	1347	1447	1439	948
Capital works	4796	4441	6212	7383	6645	7079	6515	5830
Maintenance								
1 Inspection	109	123	87	121	113	141	131	113
2 Physical work	327	370	262	363	597	588	585	685
Contribution to								
overheads#	0	0	0	0	0	0	964	1035
Other costs								
Contribution to								
reserves					-124	664	386	400
Total	6452	6300	7964	9643	8578	9919	10020	9011

# 1992/93 formula for engineering fees, 75% of engineering and overheads claimed

**TABLE A20**

## Waihou Valley Scheme

## Estimated Proportion of Maintenance Expenditure Spent On

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Inspection & monitoring	109	16	135	19	128	16	113	12
Routine maintenance	575	84	565	81	570	70	685	70
Minor flood damage*								
Major flood damage								
Replacement								
Contribution to o/heads	NA		NA		115	14	176	18
Contribution to reserves								
Other								
TOTAL	684	100	700	100	813	100	974	100

\* No actual expenditure, \$50,000 per year budgetted for transferred to scheme reserve.

**TABLE A21**

## Recent Maintenance Expenditure Classified by Assets

	1990/91		1991/92		1992/93		1993/94	
	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Main channel works	150	20	156	21	127	17	152	18
Stopbanks	118	16	198	26	205	28	196	23
Flood gates/culverts	146	20	113	15	106	15	205	24
Pump stations	23	3	18	2	18	2	32	4
Upper river channels	205	28	176	23	174	24	184	22
Soil conservation works	90	12	88	12	98	13	79	9
SUB TOTAL	732	100	749	100	728	100	848	100
Contribution to reserves					?		?	
TOTAL	732		749		728		848	

TABLE A22

Lower Waikato River Scheme, Funding and Expenditure  
All Authorities, - All Works

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	n/a	134	93	128	113	94	89	90
Regional rates	n/a	n/a	n/a	n/a	n/a	107	304	144
Scheme rates	n/a	n/a	n/a	n/a	n/a	191	189	195
Royalties and								
rentals	n/a	n/a	n/a	n/a	n/a	82	198	323
Resource users								
contribution	n/a	n/a	n/a	n/a	n/a	37	133	7
Capital accum.								
funds								
Loans								
Interest								
Total		134	93	128	113	511	913	759

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	n/a	n/a	n/a	n/a	181	145	128	109
Capital works	n/a	n/a	n/a	n/a	0	0	0	0
Maintenance								
1 Inspection					5	167	294	236
2 Physical work	n/a	n/a	n/a	n/a	n/a	174	328	184
Contribution to								
overheads						124	128	142
Other costs								
Contribution to								
reserves						14	29	34
Total	0	0	0	0	n/a	624	907	705



TABLE A23

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Lower Waikato River Scheme, Funding and Expenditure  
Environment Waikato - Main Channel and Community Works

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	n/a	134	93	128	113	94	89	90
Regional rates	n/a	n/a	n/a	n/a	n/a	107	304	144
Scheme rates	n/a	n/a	n/a	n/a	n/a	0	0	0
Royalties and								
rentals	n/a	n/a	n/a	n/a	n/a	82	117	219
Resource users								
contribution*	n/a	n/a	n/a	n/a	n/a	29	125	0
Capital accum.								
funds								
Loans								
Interest								
Total		134	93	128	113	312	635	453

\* From Electricorp as part of the Tongariro offset work

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	n/a	n/a	n/a	n/a	77	52	47	36
Capital works	n/a	n/a	n/a	n/a	0	0	0	0
Maintenance								
1 Inspection					0	157	288	230
2 Physical work	n/a	n/a	n/a	n/a	0	81	176	50
Contribution to								
overheads						119	124	137
Other costs								
Contribution to								
reserves						0	0	0
Total	0	0	0	0	77	409	635	453

TABLE A24

Lower Waikato River Scheme, Funding and Expenditure  
Franklin District Council - Part Section B

Year	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	n/a	n/a	n/a	n/a	n/a	0	0	0
Regional rates	n/a	n/a	n/a	n/a	n/a	0	0	0
Scheme rates	n/a	n/a	n/a	n/a	23	24	25	25
Royalties and								
rentals	n/a	n/a	n/a	n/a	0	0	0	0
Resource users								
contribution	n/a	n/a	n/a	n/a	0	0	0	0
Capital accum.								
funds								
Loans								
Interest								
Total					23	24	25	25

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	n/a	n/a	n/a	n/a	0	0	0	0
Capital works	n/a	n/a	n/a	n/a	0	0	0	0
Maintenance								
1 Inspection					0	5	1	0.5
2 Physical work	n/a	n/a	n/a	n/a	17	5	1	3.6
Contribution to								
overheads					0	0	0	1.2
Other costs								
Contribution to								
reserves					6	14	24	19.7
Total	0	0	0	0	23	24	26	25

TABLE A25

Lower Waikato River Scheme, Funding and Expenditure  
Waikato District Council - Part Sections A and B

Year	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	n/a	n/a	n/a	n/a	n/a	0	0	0
Regional rates	n/a	n/a	n/a	n/a	n/a	0	0	0
Scheme rates	n/a	n/a	n/a	n/a	149	150	148	154
Royalties and								
rentals	n/a	n/a	n/a	n/a	0	0	31	52
Resource users								
contribution	n/a	n/a	n/a	n/a	0	0	0	0
Capital accum.								
funds								
Loans								
Interest								
Total					149	150	179	206

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	n/a	n/a	n/a	n/a	91	81	70	61
Capital works	n/a	n/a	n/a	n/a	0	0	0	0
Maintenance								
1 Inspection					0	0	0	0
2 Physical work	n/a	n/a	n/a	n/a	15	50	104	78
Contribution to								
overheads					0	0	0	0
Other costs								
Contribution to								
reserves					0	0	0	12
Total	0	0	0	0	106	131	174	151

**TABLE A26**

**Lower Waikato River Scheme, Funding and Expenditure**  
**Environment Waikato - Drainage Section D**

Year	1986/87	1887/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
				incl. tran.				
				quarter				
CCI index	2650	2880	3050	3200	3420	3410	3460	3550

Scheme Funding, adjusted to December 1993 values. Funds are in \$1000

Govt. subsidy	0	0	0	0	0	0	0	0
Regional rates		0	0	0	0	0	0	0
Scheme rates	30	27	26	26	14	17	17	16
Royalties and rentals	0	40	43	50	37	0	50	52
Direct contribution	0	9	8	8	7	7	7	7
Capital accum. funds								
Loans								
Other	19	0	10	6	0	0	0	0
Total	49	76	87	90	58	24	74	75

Expenditure History, adjusted to December 1993 values. Costs are in \$1000

Loan repayments	0	18	19	16	12	12	12	12
Capital works	38	19	35	0	0	0	0	0
Maintenance								
1 Inspection	8	9	7	4	5	5	5	5
2 Physical work	27	32	24	28	31	37	47	52
Contribution to overheads	3	3	3	0	4	4	4	4
Other costs			11					
Contribution to reserves						0	6	3
Total	76	81	99	48	52	58	74	76

## APPENDIX B - CONTENTS

	Table	Page
Aparima Rating District		
Maintenance rating system and funding	B1	20 21 22

6/14/94 13:07	APARIMA RATING DISTRICT							
	CLASS	93/94	94/95					
VALUATION NZ	A,B,C,E,F	\$1,800	\$1,800					
FLOODWARNING	A,B,C,E,F	\$9,385	\$10,260					
STOPBANK INSURANCE	A,B	\$6,000	\$6,000					
DISASTER DAMAGE RESERVE	A,B,E	\$5,000	\$5,000					
FAIRWAY MAINTENANCE	A,B,E	\$50,000	\$50,000					
DRAINAGE MAINTENANCE	A,C	\$35,486	\$32,620					
ANTICIPATED RIVER WORKS	A,B	\$18,182	\$23,182					
SOIL CONSERVATION WORKS	F		\$5,000					
RECOVERY DIRECT COSTS DRAINAGE	A,C	\$12,230	\$16,830					
RECOVERY DIRECT COSTS RIVER WORKS	A,B,E	\$14,337	\$16,058					
		\$152,420	\$166,750					
PLUS GST		\$171,473	\$187,594					
	APARIMA RATING DISTRICT							
		A	B	C	D	E	F	TOTAL
VALUATION NZ	LV	10%	17%	3%		3%	67%	100%
FLOODWARNING	LV	10%	17%	3%		3%	67%	100%
STOPBANK INSURANCE	LV	37%	63%					100%
DISASTER DAMAGE RESERVE	LV	37%	63%					100%
FAIRWAY MAINTENANCE	LENGTH	7%	48%			45%		100%
DRAINAGE MAINTENANCE	LV	75%		25%				100%
ANTICIPATED RIVER WORKS	LENGTH	12%	88%					100%
SOIL CONSERVATION WORKS	LV						100%	100%
RECOVERY DIRECT COSTS DRAINAGE	LV	75%		25%				100%
RECOVERY DIRECT COSTS RIVER WORKS	LV	37%	63%					100%
LAND VALUE (\$)		14,862,150	27,430,200	5,556,500		5,410,150	109,750,600	
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TABLE B1

14/6/94 13:07	FUNDS TO BE RAISED		\$152,420	+ GST = \$171,473			
	CLASS	RATIO	LAND VALUE	POINTS	LEVIES	\$	%
ANNUAL DRAINAGE & S/B MAINTENANCE	A1	4	189,700	758,800	0.00624916	1,185	0.69%
2 YEARLY DRAINAGE & S/B MAINTENANCE	A2	3	2,590,500	7,771,500	0.00468687	12,141	7.08%
OTAUTAU TOWN	A3	12	643,950	7,727,400	0.01874749	12,072	7.04%
LOWER WAIMATUKU	A4	1	12,469,700	12,469,700	0.00156229	19,481	11.36%
		\$44,881		28,727,400		44,881	26.17%
	B1		0	0	0.00	0	0.00%
RURAL STOPBANKS (R/B ABOVE OTAUTAU)	B2	5	1,650,700	8,253,500	0.00454945	7,510	4.38%
RURAL STOPBANKS	B3	4	7,922,000	31,688,000	0.00363956	28,833	16.81%
UPPER WAIMATUKU	B4	1	6,428,900	6,428,900	0.00090989	5,850	3.41%
DRUMMOND HEDDON BUSH	B5	0.75	11,409,400	8,557,050	0.00068242	7,786	4.54%
		\$49,978		54,927,450		49,978	29.15%
YEARLY CLEAN	C1	3	1,201,000	3,603,000	0.00337864	4,058	2.37%
2 YEARLY CLEAN	C2	2	1,698,500	3,397,000	0.00225242	3,826	2.23%
3 YEARLY CLEAN	C3	1	2,406,000	2,406,000	0.00112621	2,710	1.58%
		\$10,593		9,406,000		10,593	6.18%
FLOODWAY MAINTENANCE	E2	1	5,341,150		0.00369272	19,723	11.50%
		\$19,723					
INDIRECT BENEFIT	F1	5	261,400	1,307,000	0.00219166	573	0.33%
INDIRECT BENEFIT	F2	1	90,874,700	90,874,700	0.00043833	39,833	23.23%
RIVERTON/POURAKINO	F3	0.75	17,921,900	13,441,425	0.00032875	5,892	3.44%
		\$46,298		105,623,125		46,298	27.00%
			163,009,500				
		\$171,473					
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TABLE B1



14/6/94 13:07	APARIMA RATING DISTRICT FUNDING 93/94							
	A	B	C	D	E	F	TOTAL 93/94	
VALUATION NZ	203	344	61		61	1357	2025	
FLOODWARNING	1056	1795	317		317	7074	10558	
STOPBANK INSURANCE	2498	4253					6750	
DISASTER DAMAGE RESERVE	2081	3544					5625	
FAIRWAY MAINTENANCE ( BY LENGTH)	3938	27000			25313		56250	
DRAINAGE MAINTENANCE	29942		9981				39922	
ANTICIPATED RIVER WORKS (BY LENGTH)	2455	18000					20455	
SOIL CONSERVATION								
RECOVERY DIRECT COSTS DRAINAGE	10319		3440				13759	
RECOVERY DIRECT COSTS RIVER WORKS	5968	10161					16129	
ACTUAL COSTS	\$58,458	\$65,097	\$13,798		\$25,690	\$8,431	\$171,473	
								\$163,042
ADJUSTMENTS FOR CLASS 'F'	(\$13,577)	(\$15,119)	(\$3,205)		(\$5,967)	\$37,867		
DISTRIBUTED BY ACTUAL COST								
MONEY TO BE RAISED IN CLASS (\$171,473)	\$44,881	\$49,978	\$10,593		\$19,723	\$46,298	\$171,473	
PERCENT OF REQUIRED FUNDS	26.17%	29.15%	6.18%		11.50%	27.00%	100.00%	
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TABLE B1