

# **TA4270-FIJ – CAPACITY BUILDING IN WATER AND SEWERAGE SERVICES**

## **Final report**

Volume 7 - Tariff review

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# CONTENTS

Section	Page
<b>1 INTRODUCTION</b>	
1.1 Objectives	1-1
1.2 The effects of institutional reform	1-3
<b>2 ACTIVITIES TO DATE</b>	
<b>3 THE TARIFF REVIEW MODEL</b>	
<b>4 GROWTH ESTIMATES, LOSS REDUCTIONS, AND BASIC COSTS</b>	
4.1 Water supply	4-1
4.2 System unit costs: large systems vs. small systems	4-6
4.3 Sewerage service	4-8
4.4 Projected operating costs	4-14
4.5 Projected capital costs	4-22
<b>5 REVENUES AND TARIFF ISSUES</b>	
5.1 The 'financial gap'	5-1
5.2 Proposed tariff setting considerations	5-4
5.3 Proposed tariff (for review and discussion)	5-7
<b>APPENDICES</b>	
1 Summary	
2 Profit and loss	
3 Balance	
4 Cash flows and debt	
5 Capital expense and depreciation	

# 1 Introduction

This report comprises the tariff review component of the Final Report of TA 4270: Capacity Building in the Water and Sewerage Sector in Fiji that was first prepared and submitted to the ADB and the Government of Fiji in December 2005. At that time, finalisation of the tariff review (the subject of this volume) was pending completion of work by the PMU for reform to corporatise the WSD and the putting into effect the capacity building recommendations of TA 4270.

In the third quarter of 2007, the work of the PMU and the new institutional capacity recommended by the TA have not been fully implemented, though it is understood that corporatisation of the WSD remains a high government priority. At the end of 2006, the PMU submitted its outputs to the government and was then disbanded. In these circumstances, and in hopes of furthering the corporatisation process, it has been judged in the best interests of all parties that the tariff review component of the TA be updated and finalised based on the final outputs of the PMU to reflect the considerable work that was accomplished during 2006, in particular the further analysis of the capital and operating costs of a corporatised WSD. For the purposes of the tariff review, the final outputs of the PMU consist of the December 2006 version of the financial model that was originally prepared under TA 4270 and extensively updated by the PMU during 2006.

The ADB loan-financed Suva-Nausori Upgrade Project, which commenced in 2005, has experienced delays in implementation and disbursements have fallen behind schedule. It is understood that the delays have been caused by government financing issues and also by capacity constraints within the WSD. The Upgrade Project is closely associated with the reform process and has particular importance to the tariff review as institutional reform, physical system improvements (through both higher investment and improvements in capacity and procedures) and tariff adjustments need to proceed in tandem. The timing and outcomes of the reform process, investment program and tariff adjustment remain, as of the third quarter of 2007, highly uncertain.

In what follows, the December 2005 draft of Volume 7 of the Final Report of the TA is updated to reflect the estimated costs of a corporatised WSD as prepared by the PMU at the end of 2006. The estimates are extracted from the detailed financial spreadsheet model originally developed under the TA and subsequently taken over and updated by the PMU in the course of its work through 2006.

All dollar values (\$) in this report refer to Fiji Dollars unless otherwise noted.

## 1.1 OBJECTIVES

The ultimate purpose of the ADB-assisted investment and institutional reform of the water supply and sewerage sector in Fiji is to reduce poverty by addressing one of

poverty's prime contributing factors: inadequate provision of a safe and reliable water supply and effective sanitation services. TA 4270, to support institutional development and capacity building in the sector and carried out in concert with the PMU for institutional reform, is a key component of this effort. The overall objectives of the tariff review component of the TA are to support the institutional reform process by:

- estimating the full costs of providing water supply and sewerage services in Fiji, taking into account the operating and capital requirements of an efficient and quality service
- allocating costs to users and other stakeholders including poor households, non-poor households, the private sector, and the Government. This will result in a draft proposal for increasing the tariff to support the ongoing reform process, while safeguarding the financial interests of the poor.

In detail, the objectives of the tariff review component are to:

- develop cost recovery objectives and targets
- update financial projections for the WSD and assess ability of tariffs to meet cost recovery objectives
- identify average costs in major and minor systems
- determine financial tariffs necessary to meet O&M costs, debt service, and full cost recovery
- assess affordability by the poor and develop tariff structures that take this into account
- identify subsidies as necessary to sustain services to the poor
- consider separate tariffs for different sizes of systems, level of service and affordability
- help develop a public awareness campaign to support introduction of a new tariff.

It is generally well recognised, at least by the Government and the donor community if not yet by all users, that a reliable and safe water supply and effective sanitation services are costly for any country to provide. This is especially so for Fiji, where the population is widely dispersed and economic integration is far less than in more developed countries, due to formidable geographic barriers. If, from a cursory comparison of water tariffs around the world, water appears to be relatively cheap in Fiji, it is manifestly not so: many costs are hidden, uncontrolled, non-monetary, and are far higher than they need to be because of historic inefficiencies that are growing gradually worse as infrastructure degrades and asset performance declines. Prominent examples of costs which are generally hidden from the community at large include poor performance and shortened life of assets because of under expenditure in maintenance, operating costs that are higher than need be, losses higher than need be, non-transparent and uncontrolled subsidies (including, for example, a prevalence of illegal connections to the water supply) and, not least, consumer costs related to supply interruptions. This last item may be the most difficult to appreciate, especially in a society that has grown accustomed to years of poor service. When a water supply interruption occurs to a single household or to a community, alternatives usually involving substantial physical labour and/or much higher cash outlays have to be

found to supply basic needs and psychological/emotional adjustments have to be made to varying degrees of deprivation. Taken in aggregate, these represent heavy economic costs to any community that suffers interruptions frequently or for lengthy periods, and contribute significantly to the extent and depth of poverty in the country.

The tariff review process is essentially one of drawing together all 'expensed' costs and hidden costs, making them all explicit and allocating them deliberately to stakeholders (users and Government). When all costs are explicit and properly allocated and the management reform processes are completed, the total costs of the sector should be lower than before, reflecting higher efficiency, improved service to all users (lowering user costs, including non-monetary costs) and better support from the sector to the economic development of the country.

No ambitious undertaking is complete without a caveat and the tariff review is no exception. Fundamentally, the tariff review at present is constrained because it is being conducted for an entity which doesn't yet exist: the corporatisation process progressed by the PMU in 2006 hasn't been completed in the third quarter of 2007, while the capacity building recommended under TA 4270 awaits recruitment of needed new personnel (though the procedures, policies, manpower requirements and costs of the new capacity are now identified). Before disbanding, the PMU recommended the creation of a commercial statutory authority for water supply and sewerage, endorsed by senior WSD management and the multi-departmental Reforms Coordinating Committee, but the practical steps for this are still underway. Notwithstanding the progress made in 2006, a heavy workload of activities remains to achieve implementation, including:

- a comprehensive review of customer meters to identify the presently unknown but large number of illegal connections and faulty meters
- determination of raw water acquisition and sludge disposal costs
- a review of overall manpower, training, and salary requirements
- the implementation of new accrual-based accounts and financial management systems, with appropriate IT support
- adoption of a new asset management system
- development and adoption of a ten year capital investment budget.

The results of each of which will have a large impact on the tariff proposal that will be adopted at the end of these processes. What follows, then, is not presented as a tariff proposal as such, but is intended rather as a framework for developing a formal tariff proposal in step with the remaining reform activities. The framework identifies the quantities (such as those indicated above) that are on the 'critical path' for tariff determination with initial estimates of their values as of December 2006 (based on the work of the PMU during that year).

## **1.2 THE EFFECTS OF INSTITUTIONAL REFORM**

The institutional reform process represents a break from the past practice of service provision – in particular, the priority is no longer simply to meet a supply target within the constraints of an externally-approved budget, but rather the provider must now to ensure that adequate resources are available to supply the services demanded by

customers. The resources available to the provider will be a combination of user fees, external grants and loans and explicit Government subsidies, all of which the provider will have to justify prior to expenditure. The reform process introduces incentives to improve efficiency and lower costs, a new emphasis on customers and demand management and a risk that poor performance will result in a shortfall of resources and a threat to the viability of the organisation, for which the managers will be held materially accountable.

It is in this context that the tariff review is carried out. In particular, it is assumed that costs will be determined in a commercial environment with key changes from present practices including the following:

- revenues collected from customers are retained by the organisation for use in operations and investment, apart from taxes or dividends that may be payable
- the organisation has authority to contract for external capital resources for investment, including loans and grants from any source including the private sector
- the organisation enjoys autonomy from the Government budget and Government budget processes except where explicit subsidies are concerned
- the organisation is autonomously responsible for personnel recruitment, management and training, and establishes a wage and salary structure appropriate to its long term needs
- the organisation adopts accrual-based financial management and accounting systems based on accepted international commercial practices.

As mentioned, such changes imply a new focus by the organisation on its revenue base and on its relationship with customers. The organisation will accordingly be vitally concerned with the following, including relatively intense set-up efforts during the initial few years as the reform process proceeds:

- discovering illegal connections in all supply areas and converting them to legitimate connections
- correcting faulty metering
- eliminating ‘rebates’ for water losses on the customers’ side of the meter
- improving revenue collection rates against invoices nationally from the current 70% to above 90%
- improving customer service and customer relations and increasing the effectiveness of response to customer complaints
- raising public awareness of water supply, conservation, and sanitation issues
- maintaining an accurate, flexible, and accessible customer database
- implementing a program to handle high-volume and/or high-strength liquid waste from commercial and industrial customers in order to recover costs associated with such wastes and minimise risks to the collection and treatment systems
- securing legally-enforceable access to adequate raw water supplies
- meeting applicable water quality and effluent standards

- detecting and repairing leakages in the water supply and sewage collection systems and eliminating avoidable losses
- making all subsidies paid by the government or external agencies transparent, explicit and controllable.

The tariff review process assumes that these steps are undertaken by the corporatised service provider to secure its revenue base. In addition, it is assumed that the organisation meets the cost of effectively implementing capacity to fulfil the organisation's requirements under legislation to safeguard the environment from overflows and improper disposal of effluent and sludge and to protect the health and safety of all personnel and the public at large.

## 2 Activities to date

To meet the above objectives, the following steps have been carried out under the tariff review component of the TA:

- collection of cost data by service sector, region, and a sample of treatment plants through consultation with plant managers and administration officials
- review of assets and estimation of asset-related costs (depreciation, repairs and maintenance)
- compilation of costs associated with capacity-building and institutional reform
- preparation of a detailed financial model of the water supply and sewerage sector in Fiji to be used as a tool to specify financial objectives, analyse tariff implications and justify a tariff recommendation
- review, in 2007, of available outputs of the PMU's work in 2006 in regard to preparing the WSD for corporatisation; in particular, the new estimated operational costs and investment plan with which the PMU updated the financial model that was originally developed under TA 4270
- conduct of numerous workshops with senior WSD managers and engineers, and consultations with representatives of the Ministry of Public Enterprise and the Ministry of Finance and Economic Development on unaccounted for water and WSD future growth in services and costs, reform priorities affecting costs and tariff implications
- a final workshop for WSD management and government officials on the PMU's updated costs and investment plan, with tariff implications, delivered by the TA Consultant in June 2007
- updating and finalising of the tariff component (this volume) of the TA 4270 Final Report.

The results are discussed in the following sections.

# 3 The tariff review model

A detailed Excel™-based financial spreadsheet model of the Water and Sewerage Department has been prepared as a flexible tool to estimate, inter alia, present and future water and sewerage volumes, numbers of customers in different categories, physical input costs, personnel and training costs, capital costs and financing charges, and costs associated with capacity building in the reformed organisation from 2004 through 2015. The model has been developed in order to form a comprehensive picture of the costs that will have to be met by the sector and to calculate revenue requirements under different tariff and subsidy scenarios and to test the sensitivity of results to changes in key assumptions. No picture of the future over ten years is perfect and uncertainty in some of the basic parameters is acute in view of the reform process currently underway in the WSD, as discussed further below. The model in its present stage of development represents a consistent set of assumptions and estimates that should be further refined as the reform process continues. The model was developed in close coordination with the financial management and asset management work of the PMU Reform Project.

Key portions of the model are reproduced in the Appendix to the Tariff Review Volume. Briefly, the model contains the projected financial performance of the WSD as measured by standard financial statements including a profit and loss statement, a balance sheet, and a statement of cash flows, employing accrual accounting methods similar to those developed for the WSD under the financial management component of the PMU Reform Project. At the core of the analysis are detailed calculations of customer and demand growth and associated volume requirements; projections of personnel and training costs; expected repair and maintenance requirements; costs of physical inputs such as electricity; chemicals; and fuel; other recurrent costs; and future capital requirements. Start-up and annual costs of new institutional capacity supported by this TA (environmental management, trade waste, customer relations, public relations, community awareness and occupational health and safety programs) as well as new areas supported by the PMU Reform Project (e.g., information technology, asset management, financial management and human resource development) are included in the cost estimates.

# 4 Growth estimates, loss reductions, and basic costs

## 4.1 WATER SUPPLY

### 4.1.1 Demand projections

Using 2005 as the base year, the WSD presently has about 127,000 legitimate water supply connections plus a large number – roughly estimated at around 40,000<sup>1</sup> – of illegal connections. Nationally, about 92% of all connections are domestic, 7% are commercial/industrial, and 1% are government. An estimated total of 110,000 million litres (ML) of potable water will be produced by the WSD in 2007, of which about 53,000 ML will be consumed by customers legitimately connected to the water supply and a further 35,000 ML will be consumed through illegal connections. Of the water volume taken through legitimate connections about 71% is consumed by domestic customers, 24% by commercial/industrial customers and the balance of 5% by government. About 54% of potable water will be produced in the Central/Eastern Division, 39% in the Western Division and 7% in the Northern Division. These percentage distributions are depicted graphically in Figure 4.1.

It is assumed that a campaign has commenced as part of the reform process to discover illegal connections and convert them to legitimate connections and that meter testing is resulting in replacement of inaccurate meters, to continue through about 2012, throughout the WSD's service territories. If present estimates of illegal connections and illegal water consumption are reasonably accurate, the effect of such a campaign will have a dramatic effect of reduction in the volume of UFW nationally.

As shown in Figure 4.5, the total volume of the potable water production requirement rises from about 107,000 ML in 2005 to about 124,000 ML by the end of the period (2015), at an average annual growth rate of 1.5%.

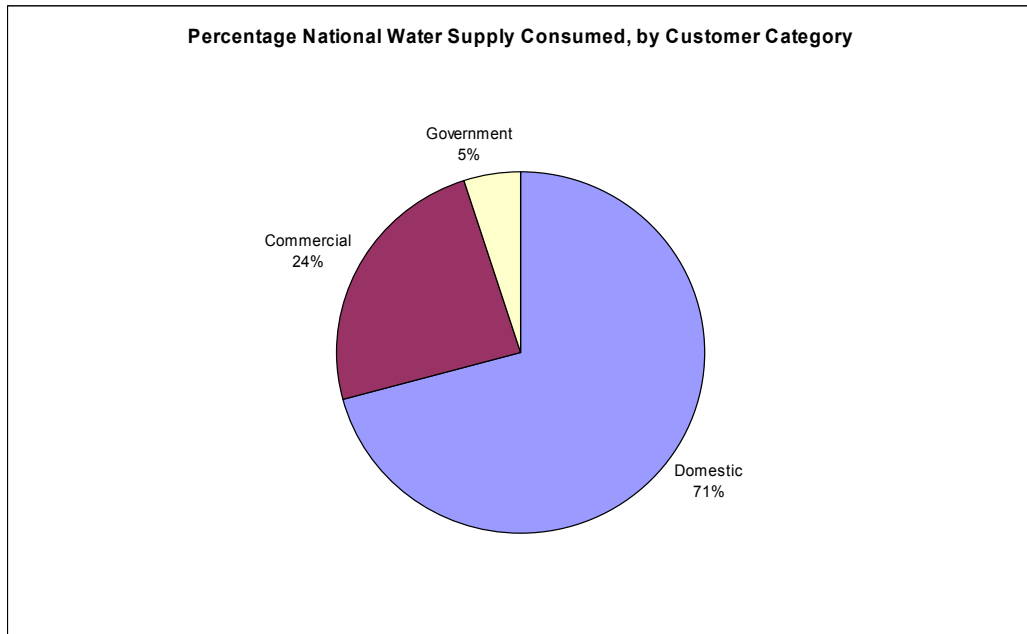
Based on the latest Census<sup>2</sup>, a comparison of the number of legitimate domestic water supply connections with the number of potentially connectable households in each division shows that the Western Division leads with 84.1%, followed by the Central/Eastern Division at 73.9%, and 58.8% in the Northern Division. The weighted national average is thus 75.3%. However, due to the presumed but likely prevalence of illegal connections, actual connections are much closer to 100% of potentially

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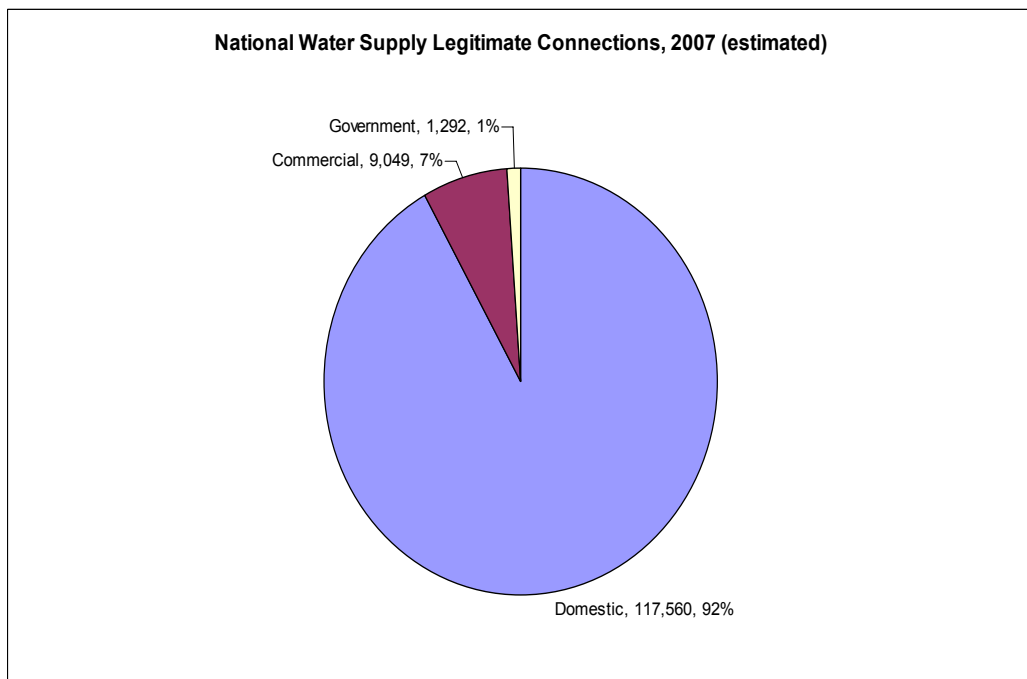
<sup>1</sup> Anecdotal evidence indicates that the actual number of illegal connections could be far higher; an extensive metering survey to discover illegal connections and to correct faulty meters is urgently needed.

<sup>2</sup> Last done in 1996, with some updated analysis since then. A new census has begun in September 2007 but its results will not be available until 2008.

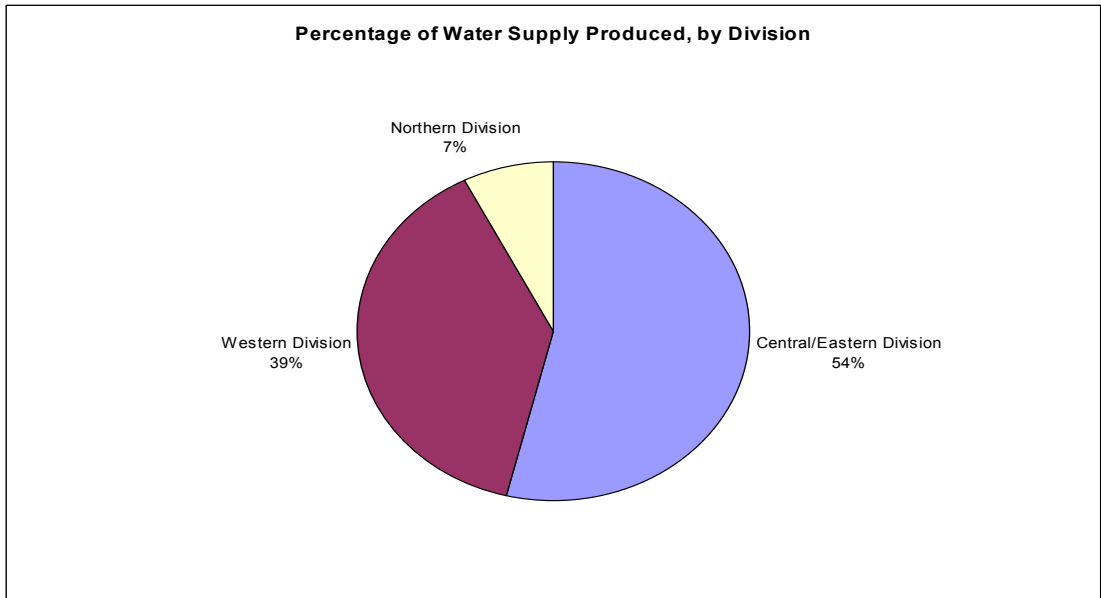
connectable households. Thus when the present estimates of illegal connections by division are added in, the percentage of connections-to-connectable-households rises to 97% in the Western Division, 100% in Central/Eastern, and 79% in the North, producing an overall national weighted average of 97%.



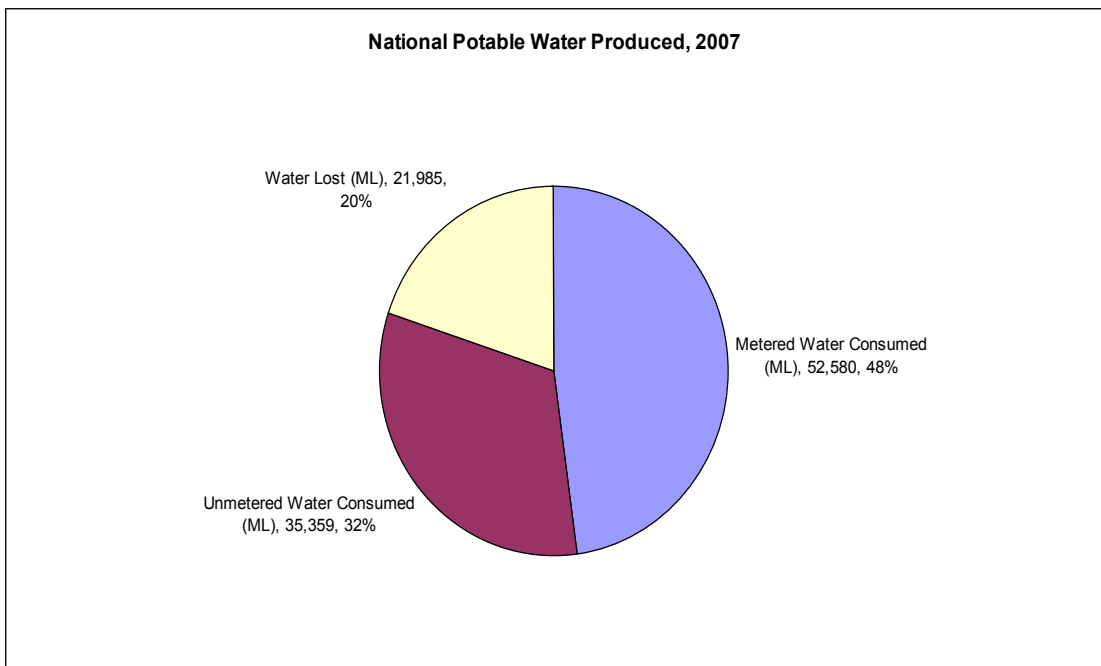
**Figure 4.1**  
Percentage national water supply consumed by customer category



**Figure 4.2**  
National water supply legitimate connections, 2007 (est)



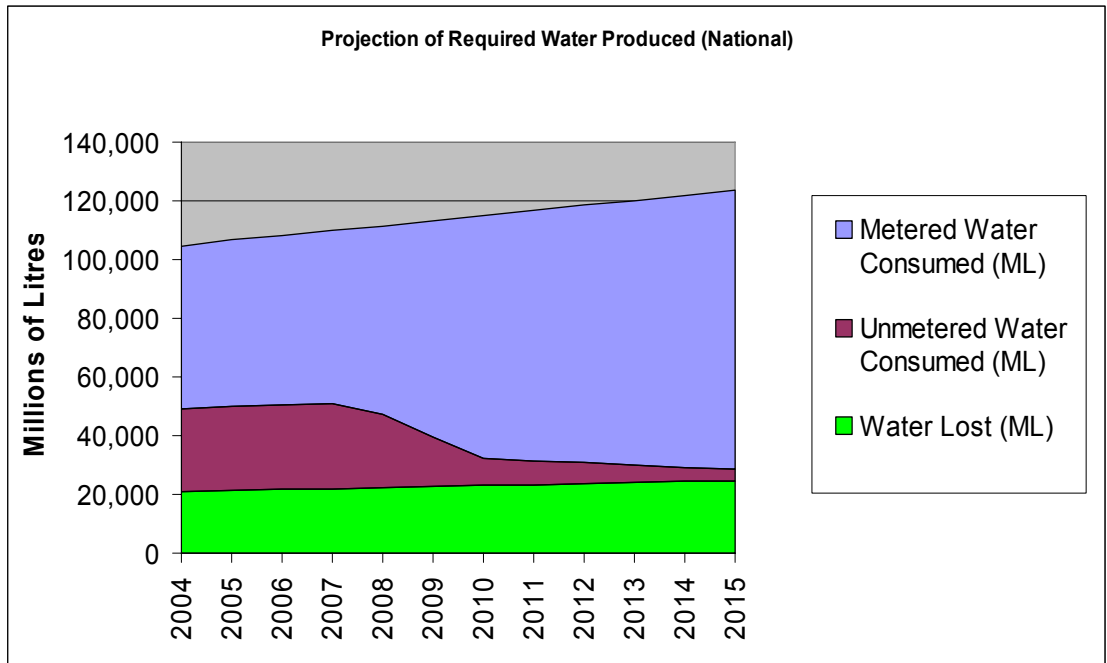
**Figure 4.3**  
**Percentage of water supply produced by division, 2007 (est)**



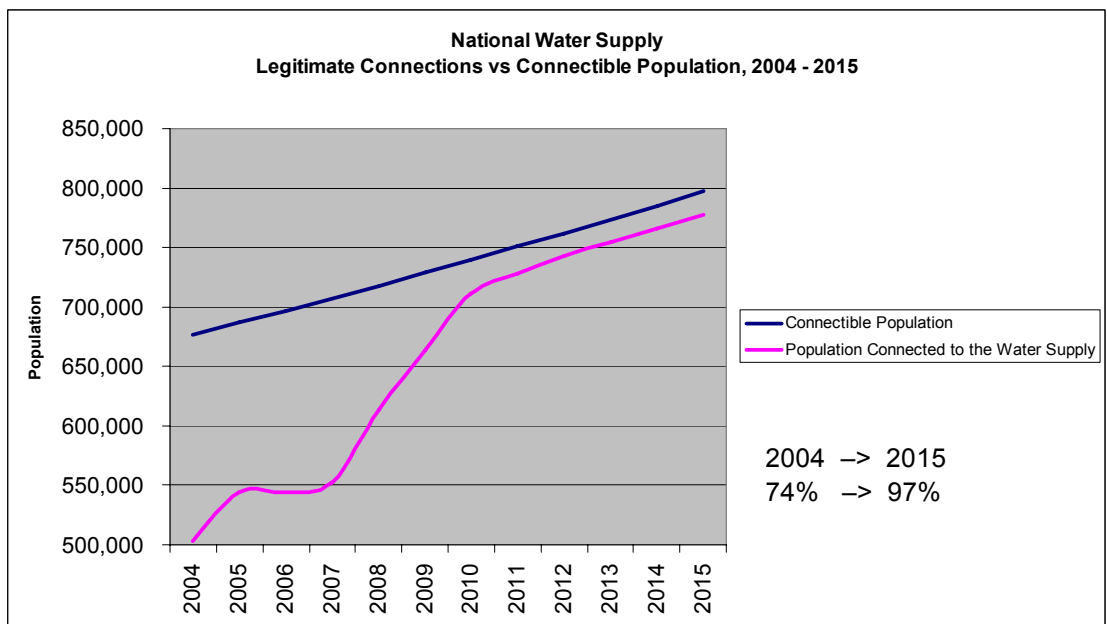
**Figure 4.4**  
**National potable water produced 2007 (est)**

The process of converting illegal connections to legitimate connections will cause a steep rise in the number of connections that are ‘apparent’ to the billing system (which records only legitimate connections), as shown in Figure 4.6 and Figure 4.7.

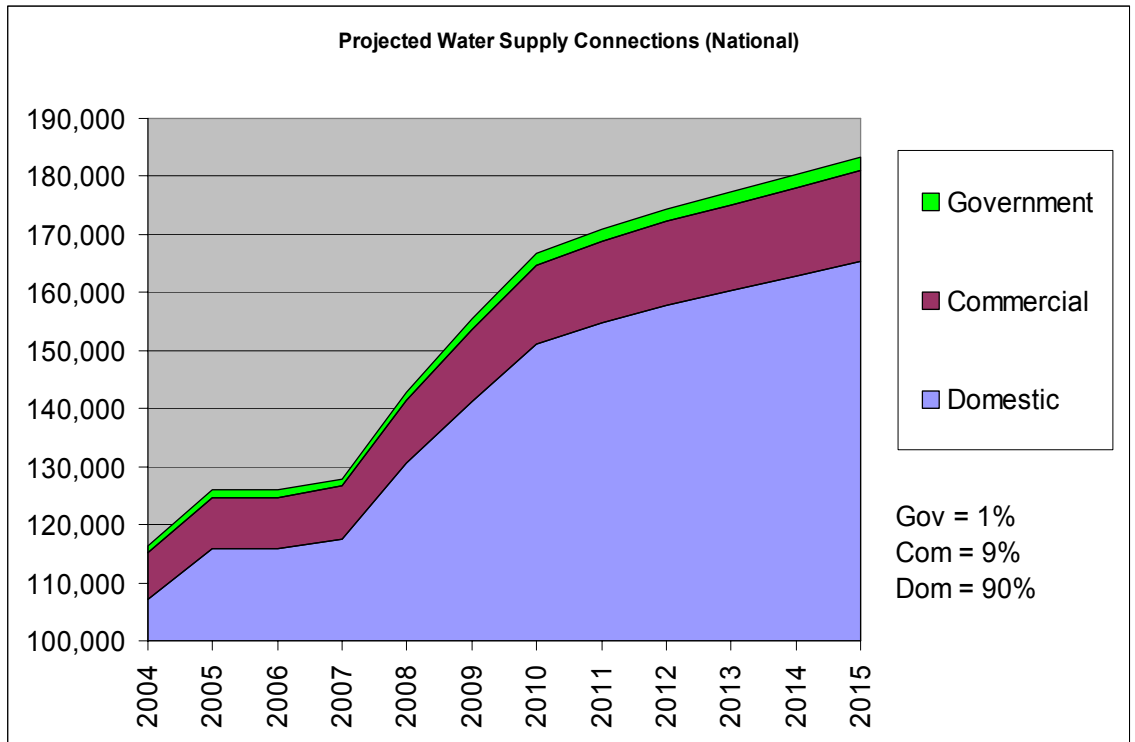
Based on the above, the estimated volume of metered water consumed rises nationally from about 57,000 ML in 2005 to about 95,000 ML in 2015 at an average annual growth rate of 5.3%, as depicted in Figure 4.8.



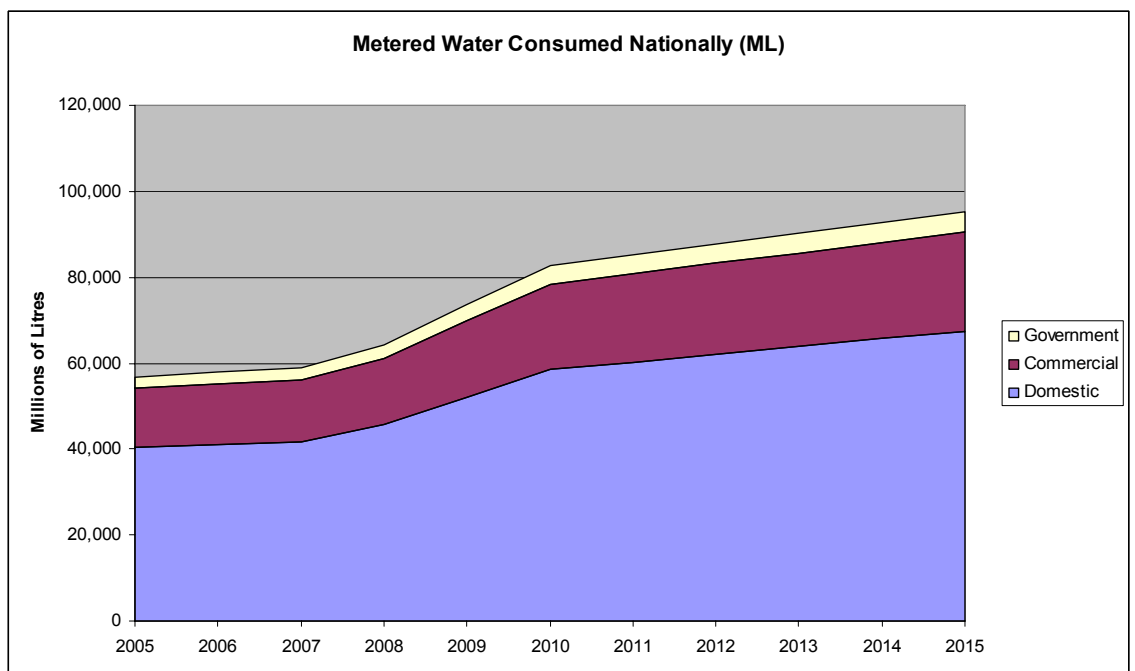
**Figure 4.5**  
**Projection of national potable water produced, showing the effects of a comprehensive meter correction program**



**Figure 4.6**  
**National water supply legitimate connections vs connectible population 2004–15**



**Figure 4.7**  
Increase in number of legitimate water supply customers



**Figure 4.8**  
Metered water consumed

However, as indicated in Figure 4.5, the treated water volume and raw water intake requirement rises over the same period at the more modest rate of 1.5% per annum (consistent with the rate of urban population growth) rather than the 5.3%

increase in ‘apparent’ water consumption, because much of the additional consumption is already being consumed, through illegal connections.

#### **4.1.2 UFW**

UFW, defined here as the simple difference between the total volume of water delivered to the transmission mains from the treatment plants and the volume that is metered and invoiced by the billing system, averages an estimated 47% nationally in 2005 (about 50,000 ML) with 53% (31,000 ML) in the Central/Eastern Division, 38% (15,000 ML) in the Western Division and 50% (4,000 ML) in the Northern Division. The accuracy of UFW volume estimates suffer from a lack of metering at the transmission mains of most water treatment plants and apparent errors in customer metering and reporting of data by the billing system, but are believed to be reasonably accurate as they are consistent with known indicators such as annual chemical and electricity usage.

WSD plant and metering managers report anecdotally that there is a high prevalence of illegal connections in most urban areas, reaching as high as 50% of all connections in some areas. In addition to illegal connections, it is widely agreed that many of WSD’s customer meters are old and inaccurate and that legitimate connections are commonly under-billed. It is emphasised that the actual incidence of illegal connections and faulty metering has not been specifically determined and a detailed survey of meters to measure this is urgently required. There is however general agreement within the WSD that illegal connections and faulty meters are responsible for the majority of UFW and that leaks from the transmission and distribution systems are therefore not the main source. For the present analysis, a consensus estimate has emerged among plant managers across the three divisions, developed during a series of workshops on the tariff, that water lost through leaks in the transmission and distribution mains is about 20% of the total volume delivered by the treatment plants and that 20% UFW overall is a reasonable target for WSD to attain over the next ten years. (The estimate of the volume lost due to leaks will be improved once the recommended metering survey is completed.) This implies that the balance of UFW at present, 27% of treated water nation-wide, is accounted by illegal connections and faulty meters. In principle, these losses can be reduced close to zero well within the ten year period. These targets are depicted graphically in the Figure 4.9.

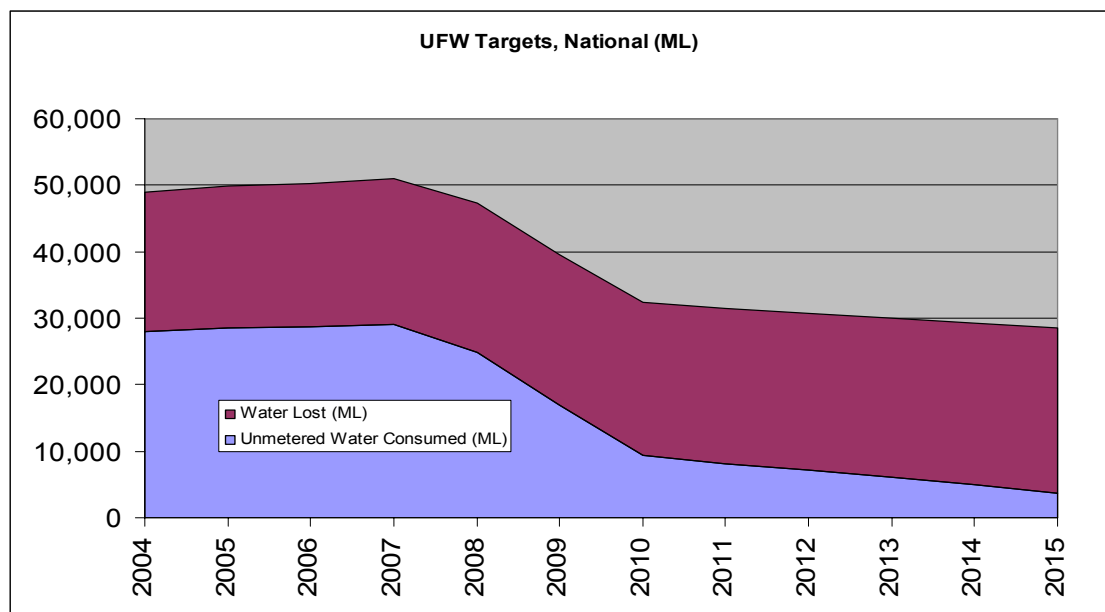
#### **4.1.3 Water supply production versus capacity**

Nationally and especially within the Western and Northern Divisions, it appears that, barring new investments in treatment plant capacity expansion, existing water treatment capacity which is near or above full-utilisation even now will become increasingly strained over the ten year period at new-customer connection and consumption rates of approximately 1.5% growth per annum, as shown in Figure 4.10.

#### **4.2 SYSTEM UNIT COSTS: LARGE SYSTEMS VS. SMALL SYSTEMS**

The estimates of costs of operating the water treatment and supply systems throughout Fiji for tariff review purposes are based on the objectives of the reform process, which include higher overall performance (reliability and efficiency), improved asset reliability through improved asset protection (repairs and maintenance), better protection of the health and safety of workers and higher water quality standards,

among others. An examination and comparison of average costs of water supply (and sewerage service, discussed below) across large and small systems (Nadi-Lautoka regional and Sigatoka water supply systems; the Suva-Nausori and the Northern Division water supply systems) indicate that apparent differences in unit costs are largely due to differences in quality of service and output rather than to differences in volumes and that applying consistent quality and operating standards across all such systems homogenises unit costs. In this light, the following principle is adopted for the purpose of tariff analysis: wherever the WSD assumes responsibility for commercial operations in water supply (and, as required in recent legislation, sewerage), consistent standards in regard to water quality, delivery reliability, asset management and protection, worker health and safety and all other significant parameters will apply. Where different quality standards exist (in small systems compared to large systems), such differences will be addressed and necessary expenditure will be made to rectify them.

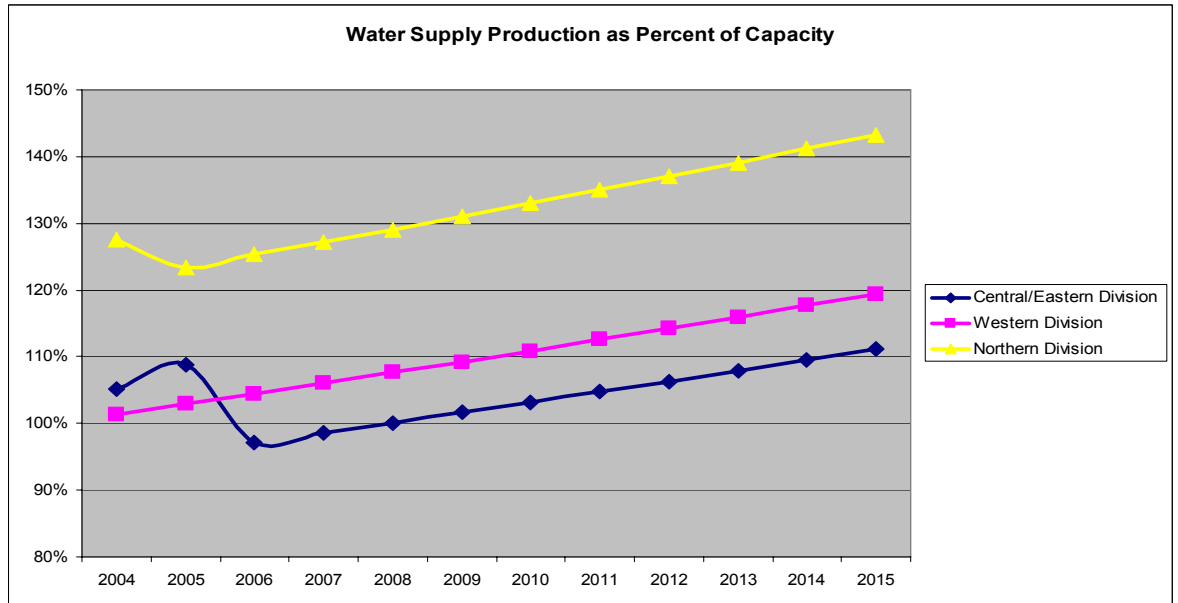


**Figure 4.9**  
**UFW targets**

The same principle does not apply, however, to rural water supply systems, because rural systems are not and, in the foreseeable future will not be, incorporated into WSD's commercial operations. Rural water supply investments are wholly funded by the Government as a social service; the water produced is not treated and delivery standards are not consistent. The WSD is involved in such systems essentially as contractors to the Government for the purpose of initial installation and occasional maintenance services but the facilities belong to and are the responsibility of the beneficiary communities.

In summary, as consistent quality, operational and reliability standards are defined and implemented through the reform process for all of WSD's commercial operations in large and small urban areas, unit-cost differences among isolated systems under WSD's responsibility will diminish. However, there will remain a significant and

widening divide between the WSD's (urban) operations and the government-funded and community-operated rural water supply projects.



**Figure 4.10**  
**Water supply production**

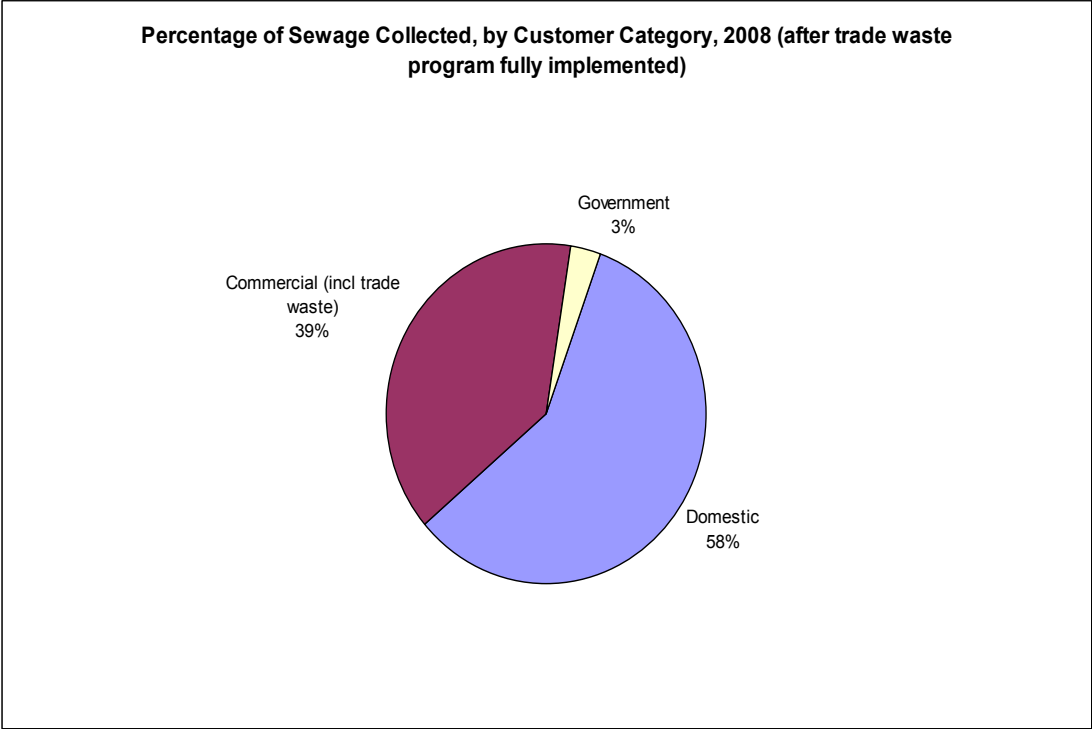
### 4.3 SEWERAGE SERVICE

A similar analysis of projected connections and treatment requirements as presented above for the water supply in Section 4.1 is presented below for the sewerage service.

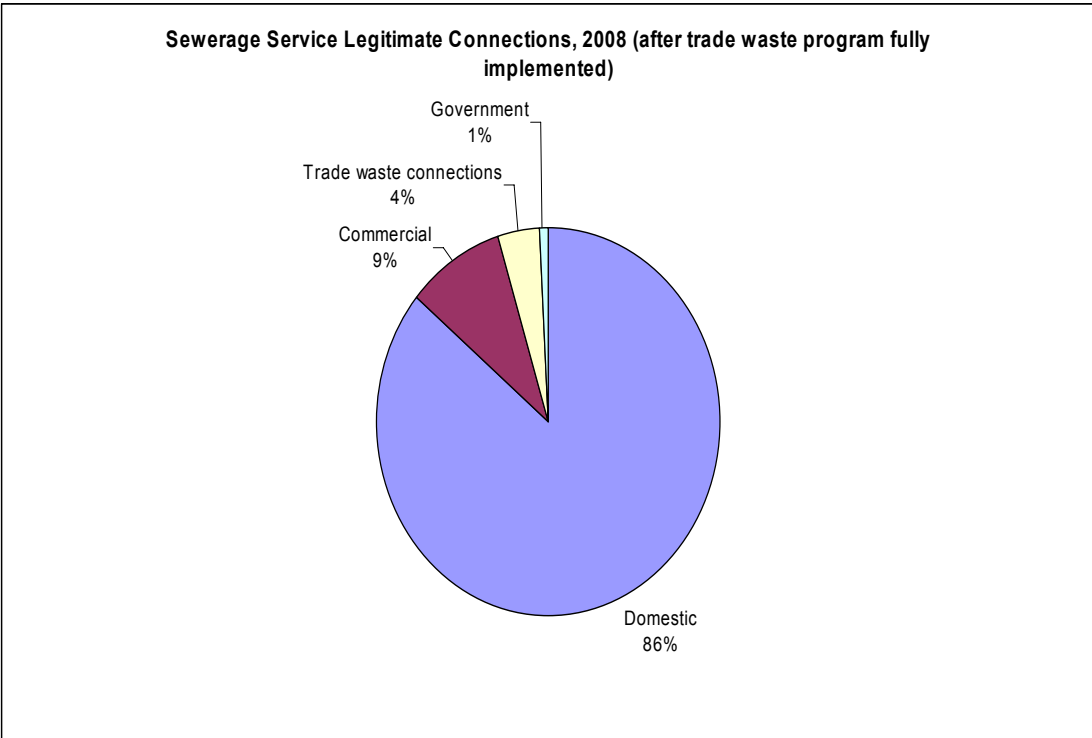
#### 4.3.1 Connections and volume projections

As the trade waste component of the TA is intended to make far-reaching impacts on the sewerage service system, we present a picture of the sewerage services in 2008, the first year in which it is expected that the trade waste component will be fully implemented. Using 2005 as the base year, there will be an estimated 28,000 legitimate sewer connections in 2008 and an unknown number of illegal sewer connections (assumed to be few). In 2008 nationally, about 86% of sewer connections will be domestic, 13% will be commercial including trade waste connections<sup>3</sup> and 1% will be government. Approximately 16,700 ML of sewage will be treated nationally in 2008, of which about 12,700 ML will be produced by WSD customers connected to the sewage systems and the balance, 4,000 ML, is due to inflow and infiltration. Of the total volume of sewage produced by WSD customers, about 58% will be due to the domestic sector, 39% to the commercial/industrial sector including trade waste connections and 3% to government. Across divisions, about 43% of the total sewage volume will be treated in the Central/Eastern Division, 53% in the Western Division and 4% in the Northern Division. These percentage distributions are depicted graphically in Figure 4.11 through to Figure 4.13.

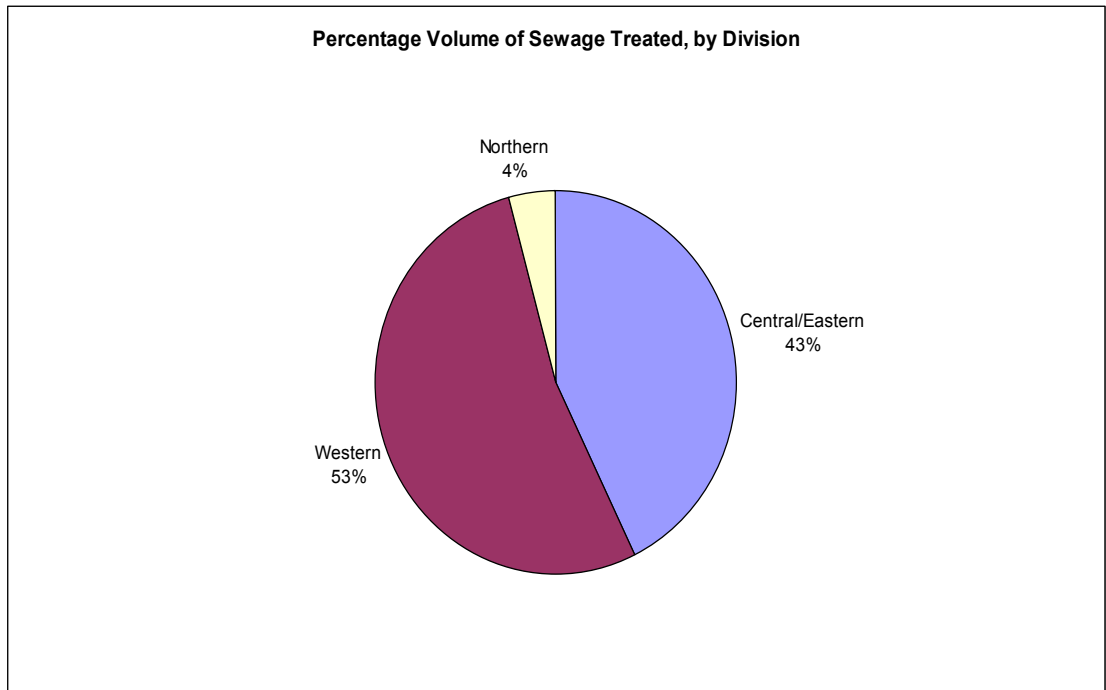
<sup>3</sup> About 30% of commercial and government connections are expected to be converted to trade waste connections once the trade waste program becomes fully operational in 2008.



**Figure 4.11**  
Percentage of sewage collected



**Figure 4.12**  
Sewerage service legitimate connections



**Figure 4.13**  
**Percentage volume of sewage treated**

The number of sewer service connections in all divisions is far less than the number of water supply connections. Based on the 1996 census data, the number of households connected to the sewer system as a proportion of connectable households in 2008 is greatest in the Western Division at about 23%, followed by the Central/Eastern Division at about 15% and the Northern Division at about 9%. Nationally, the average proportion of sewer-connected households to connectable households in 2008 is about 17%.

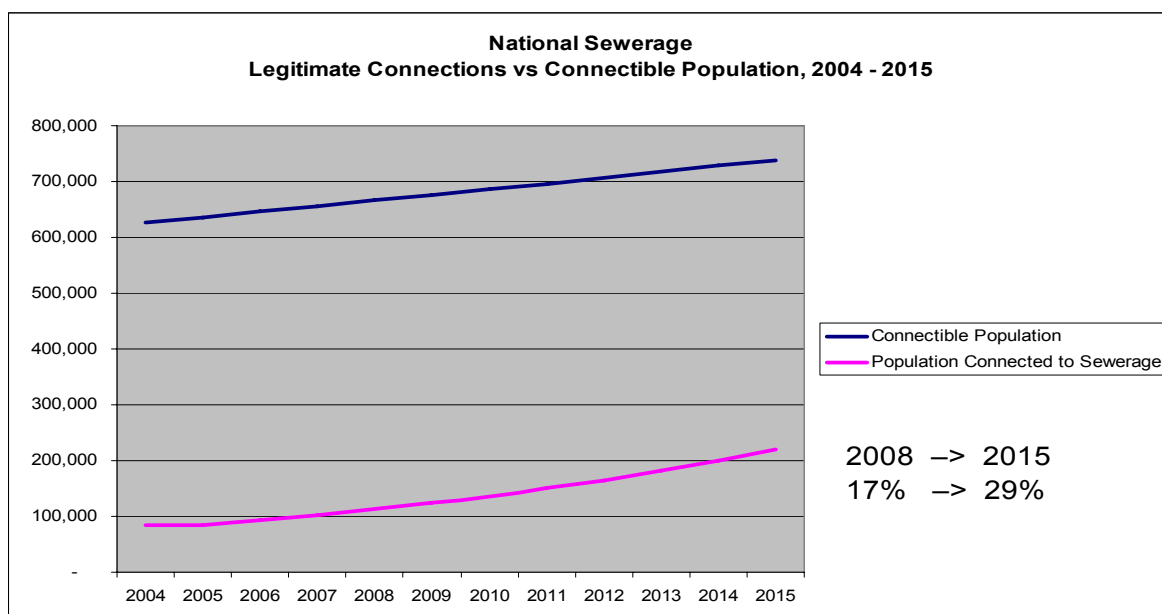
All customers connected to WSD’s sewerage service are also WSD water supply customers, but only a fraction of water supply customers are sewerage service customers. A conceivable, but distant, goal is to bring the ratio of sewerage customers to water supply customers equal or close to 100%, leading with the customer categories who pose the greatest environmental risks. In Fiji, as in most countries, these are the commercial/industrial customers and this is what justifies a focus on trade waste programs. In this context, the Western Division leads the rest of the country with 26% of domestic water supply customers connected to sewer and 56% of commercial/industrial. The corresponding percentages are 17% and 27% in Central/Eastern and 10% and 35% in the Northern Division, respectively. As seen, the commercial/industrial sector leads the domestic sector overall by a wide margin, in accord with sensible environmental practice.

However, there is a long way to go. There is strong awareness in Government of the environmental benefits of well-functioning and extensive sewerage systems and a high priority has been placed on expansion of the systems in Fiji. In accordance with the

*Strategic Development Plan 2003 – 2005*<sup>4</sup>, in 2002 the Government planned that ‘60% of the urban population (should have a) sewerage connection by 2005’ – a goal that, while unattainable, provides a clear signal to the WSD that the Government expects concerted action in this area.

For present purposes, it is assumed that an accelerated rate of increase in sewerage connections might be sustained at 10 percent per year, equivalent to slightly more than 2,000 new connections in all divisions annually in the near term, increasing to about 4,500 new connections annually by 2015. Factors that constrain the rate of new sewer connections are chiefly the availability of capital finance and manpower to survey new routes, liaise with households and proprietors, and install the connections; and the geographical extent of new connections which is likely to increase over time. An allowance has been included in the estimated capital budget for meeting the infrastructure costs of this rate of new sewer connections, but the required expenditure level nationally can be reliably estimated only after a detailed long term sewerage master plan has been prepared. Accordingly, the present estimates of population connected to the sewerage systems and the number of sewerage connections by customer category are shown in the Figure 4.14 to Figure 4.17.

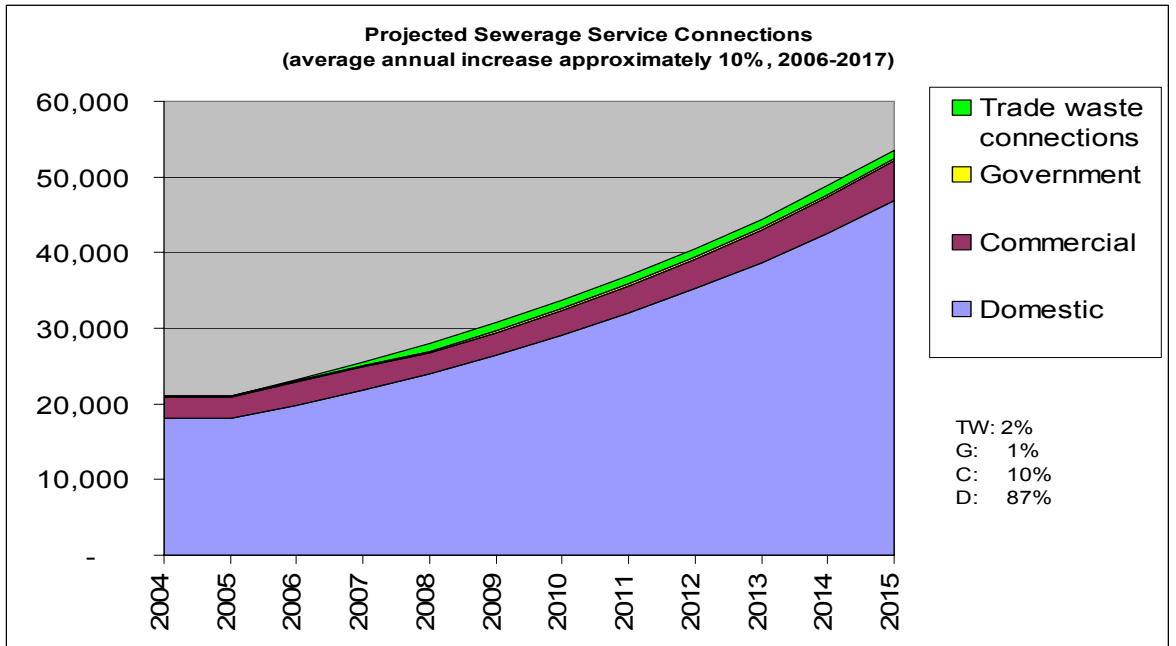
As shown in Figure 4.14, given present assumptions, the percent of connectable (urban) population that is connected to sewer rises from 17% in 2008 to 29% by 2015. Under the constraints discussed above this is assumed to be a practical target for WSD to achieve.<sup>5</sup>



**Figure 4.14**  
National sewerage legitimate connections

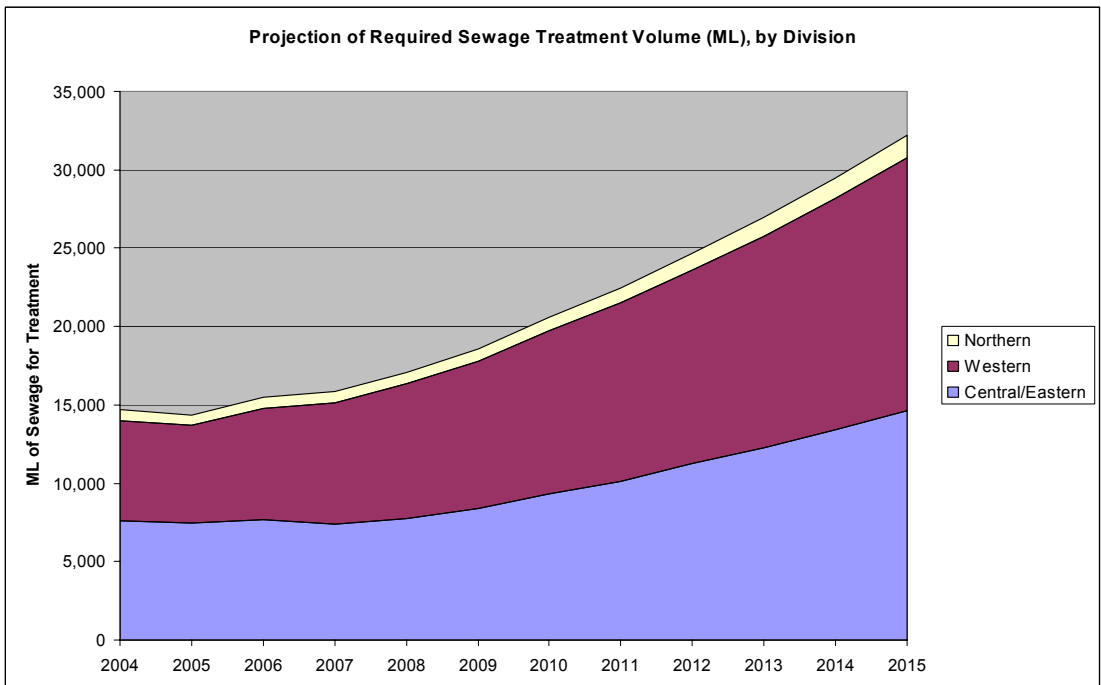
<sup>4</sup> ‘Rebuilding Confidence for Stability and Growth for a Peaceful, Prosperous Fiji’, *Strategic Development Plan 2003 – 2005*, Parliamentary Paper No 72 of 2002, November 2002.

<sup>5</sup> though still well below the target indicated in the Strategic Development Plan 2003 – 2005.



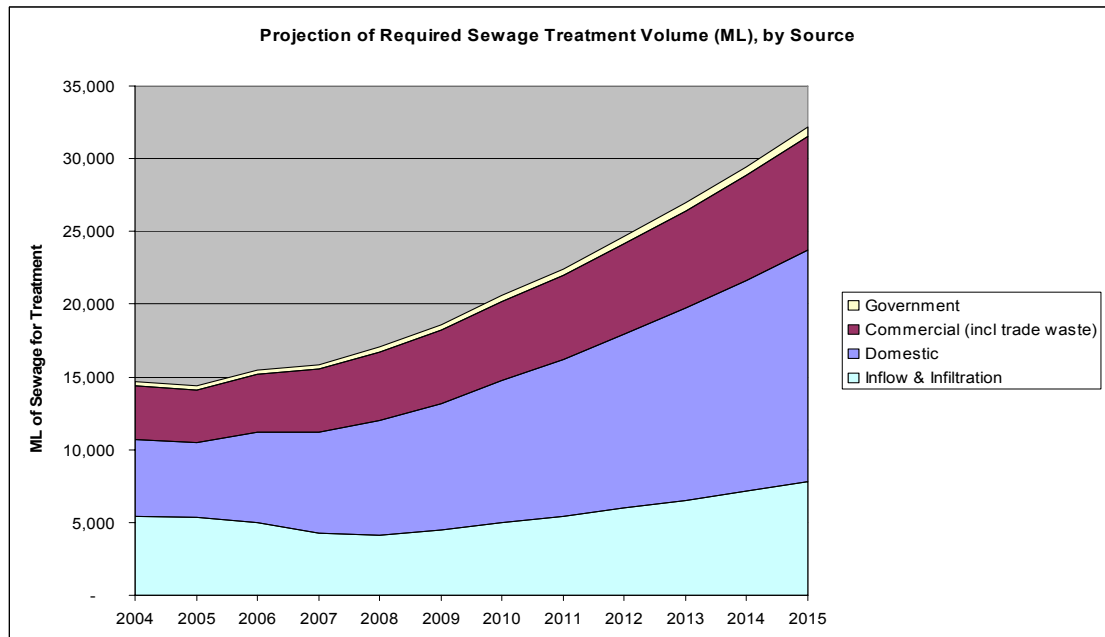
**Figure 4.15**  
Growth in sewerage legitimate connections

As indicated, the total number of sewerage connections rises from about 28,000 in 2008 to about 54,000 by 2015. Based on the above rate of new connections, the required volume of sewage to be treated by division is estimated to increase annually as shown in Figure 4.16.



**Figure 4.16**  
Projection of required sewage treatment

As indicated, total sewage treatment volumes (including inflows and infiltration) rise from slightly less than 16,700 ML in 2008 to about 33,000 ML in 2015.



**Figure 4.17**  
**Projection of required sewage treatment**

#### 4.3.2 Inflow and infiltration

Inflow and infiltration (I&I), defined as the volume of wastewater entering the sewage treatment plants which is not produced by sewerage customers (is largely storm water leaking into the collection system at various points), has not been measured for WSD's sewer collection and treatment systems. Sewage treatment plant managers, however, have informally estimated this volume for the Central/Eastern and Western Divisions and these estimates are used for present purposes. I&I is not known for the Northern Division, but the rate estimated for the Central/Eastern Division is for present purposes applied there, until I&I studies to alter or confirm the estimate have been carried out.

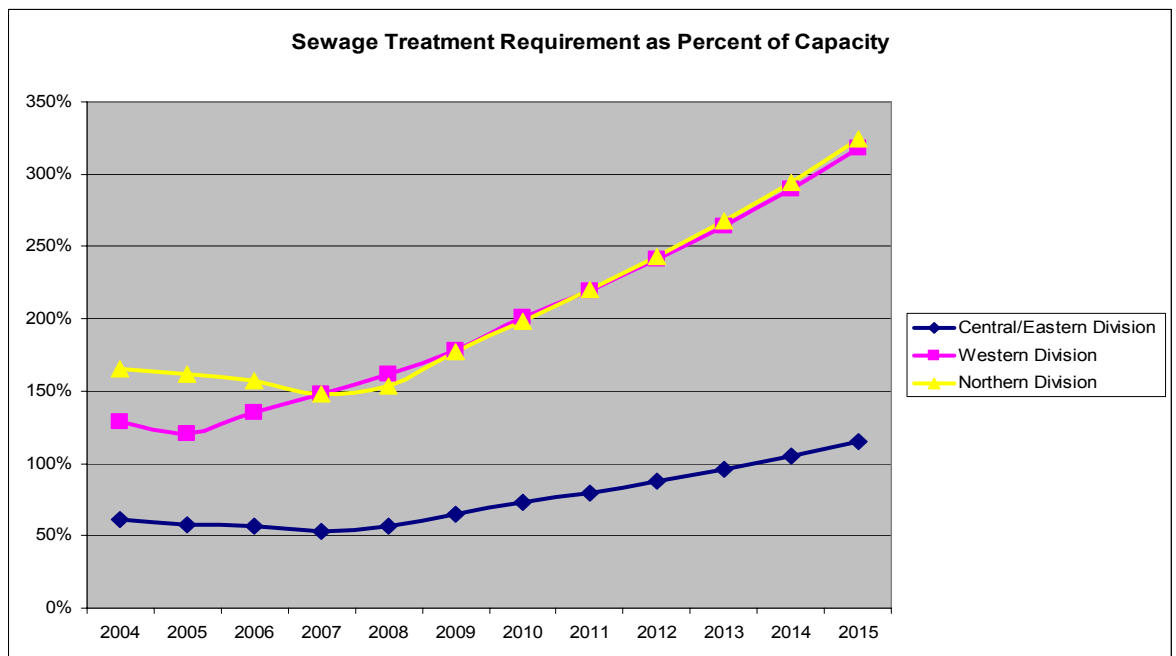
It is estimated that, for the Central/Eastern Division, I&I is currently about 100% of produced sewage volume that is each unit of produced sewage is matched by a unit of I&I which results in the observed dilution of flows into the sewage treatment plants in Central/Eastern. It is further assumed; however, that as work continues under the Suva-Nausori Upgrade Project (and maintenance works extending beyond completion of the project) the I&I rate will gradually diminish towards 40%, reaching that level by 2008. This will have the effect of reducing the total sewage volume that would otherwise have to be treated by existing capacity, thus helping to contain costs. However, as a consequence of the accelerated rate of new sewer connections and extension of the collection systems as discussed above, the total I&I volume begins to climb after 2008. A similar pattern is assumed for the Northern Division.

The current I&I rate estimated by STP managers in the Western Division is markedly less, however, at 25%, because of the drier conditions there, and possibly because the

sewage collection system is in better shape (though that is not confirmed). It is assumed that the rate of 25% is maintained in the Western Division throughout the planning period.

#### 4.3.3 Sewage treatment requirement vs. capacity

Existing sewage treatment capacity in the Central/Eastern Division appears to be adequate to handle increasing flows virtually throughout the ten-year planning period (though expenditure will be required to restore capacity that is not currently functioning properly if effluent standards are to be raised and sustained as required under current legislation). In the Western and Northern Divisions, however, it appears that, barring new investments in sewage treatment plant capacity expansion, existing capacity which is currently above full-utilisation will become increasingly strained over the ten year period (resulting in increasingly inadequate treatment services), as shown in Figure 4.18.



**Figure 4.18**  
**Sewage treatment requirement**

#### 4.4 PROJECTED OPERATING COSTS

Under institutional reform, the cost structure of the WSD will change with respect to the cost structure that applied up to the end of 2004 as a Government department, for two fundamental reasons:

- *'Hidden' costs that were distributed widely among government stakeholders become explicit and focused within the WSD:* some costs that were implicit or hidden under the old structure and shared to varying degrees across a number of Government entities including the Ministry of Works and Energy (MWE), the Ministry of Finance (MoF), the Lands Department, and Native Land Trust Board among others, now become explicit and transferred to the new service provider, the Water and Sewerage Department (WSD). These costs chiefly relate to:

- the transfer of responsibility for water supply and sewerage assets from the MWE and central government to the WSD, with explicit absorption by the WSD of capital costs, asset management costs, asset financing costs, and asset depreciation
- the transfer of environmental and raw water resource costs from the MWE, the Department of Environment, the city councils and health authorities and the Lands Department to the WSD, including the costs of inspections and sound disposal of sludge and effluent and payments to landowners of catchment areas for raw water.
- *Performance standards increase, entailing higher expenditures in both capital investment and operations:* other costs relate to functions which have long been recognised as responsibilities of water supply and sewerage operations but which were generally not performed to an adequate standard under the Government department structure. These include environmental management, sustaining quality and reliability of the urban water supply, protection of assets and protection of the health and safety of personnel working in the sector and of the public at large. As part of the institutional reform of the water supply and sewerage sector, performance in these areas must increase and the higher standards will be enforced under existing and new legislation.

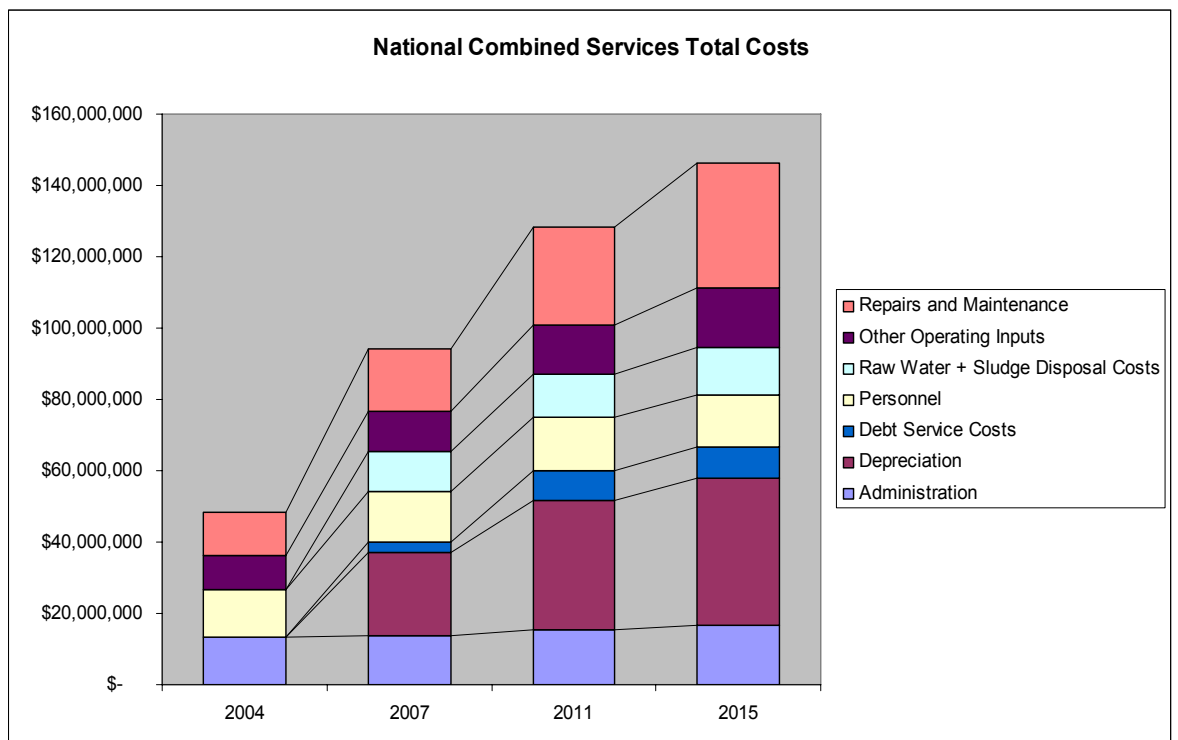
‘Hidden’ costs are made explicit by transforming the WSD’s cost accounting from the previous cash-based system to a cost-accrual based system typical of commercial and semi-commercial entities. The tariff review represents a first step towards this transformation and is based upon a core set of financial statements and projections consistent with accrual-based accounting (which, for example, explicitly recognises asset depreciation as a key component of operating costs). The transformation to accrual-based accounting has been carried forward through 2006 by the financial management component of the PMU Reform Project. The tariff review has therefore been conducted in close coordination with the PMU reform processes (and indeed was under their direction during 2006). However, in 2007, reform is still in process. Key components of the tariff that are essentially assumptions now still need to be confirmed or altered when the reform processes, particularly in regard to financial management and asset management, are complete.

In the discussion of costs and the accompanying figures that follow, it will appear as if the costs of operating the water supply and sewerage sector following institutional reform are substantially higher than the costs were in the years up to 2004, when the sector was operated under a Government department. However, a direct comparison of costs before and after institutional reform is a false comparison, in the sense that the financial accounts prior to reform fail to reflect certain costs that, even though ‘hidden’, did in fact always exist they are now explicitly recognised in the accounts after the reform process. Making such a comparison in the present context is nevertheless desirable, if only to help the Government and other stakeholders to understand the implications of coming to grips with the water supply and sewerage performance and reliability issues and their costs.

In a comparison, then, between recognised costs in 2004 (prior to reform) and 2007 (after reform is implemented) the major differences will relate to the following cost components:

- asset depreciation
- debt service costs
- raw water purchase and sludge disposal costs
- ‘other’ operating costs including occupational health and safety
- repairs and maintenance.

Overhead costs such as personnel and administration will differ by a far lesser degree than the above items. After 2007, overall costs will continue to rise, but mainly in response to demand-driven system investment requirements, asset accumulation and staffing. These changes are shown graphically (for WSD’s combined water supply and sewerage services) in Figure 4.19.



**Figure 4.19**  
National combined services total costs by major component

As indicated, overall costs of the sector which under the pre-reform accounting system were measured at about F\$48 million annually<sup>6</sup> increase to about \$94 million as measured in 2007. Apart from annual debt service cost increasing from about

<sup>6</sup> The actual accounts reflect a somewhat lesser figure due to a large number of staff vacancies then (which persist to the present). The above figure, for comparison purposes, assumes full staffing in 2004 onwards.

\$3 million to about \$9 million between 2007 and 2011, costs rising to about \$128 million in 2011 and \$146 million in 2015 are primarily growth-related. Though there are some growth-related effects between 2004 and 2007, the great majority of the difference is due to explicit recognition of costs that were not accounted for previously, as discussed below.

#### **4.4.1 Depreciation**

Each year that the WSD uses assets to produce and distribute potable water and to collect and treat sewage, the assets progress one year further to the end of their useful lives. The value of the assets 'used up' in one year is that year's depreciation charge and is one of the prime asset-related operating costs (the other being repairs and maintenance, discussed below). This cost did not appear in WSD's predecessor's accounts, but is assumed to be included in the WSD's accounts for 2008.

The value of depreciation in any year depends on the assets in service, their initial cost and the design life and the life remaining of each major component of the assets. Each major asset component has to be assessed separately, as each will have a different design life; for example, civil works are usually designed to last 50 years, whereas a truck with adequate maintenance will last five years.

For the tariff review, in consultation with the PMU Reform Project, assets were valued first with reference to the replacement-value estimates in the department's Asset Register which was completed in 1999, the 1999 assets were revalued to 2004 prices using an inflation factor; then assets built since 1999 (initially from the Nadi-Lautoka and Suva-Nausori upgrade projects, then from continuing investments over the ten year period to 2015) were added; and design-life and remaining-life assumptions for each asset component were employed to estimate an annual depreciation charge through the period. The detailed calculations of this are tabulated in the Tariff Appendix under the Table labelled 'Capital Expenditures and Depreciation.'

In 2006, the PMU Reform Project engaged specialist expertise to update the asset register. The Asset Management and Financial Management Specialists re-estimated the WSD's depreciation costs based on the new asset register, taking into account additional work in parallel on preparation of the WSD's capital development program. The following estimates are extracted from the detailed tabulation in the Tariff Appendix.

The replacement value of water supply assets in 2004 is about \$508 million, increasing to about \$1.3 billion in 2015<sup>7</sup>. The value of net fixed assets in the water supply sector from which accumulated depreciation has been deducted is about \$167 million in 2004 increasing to \$545 million in 2015. The corresponding depreciation charges beginning in 2007 for the water supply sector are \$16.2 million increasing to \$29.6 million in 2015.

The replacement value of sewer service assets in 2004 is about \$184 million, increasing to \$454 million in 2015. The value of net fixed assets in the sewer sector is about \$60.8 million in 2004 increasing to \$176.1 million in 2015. The corresponding

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<sup>7</sup> All values in financial terms, i.e., inflation-adjusted dollars.

depreciation charges in 2007 for the water supply sector are \$6.8 million increasing to \$11.5 million in 2015.

WSD's total depreciation charges for the combined services are thus \$23.1 million in 2007 increasing to \$41.1 million in 2015.

#### **4.4.2 Debt service**

Foreseeable debt service arises from the two external loans that the Government has taken on behalf of the WSD that will be transferred to WSD's responsibility once the reform process is complete. These are:

- The JBIC loan to finance the Nadi-Lautoka Upgrade Project which commenced disbursements in 2000 and was completed in 2005. The loan amount was F\$39.4 million with a total Government counterpart contribution of about \$34 million<sup>8</sup>. The repayment period is 25 years, with an annual interest rate of 2.5%. The grace period, during which no repayments are made to the JBIC but interest is accrued, is seven years from the commencement of disbursements. First payments will thus be due in 2007. Total debt service on the loan under these conditions, including repayments of interest and principal, will be approximately \$3.1 per annum from 2007.
- The ADB loan to finance the Suva-Nausori Upgrade Project which commenced disbursements in 2005<sup>9</sup> and will be completed in 2008<sup>10</sup>. The loan amount was US\$42.3 million with a Government counterpart contribution of about US\$25.4 million. The repayment period is 25 years with an annual interest rate of 3.29%. The grace period is five years from the commencement of disbursements, thus first payments will be due in 2010. Total debt service on the loan under these conditions, including repayments of interest and principal, will be approximately F\$5.5 per annum from 2010.

Total debt service payments are thus \$3.1 per annum in 2007 rising to \$8.6 million per annum from 2010 through the balance of the ten year period.

#### **4.4.3 Raw water and sludge disposal costs**

The costs of raw water acquisition have not been included in the WSD's predecessor accounts as they have been borne by the Lands Department, the agency responsible for making lease payments to the landowners of the water catchment areas throughout the country. This responsibility will be transferred to WSD once institutional reform is

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<sup>8</sup> Actual, necessitated by project cost over-runs. The planned counterpart contribution was less.

<sup>9</sup> With some government counterpart funds disbursed in 2004.

<sup>10</sup> As mentioned in the Note at the beginning of this report, implementation of the Suva-Nausori upgrade project has been seriously delayed, and it now seems unlikely that the Project will be completed by 2008. It is not clear, however, what specific effect this will have on the schedule of disbursements or (in particular) on the repayment schedule. For present purposes, the repayment schedule has not been altered from what it was understood to be in 2005. Subsequent adjustments to the disbursement and repayment schedules that may become necessary will have only a minor effect on the total costs of the WSD.

complete. Since the WSD will be a quasi-commercial organisation it is assumed that the value of raw water acquired for public consumption will be re-assessed. For analytic convenience the payment for raw water is calculated on a water volume basis rather than as a lease payment for land<sup>11</sup>. There is no precedent in Fiji for valuing the water (in large volume) extracted from customary land; the eventual value will be based on negotiations with landowners. For present purposes, an initial estimate of this value has been made of F\$100 per ML<sup>12</sup>.

The disposal of sludge as a by-product of sewage treatment has not been a cost item to date because sludge has not, until recently, been disposed of or used away from the treatment plants. However, there is a recognition that sludge will have to be transported to properly designed and operated land fill sites and the present estimate by STP managers is that this will cost F\$20/tonne. Sludge production is based on total sewage inflows at the rate of one tonne of sludge per ML of sewage.

The estimated cost of disposing of treated effluent is currently zero, implicitly assuming that effluent quality from now on is within standard and that disposal works have been approved by the Department of Environment. The estimate will have to be revised if capital and recurrent costs to achieve this compliance are incurred, an issue is still to be resolved in the context of the reform process.

Under these assumptions the cost of raw water acquisition will be about \$11.0 million per annum in 2007 rising to \$12.4 million per annum in 2015. Sludge disposal will cost \$0.3 million in 2007 rising to \$0.7 million in 2015.

#### **4.4.4 Other operating inputs**

‘Other’ operating inputs include the costs of electricity and treatment chemicals, fuel and oil and the non-salary costs of new-capacity functions that will be taken up by the WSD when institutional reform is complete, such as fully-compliant occupational health and safety programs and customer services. These costs rise from about \$11.2 million in 2007 to \$16.9 million per annum in 2015.

#### **4.4.5 Repairs and maintenance**

Repairs and maintenance costs comprise the second of two major asset-related operating costs (the first is depreciation, as discussed above). Repairs and maintenance expenditure is directly related to the stock of assets employed in operations and the age of the assets (the older they are, the greater the annual expenditure required to keep them operating at full capacity).

It is clear that the WSD’s predecessor organisation has substantially under-spent on Repairs and maintenance in the past (some F\$12 million in 2004), as evidenced by the advanced state of disrepair of many of the assets for which there is (or should be) a significant remaining life. New assets that have been or are being installed under the

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<sup>11</sup> This approach is justified under the assumption that an agreement for fixed lease payments would have to be periodically re-negotiated with landowners anyway, as the total uptake of raw water increases through time. Thus lease payments are ultimately related to water volumes.

<sup>12</sup> Based on the price paid in Sydney, Australia.

two upgrade projects on Viti Levu will suffer this fate unless repairs and maintenance activities are strengthened and annual expenditures increased. That said, it is not possible at present to estimate with confidence what an 'adequate' repairs and maintenance budget for WSD should be, in the absence of a detailed review of assets, the establishment of an asset management system and reasonable estimates at the ground level, stemming from such a review, of what needs to be done to restore assets to peak performance and to keep them in that condition through the rest of their useful lives. Some progress with the asset management system and other issues related to maintenance was made by the PMU during 2006<sup>13</sup>. The estimates now in the financial model need to be validated and adapted as necessary to actual operating experience once the WSD is fully established as an autonomous and corporatised entity. For present purposes, a repairs and maintenance budget that is assumed sufficient to maintain assets at peak performance (after restoration works are completed<sup>14</sup>) is calculated as two% per annum of the replacement value of assets in service, a value that has been determined in consultation with the PMU Reform Project and is referenced upon reported values of such expenditure by utilities in Europe and Australia<sup>15</sup>.

Under these assumptions, the amount budgeted for repairs and maintenance for the combined services is \$17.8 million in 2007, rising to about \$35.1 million per annum in 2015.

The following figures show graphically how costs are projected to change through time for the water supply sector, the sewer service sector and for the combined WSD services, based on the above approach and assumptions. A detailed tabulation of projected WSD costs is provided in the Tariff Appendix under the tables labelled 'Market data' and 'Recurrent costs'.

For the national water supply, total costs rise from \$74.1 million in 2007 to \$114.6 million in 2015, chiefly due to increases in depreciation, repairs and maintenance and debt service (all asset related, driven by system growth).

For the national sewerage service, total costs rise from \$20.3 million in 2007 to \$31.8 million in 2015. As for the water supply sector, cost increases are chiefly due to increases in depreciation, repairs and maintenance and debt service (all asset related, driven by system growth).

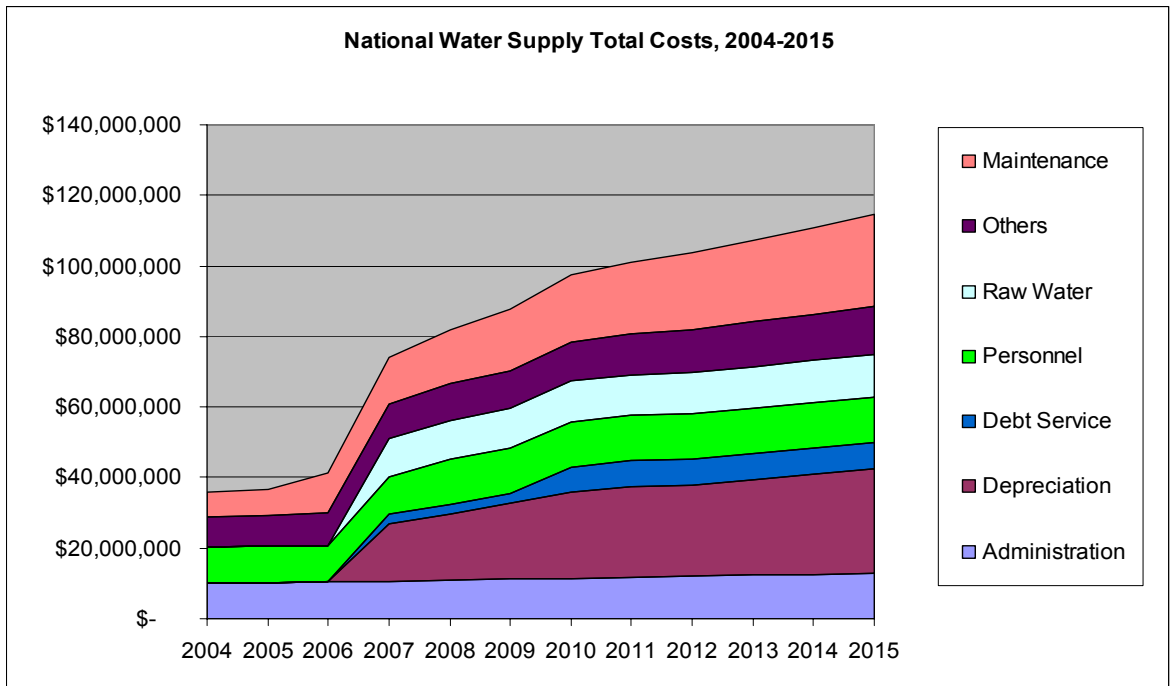
For the national combined services, annual operating costs rise from \$94.3 million in 2007 to \$146.4 million in 2015.

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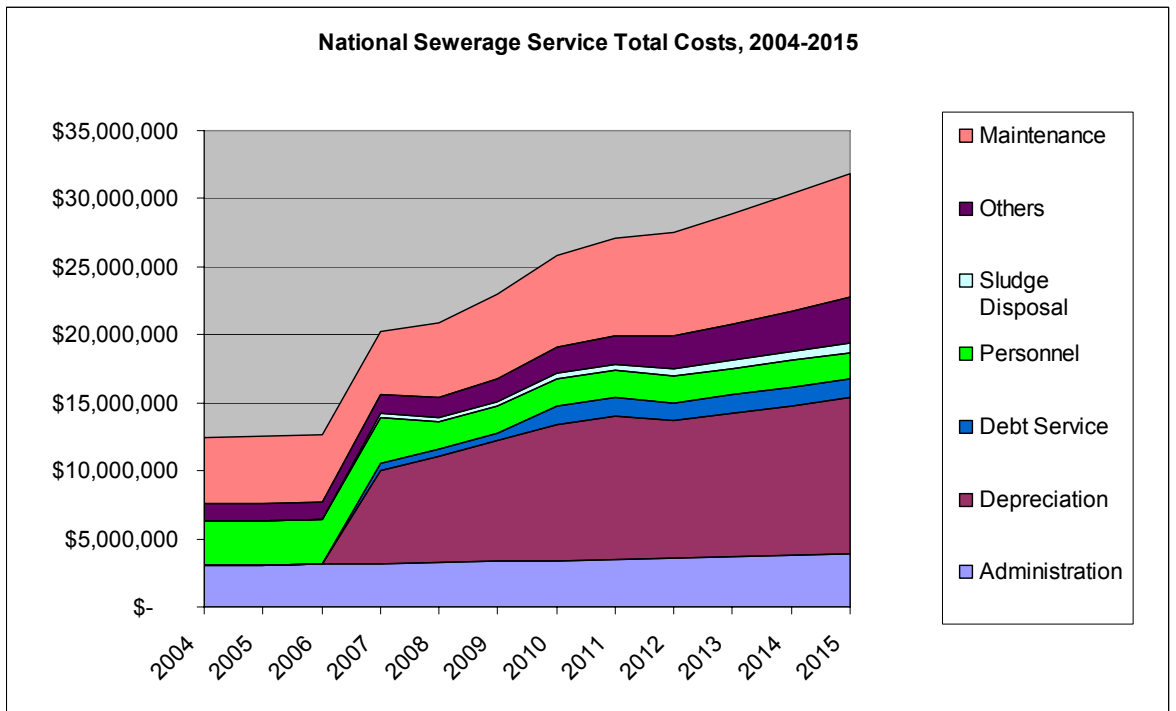
<sup>13</sup> However, no changes were made by the PMU to the underlying parameters of the repairs and maintenance estimate in the 2005 version of the financial model.

<sup>14</sup> Restoration works, the costs of which over several years have been roughly estimated for present purposes, are included in the capital budget. Repairs and maintenance is, in contrast, an operating cost item.

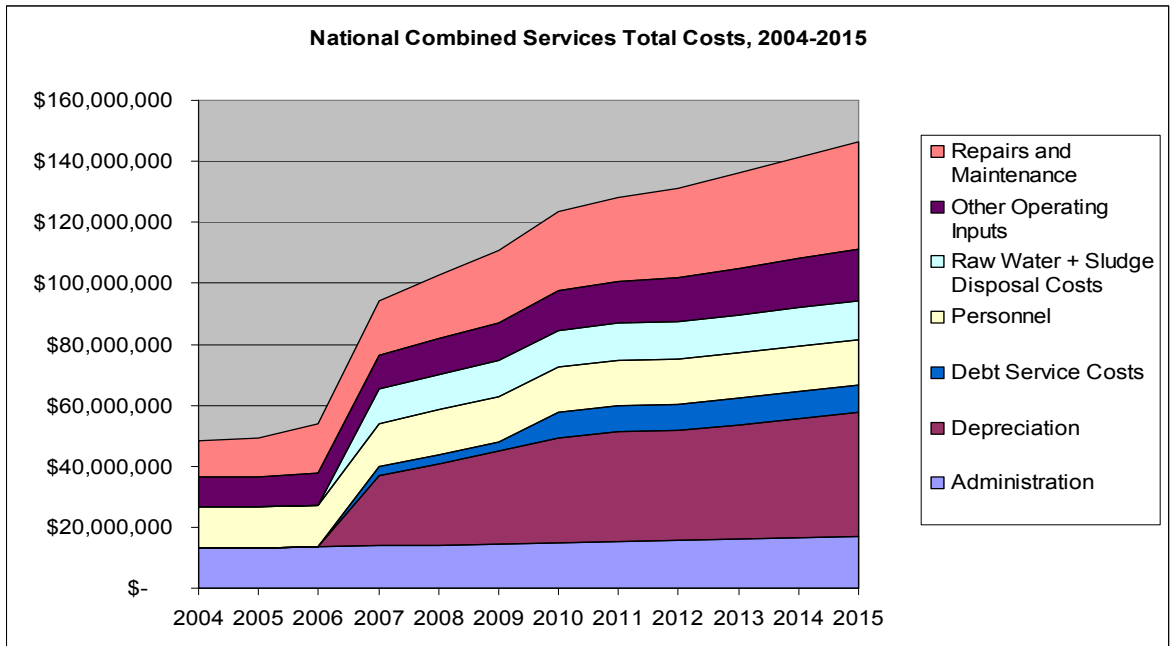
<sup>15</sup> *GHD's Approach to Assisting Clients to Develop Accurate Future Maintenance Budgets When Constructing AMPs* [Asset Management Plans], GHD Asset Management Group, Life Cycle Group (Melbourne), January 2001



**Figure 4.20**  
National water supply costs



**Figure 4.21**  
National sewerage service



**Figure 4.22**  
National combined services

#### 4.5 PROJECTED CAPITAL COSTS

The PMU Reform Project team has developed a draft capital development program for the WSD to 2015, to reflect the costs of ongoing investments in system upgrades, replacement of assets, backlog maintenance and certain costs (example consulting costs, metering inspection and correction) associated establishment of the corporatised entity. The capital program developed by the PMU in 2006 is summarised in Table 4.1.

**Table 4.1 Projected capital expenditures**

Financial Years	2007	2008	2009	2010	2011	2012	2013	2014	2015	Totals
<b>Capital Expenditures</b>										
Consultancy Services	\$ 1,600,000	\$ 1,100,000								\$ 2,700,000
Updating Infrastructure Asset Register	\$ 400,000									\$ 400,000
Offices Relocation / New Buildings	\$ 1,000,000	\$ 2,000,000	\$ 1,000,000							\$ 4,000,000
Customer Services & Call Center Set-up	\$ 500,000	\$ 1,000,000								\$ 1,500,000
Information Technology (hardware & software)	\$ 1,200,000	\$ 1,200,000								\$ 2,400,000
Water Supply Investment Program	\$ 44,750,000	\$ 43,350,000	\$ 47,550,000	\$ 30,000,000	\$ 30,000,000	\$ 30,000,000	\$ 30,000,000	\$ 30,000,000	\$ 30,000,000	\$ 315,650,000
Sewerage Investment Program	\$ 32,500,000	\$ 38,300,000	\$ 39,675,000	\$ 14,850,000	\$ 10,400,000	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000	\$ 175,725,000
Asset Replacement - Water										
Northern	\$ 2,938,025	\$ 67,500	\$ 71,400	\$ 57,120	\$ 49,651	\$ -	\$ 72,822	\$ -	\$ 99,960	\$ 3,356,479
Central Eastern	\$ 4,758,000	\$ 5,561,037	\$ 6,659,920	\$ 6,746,845	\$ 6,183,352	\$ 4,935,120	\$ 7,487,890	\$ 6,943,205	\$ 5,284,080	\$ 54,559,450
Western	\$ 2,714,253	\$ 5,605,730	\$ 2,829,153	\$ 4,077,736	\$ 3,061,194	\$ 3,194,491	\$ 4,035,975	\$ 4,253,618	\$ 2,873,668	\$ 32,645,817
Asset Replacement - Sewerage										
Northern	\$ 1,159,604	\$ 33,073	\$ -	\$ -	\$ -	\$ 64,029	\$ -	\$ -	\$ -	\$ 1,256,706
Central Eastern	\$ 1,408,829	\$ 1,408,829	\$ 4,272,210	\$ 1,465,521	\$ 1,736,574	\$ 1,551,298	\$ 1,449,326	\$ 1,408,829	\$ 1,408,829	\$ 16,110,246
Western	\$ 769,542	\$ 4,553,435	\$ 803,872	\$ 879,345	\$ 1,653,642	\$ 1,198,609	\$ 803,751	\$ 769,542	\$ 769,542	\$ 12,201,277
Asset Upgrade (Meet Quality Standards) - Water										
Northern	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000							\$ 9,000,000
Central Eastern	\$ 5,400,000	\$ 5,400,000	\$ 5,400,000							\$ 16,200,000
Western	\$ 1,133,333	\$ 1,133,333	\$ 1,133,333							\$ 3,400,000
Asset Upgrade (Meet Quality Standards) - Sewerage										
Northern			\$ 285,714	\$ 285,714	\$ 285,714	\$ 285,714	\$ 285,714	\$ 285,714	\$ 285,714	\$ 2,000,000
Central Eastern			\$ 821,429	\$ 821,429	\$ 821,429	\$ 821,429	\$ 821,429	\$ 821,429	\$ 821,429	\$ 5,750,000
Western			\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 1,750,000
Backlog Remediation										
Environmental Remediation	\$ 100,000	\$ 100,000	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 300,000
OHS Remediation	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 6,000,000
Backlog Connection Remediation	\$ 7,509,600	\$ 7,509,600	\$ 7,509,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 22,528,800
Routine Meter Testing/Repair/Replacement	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 1,247,570	\$ 11,228,130
New Meter Connections	\$ 189,016	\$ 780,428	\$ 1,235,810	\$ 1,132,083	\$ 405,349	\$ 383,439	\$ 391,265	\$ 399,239	\$ 357,351	\$ 5,273,982
<b>Total Capital Expenditures</b>	<b>\$ 116,277,773</b>	<b>\$ 125,350,534</b>	<b>\$ 125,845,011</b>	<b>\$ 61,813,363</b>	<b>\$ 56,094,475</b>	<b>\$ 53,931,699</b>	<b>\$ 56,845,743</b>	<b>\$ 56,379,146</b>	<b>\$ 53,398,142</b>	<b>\$ 705,935,886</b>

The sum of capital expenditures expected over the period 2007–15 include:

- \$316 million to complete water supply upgrade projects, including the ongoing multilateral financed projects on Viti Levu and a provision for \$30 million per annum between 2010 and 2015 to permit continued investment in upgrades of the system nationally
- \$176 million to complete expansion and improvement of sewage collection and treatment plant capacity, including an allowance of \$10 million per annum between 2011 and 2015 to continue expansion of systems nationally
- a provision for \$91 million and \$30 million respectively to allow for replacement of water supply and sewerage assets (treatment plant equipment, pipes and pumps) as they wear out
- a provision for \$29 million and \$10 million for ongoing work to improve quality standards for the water supply and sewerage services across all divisions
- \$11 million for capital expenditures related to institutional reform, including office relocation, consultancy services, call centre set-up and branding activities and information technology development
- \$29 million for ‘backlog’ maintenance of existing assets to restore performance
- \$11 million for meter inspection, testing, and replacements to convert illegal water supply connections to legitimate connections and to correct faulty meters; and a further \$5.3 million for provision of new meters as required to meet demand for new connections.

Many of the sums indicated above are estimated, especially the investment requirements for expanding and improving treatment facilities; the ‘backlog’ maintenance requirements to meet environmental and occupational health and safety regulations, and the cost of asset replacements (including meters). These estimates need to be validated by detailed engineering assessment and costing, to be carried out over the first several years of operation of the corporatised entity. Periodic reviews of the capital budget (and its tariff implications) will be needed as operations proceed.

# 5 Revenues and tariff issues

It has been widely recognised, since before the TA and institutional reform processes began, that there is a large gap between the revenues that are collected for water supply and sewerage services from customers and the cost of operating the services, even the costs as measured under the Government's cash-based accounting system which, as discussed, ignore large components of true costs such as depreciation. For example, in 2004, invoices issued for water and sewerage in all divisions totalled \$22.3 million<sup>16</sup>, of which \$15.7 million was collected in revenues, in a year when total costs measured by the Government accounting system were about \$46 million. Part of the gap is due to a poor rate of revenue collection against invoices, which in 2004 was about 70% nationally. The tariff review assumes that the revenue collection rate will improve to 95% by 2010 through reform of customer service and revenue collection procedures and will be maintained at that level thereafter.

## 5.1 THE 'FINANCIAL GAP'

The true financial gap at the existing tariff, once all major cost items as discussed above have been included, is much higher than indicated by the Government accounts. Figure 5.1 shows projections of the operating revenues, operating expenditures and net losses of the WSD over the ten year period under an assumption that the current tariffs for WSD services are not changed, but all other assumptions regarding institutional reform and growth are maintained. This is done to demonstrate the full extent of the gap and how it is affected by future system growth.

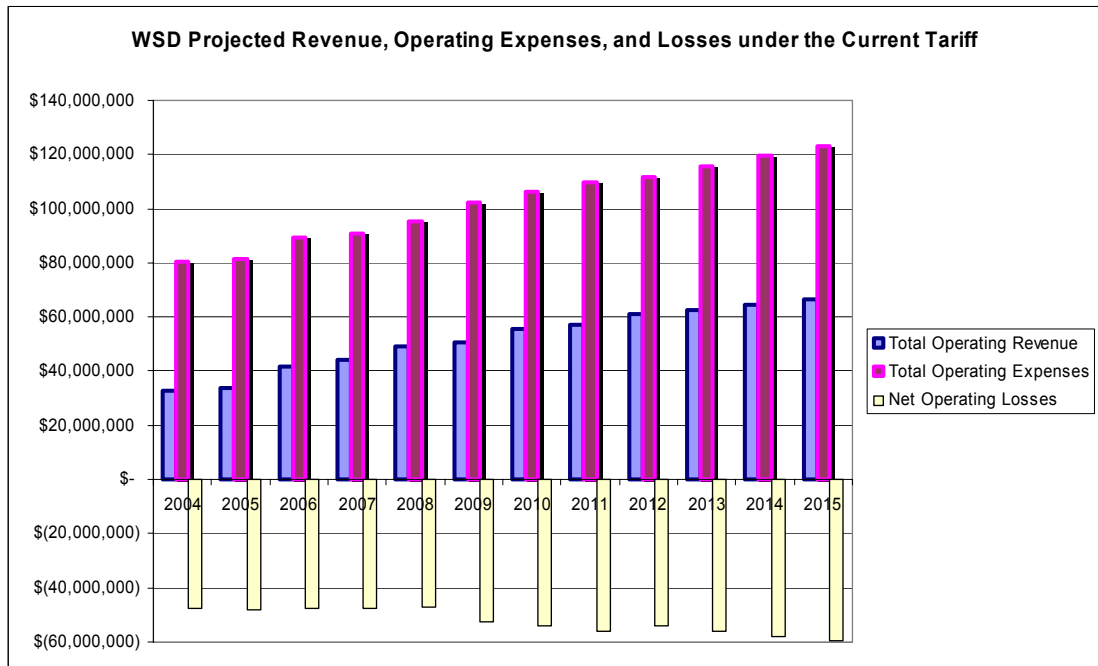
As indicated, net operating losses gradually increase as growth proceeds through the period and are cumulatively more than 100% of revenues, despite improvements in efficiency and reductions in unmetered consumption that are built into the assumptions on the cost side.

Depreciation charges as discussed above make up about 27% of operating expenses and account for about 46% of operating losses in 2005. When depreciation is deducted from operating costs, the result measures the 'cash costs' of operations, or 'operations, maintenance, and management' (OMM) costs, which include wages and salaries,

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<sup>16</sup> This figure represents an apparent considerable under-billing of metered consumption that year, as the true invoices for water and sewerage in 2004 based on reported volumes equate to a calculated \$33 million. The difference is partly explained by (i) rebates to consumers for on-premises leakages; and (ii) a legal allowance for an amount of 'social obligation' or free water consumed by churches, schools, and hospitals. The total volume of 'social obligation' water under present arrangements is not known but is estimated for present purposes at about 500 ML/year.

inputs such as electricity, chemicals, and fuel, outside services and all other inputs for which cash must be paid to keep operations going. When OMM costs are used for expenditures instead of the full operating costs, the cash loss under the current tariff averages about \$24 million per year.



**Figure 5.1**  
**WSD projected revenue**

The gap shown here highlights two issues of immediate interest:

- Operations at the existing tariff cannot be sustained without an annual cash subsidy from the government of at least \$24 million per year and a further implicit subsidy of about \$22 million in 2005 rising to about \$35 million in 2015 to cover depreciation.
- There are no internal funds to generate cash reserves and support investment (or contingencies), resulting in a need to subsidise 100% of capital financing costs. It is instructive at this point to consider the scale of overall water supply tariff increase<sup>17</sup> that would be required to achieve OMM cost recovery 85% eliminating reliance on the government to sustain recurrent operations, but without generating cash reserves and 165% higher than cost tariff board. Full cost recovery, thus eliminating reliance on the government for recurrent operations, depreciation, and financing costs, and accumulating cash reserves.

Table 5.1 details the cost recovery scenarios.

<sup>17</sup> Assuming no adjustment to the sewerage charge, currently set as a surcharge of \$0.20 per cubic meter of water consumed.

**Table 5.1 Cost recovery scenarios**

	Current Tariff		OMM-Recovery Tariff			Full-Cost-Recovery Tariff		
	Tariff Levels	Weighted Average Tariff per m3	Required Percent Increase from Current Levels	Increased Tariff Levels	Weighted Average Tariff per m3	Required Percent Increase from Current Levels	Increased Tariff Levels	Weighted Average Tariff per m3
<b>Water Supply (per m3 per quarter)</b>								
<i>Domestic</i>		\$ 0.553			\$ 1.127			\$ 1.520
Basic Charge	\$ -		\$ -	\$ -		\$ -	\$ -	
0-50 m3	\$ 0.153		85%	\$ 0.283		165%	\$ 0.405	
51-100 m3	\$ 0.439		85%	\$ 0.812		165%	\$ 1.163	
>100 m3	\$ 0.838		85%	\$ 1.550		165%	\$ 2.221	
Water Connection Fee	\$ 21.95		85%	\$ 40.61		165%	\$ 58.17	
Water Re-Connection Fee	\$ 10.00		85%	\$ 18.50		165%	\$ 26.50	
<i>Commercial</i>		\$ 0.529			\$ 1.079			\$ 1.455
Basic Charge	\$ -		\$ -	\$ -		\$ -	\$ -	
All Usage m3	\$ 0.529		85%	\$ 0.979		165%	\$ 1.402	
Water Connection Fee	\$ 100.98		85%	\$ 186.81		165%	\$ 267.60	
Water Re-Connection Fee	\$ 10.00		85%	\$ 18.50		165%	\$ 26.50	
<i>Government</i>		\$ 0.529			\$ 1.079			\$ 1.455
Basic Charge	\$ -		\$ -	\$ -		\$ -	\$ -	
All Usage m3	\$ 0.529		85%	\$ 0.979		165%	\$ 1.402	
Water Connection Fee	\$ 100.98		85%	\$ 186.81		165%	\$ 267.60	
Water Re-Connection Fee	\$ 10.00		85%	\$ 18.50		165%	\$ 26.50	
<b>Sewer Service (per m3 water supplied per quarter)</b>								
<i>Domestic</i>		\$ 0.20			\$ 0.408			\$ 0.55
All Usage m3	\$ 0.200		0%	\$ 0.200		0%	\$ 0.200	
Sewer Connection Fee	\$ 15.25		0%	\$ 15.25		0%	\$ 15.25	
<i>Commercial</i>		\$ 0.20			\$ 0.408			\$ 0.55
All Usage m3	\$ 0.200		0%	\$ 0.200		0%	\$ 0.200	
Sewer Connection Fee	\$ 15.25		0%	\$ 15.25		0%	\$ 15.25	
<i>Government</i>		\$ 0.20			\$ 0.408			\$ 0.55
All Usage m3	\$ 0.200		0%	\$ 0.200		0%	\$ 0.200	
Sewer Connection Fee	\$ 15.25		0%	\$ 15.25		0%	\$ 15.25	
Net Profit/(Loss) in 2010	\$ (71,010,849) with depreciation \$ (36,644,901) without depreciation		\$ (33,124,307) with depreciation \$ 1,241,642 without depreciation		\$ 2,533,616 with depreciation \$ 36,899,565 without depreciation			
Cash Accumulation Greater than Zero from 2010?	No		Yes		Yes			

For illustrative purposes, typical monthly bills for domestic customers are calculated as shown below for different levels of consumption at the notional tariff levels shown in Table 5.2.

**Table 5.2 Typical monthly bills, domestic customers**

	Existing tariff	OMM recovery	Full cost recovery
25 m <sup>3</sup> per month	\$6.21	\$11.49	\$16.45
50 m <sup>3</sup> per month	\$23.83	\$44.09	\$63.16
100 m <sup>3</sup> per month	\$65.73	\$121.61	\$174.19
150 m <sup>3</sup> per month	\$107.63	\$199.12	\$285.23

The above tables are intended merely to show the estimated scale of the across the board tariff increases required to meet two types of financial objective and (broadly) their impact on domestic consumers' bills, based on the cost assumptions previously discussed. They do not reflect any consideration of how the tariff should be structured across different customer classes to meet socioeconomic objectives.

## 5.2 PROPOSED TARIFF SETTING CONSIDERATIONS

### 5.2.1 Poverty and willingness to pay

A customer survey and statistical analysis of customer willingness to pay for water was carried out as a Master's Thesis<sup>18</sup> in Lautoka, in early 2004. The survey by interview of 250 randomly-selected water supply customers sought information on each respondent's socioeconomic background, occupation, education level and other parameters and included, statistically quantifiable and testable questions indicating the respondents' degree of willingness to pay for water, under hypothetical increases in the quality and reliability of water supply service in the Lautoka area. Although the majority of respondents were low income, the study found a small but positive and significant willingness to pay more for water than the respondents pay at present, approximately 25% more than a bill based on the minimum-block rate. It was also found that expressed willingness to pay is highly constrained by a lack of credibility of the hypothetical improvements in supply that the respondents generally shared, no doubt borne of long experience with frequent and lengthy supply interruptions and the widely perceived ineffectiveness of the water supply department to address such problems.

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<sup>18</sup> Mirti, Anumitra V., *Estimating Lautoka (Fiji) Residents' Willingness to Pay for Improvement in Water Supply – (An Application of Contingent Valuation Method)*, Master's Thesis prepared for the Asia-Pacific School of Economics and Governance, Australian National University, June 2004.

The Lautoka study's results support the assumptions employed for present purposes that:

- there is a significant willingness to pay a higher tariff for water than the present tariff, in exchange for credible improvements in service quality and reliability
- that such willingness to pay will increase as real improvements in supply become effective and are recognised.

It is observed in this connection that the role of investment and institutional reform in the water supply and sewerage sector in reducing poverty in Fiji does not consist solely, or even mainly, in keeping rates to poor households as low as they are now (an average of F\$6.21 per month for consumption of 25 m<sup>3</sup> by a family of five). As has been documented elsewhere<sup>19</sup>, a prime indicator of poverty or 'hardship' in Fiji is deprivation of reliable access to basic services, including most importantly, a potable water supply. The chronically insufficient performance of the Government provider of the water supply in many urban areas in the past has contributed to hardship in those areas; alleviating such hardship through lasting improvements in supply will directly improve such indicators. As the above Lautoka study shows a small but significant willingness to pay for water in exchange for better supply, it supports the conclusion that poverty will be alleviated, in the view of poor households, even if monthly bills increase. To confirm this, it is recommended that additional willingness to pay studies be conducted in other urban areas of Fiji (including where reliability standards differ from Lautoka's), including an attempt to estimate the monetised costs that poor households face to secure alternative sources of water when the piped supply is interrupted, as an indicator of 'revealed' willingness to pay for a minimum reliable supply.

### **5.2.2 Proposed tariff structure criteria**

Under the cost assumptions discussed previously, the average cost of treating raw water and delivering a potable water supply to consumers in Fiji is approximately F\$1.50 per m<sup>3</sup>. Since all consumers pay rates that are well below the average cost of supply under the present tariff structure, *all* water supply consumers are effectively subsidised by funds from the Government's consolidated revenues, including even large businesses and industries, relatively well-off households and government consumers themselves. Given that there is no poverty-related justification for subsidising consumers who can afford to pay and that mis-targeted subsidies promote wasteful consumption (consumption that costs economic resources but provides little or no benefit), the current tariff is inefficient in the sense that it is ultimately leading the country to expend more resources on the water supply than the minimum necessary to provide the sector's aggregate economic benefit. A new tariff is therefore in order, one which focuses subsidy narrowly on the poor, but which ensures that all others pay rates that meet the costs of supplying them.

A survey of several urban communities that was conducted under the CEAP component of this TA found that wasteful consumption patterns are prevalent with

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<sup>19</sup> See, for example, *Priorities of the People: Hardship in Fiji*, ADB, 2005, and other country reports in the ADB's series on poverty in the Pacific.

little grassroots understanding of water issues or conservation benefits, even among poor households<sup>20</sup>. This indicates that the effect of a higher tariff on household budgets will be partly offset by reductions in wasteful consumption in all households. Also, as mentioned previously, there appears to be a high incidence throughout the country of illegal water supply connections<sup>21</sup> and the provision of rebates on customers' water bills for leakages on the customers' premises is a common WSD practice, thus reducing or removing incentive to track down and fix such leaks. Prior to and in conjunction with introducing a new tariff, therefore, it will be necessary to conduct an awareness campaign on water conservation and billing issues, eliminate the practice of rebating customers for after-the-meter leakages and track down all illegal connections and convert them to legitimate connections.

A number of basic 'structural' criteria for setting a new tariff for water supply and sewerage services in Fiji are proposed as follows:

- The tariff structure should be simple to administer and easy for customers to understand. In general, the new tariff structure should deviate from the current structure by the minimum necessary to achieve the WSD's financial goals and pro-poor objectives.
- No new tariff structure will make sense or have the desired efficiency effects without eliminating rebates and rigorously correcting all illegal connections, supported by an effective public awareness campaign.
- Non-poor consumers, which include commercial and industrial users, government users and non-poor households, should be charged a full cost recovery tariff for water supply.
- The present approach to cross-subsidising poor households, which relies on a 'rising block' structure under which an initial quantity of water consumed per period is charged at a lower rate than subsequent units, should be maintained, as it is simple to administer and is familiar to consumers. The initial block should, however, be sized to ensure that poor households are the main beneficiaries. Non-poor households habitually consume more water than poor households: the initial block should not exceed the basic needs of a poor household.
- The current quarterly billing cycle should be more frequent (monthly or even bimonthly is preferable) in order to reduce average bills. The less frequent the billing cycle the larger the bill, for a given level of monthly consumption and thus

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<sup>20</sup> *Community Consultative Survey, An Assessment of Need for Education and Awareness*, TA 4270-FIJ, April 2005. All things equal, the finding appears to indicate that, at the current tariff, water supply costs aren't particularly onerous even to the poor.

<sup>21</sup> It is likely that the average monthly consumption of a household with an illegal connection is higher than that of a same-size household with a legitimate connection, since the former pays nothing for the water, implying that much of the excess consumption is waste. (The tariff model at present assumes the consumption of an illegal connection is double that of a legitimate connection.) Therefore, converting illegal connections should have a rapid effect on reducing waste.

may eliminate the subsidy effect on poor households of the initial (subsidised) tariff block.

- A basic minimum charge per billing cycle (differing by customer category) is justified to defray overhead customer service costs which are incurred for each legitimate connection, even when consumption is very low or zero.
- The rate charged for sewerage can justifiably be cross-subsidised by the water supply tariff and/or externally subsidised, in view of the public-good environmental benefit of maximising the number of sewerage connections. The only exception to this criterion relates to large commercial, industrial, and Government producers of sewage ('trade waste' users) who should be charged the full cost of collecting and treating the wastes produced by their processes, as these costs are legitimately part of their output costs and need not be subsidised.

### **5.3 PROPOSED TARIFF (FOR REVIEW AND DISCUSSION)**

A tariff structure and level that meet the above criteria is outlined below. What follows should not be interpreted, however, as a tariff recommendation for the Water and Sewerage Department but rather as a demonstration of the implications of the foregoing cost analysis and discussion of tariff issues, to be used as a reference point for review and discussion as the reform process proceeds.

#### **5.3.1 The minimum-rate block of domestic water consumption**

Average rural water consumption has been estimated at 160 litres/capita/day<sup>22</sup> and is less than the average urban water consumption for households (about 200 litres/capita/day) calculated within the tariff review model. The 160-litre figure is employed here as an indicator of a minimum necessity level of water consumption for a poor household. With an average urban household size<sup>23</sup> of approximately five in Fiji, average subsistence consumption per household is 800 litres per day, or about 25 m<sup>3</sup> per month. Therefore, adopting a bimonthly billing cycle, the minimum-rate block of 50 m<sup>3</sup> would be renewed every two months.

A 50% increase in the minimum block rate for domestic customers is proposed, i.e., from the current \$0.153/m<sup>3</sup> to \$0.23/m<sup>3</sup>. For a poor household maintaining consumption within the 25m<sup>3</sup>/month band, monthly costs would rise from the current \$6.21 per household (see Table 3.4) to \$7.75 per household, representing a total increase of about 25%. The total percentage increase in monthly bills is less than the percentage increase in the minimum block rate because the increase is partly ameliorated by switching to a bimonthly rather than quarterly billing cycle.

#### **5.3.2 Proposed usage rates for domestic water consumption above the minimum block**

It is proposed that the two higher-consumption blocks for the domestic sector be maintained as they are (51–100 m<sup>3</sup>, and greater than 100 m<sup>3</sup>), but on a bimonthly

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<sup>22</sup> See reference in footnote 19.

<sup>23</sup> 1996 Census

rather than quarterly billing cycle. The rates for the next highest consumption block would be increased by 100% of its present level, i.e., from \$0.439/m<sup>3</sup> to \$0.878/m<sup>3</sup>, while the highest block would increase by the full recovery rate (165%), i.e., from \$0.838/m<sup>3</sup> to \$2.221/m<sup>3</sup>.

### **5.3.3 Proposed usage rates for commercial and government water consumption**

The existing rates for all usage by these customer categories would be increased by 165%, from \$0.529/m<sup>3</sup> to \$1.402/m<sup>3</sup>.

### **5.3.4 Water supply connection and re-connection fees**

Water supply connection fees should remain unchanged at \$21.95 and \$100.98 for the domestic and commercial/government categories, respectively.

Reconnection fees should increase by 100% in the domestic category from \$10.00 to \$20.00 and by 165% in the commercial/government category from \$10.00 to \$26.50 as an increased bill payment incentive.

### **5.3.5 Basic charges for water supply**

Introduction of minimum basic charges per billing cycle is proposed to help defray fixed customer service costs. A minimum charge of \$4.00 per two month billing cycle is proposed for all households with a minimum charge for the commercial/government categories of \$20.00 on the same billing cycle. These charges would bring approximately \$5.1 million in fees to the WSD in 2008, rising to \$6.6 million by 2015.

### **5.3.6 Charges for sewerage service**

It is proposed to leave sewerage charges including sewer connection fees unchanged from existing levels in order to promote wide acceptance of sewerage connections as the sewer systems are extended.

For reference, the above proposed tariff changes are summarised in Table 5.3.

These tariff changes, under all of the cost, institutional reform and customer and system growth assumptions as discussed previously, would recover the full costs of the water supply and sewerage sector beginning in 2010 (the assumed date of implementation of the new tariff). The financial performance of the WSD under these conditions is shown in the detailed model tables presented in the Volume 7 – Appendix.

**Table 5.3 Proposed tariff changes (for discussion)**

	Current Tariff (2004/05)	National Uniform Tariff Scenarios				
		Weighted Average Tariff per m3 in 2004	Year of Adjustment	Tariff after Adjustment	Weighted Average Tariff per m3 in year of Implementation	Percent Increase in Weighted Average Tariff
			Tariff Level (\$) or Increase (%)			
<b>Water Supply (per m3 billed every two months)</b>						
<i>Domestic</i>						
		\$ 0.56	2010		\$ 1.37	146.66%
Basic Charge per period	\$ -		\$ 4.00	\$ 4.00		
0-50 m3	\$ 0.153		50%	\$ 0.230		
51-100 m3	\$ 0.439		100%	\$ 0.878		
>100 m3	\$ 0.838		165%	\$ 2.221		
Water Connection Fee	\$ 21.95		0%	\$ 21.95		
Water Re-Connection Fee	\$ 10.00		100%	\$ 20.00		
<i>Commercial</i>						
		\$ 0.48	2010		\$ 1.38	188.66%
Basic Charge	\$ -		\$ 20.00	\$ 20.00		
All Usage m3	\$ 0.529		165%	\$ 1.402		
Water Connection Fee	\$ 100.98		0%	\$ 100.98		
Water Re-Connection Fee	\$ 10.00		165%	\$ 26.50		
<i>Government</i>						
		\$ 0.53	2010		\$ 1.46	175.43%
Basic Charge	\$ -		\$ 20.00	\$ 20.00		
All Usage m3	\$ 0.529		165%	\$ 1.402		
Water Connection Fee	\$ 100.98		0%	\$ 100.98		
Water Re-Connection Fee	\$ 10.00		165%	\$ 26.50		
<b>Sewer Service (per m3 water supplied per quarter)</b>						
<i>Domestic</i>						
		\$ 0.25	2010		\$ 0.25	0.00%
All Usage m3	\$ 0.200		0%	\$ 0.200		
Sewer Connection Fee	\$ 15.25		0%	\$ 15.25		
<i>Commercial</i>						
		\$ 0.25	2010		\$ 0.25	0.00%
All Usage m3	\$ 0.200		0%	\$ 0.200		
Sewer Connection Fee	\$ 15.25		0%	\$ 15.25		
<i>Government</i>						
		\$ 0.25	2010		\$ 0.25	0.00%
All Usage m3	\$ 0.200		0%	\$ 0.200		
Sewer Connection Fee	\$ 15.25		0%	\$ 15.25		

*Appendix 1*

## **SUMMARY**

## Water and Sewerage Department

### SUMMARY OPERATIONAL AND FINANCIAL PROJECTIONS

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
<b>WATER SUPPLY OPERATIONS</b>									
Connections									
Domestic	117,560	124,351	135,008	144,807	148,389	151,795	155,269	158,814	161,930
Commercial	9,049	9,891	11,337	12,657	13,066	13,438	13,818	14,206	14,603
Government	1,292	1,464	1,719	1,921	1,983	2,040	2,098	2,157	2,218
<b>Total Connections</b>	<b>127,901</b>	<b>135,705</b>	<b>148,064</b>	<b>159,384</b>	<b>163,438</b>	<b>167,272</b>	<b>171,185</b>	<b>175,177</b>	<b>178,751</b>
Total Treated Water Produced (ML)	109,924	111,573	113,247	114,945	116,670	118,420	120,196	121,999	123,829
Total Treated Water Consumed (ML)	58,868	64,359	73,610	82,600	85,169	87,631	90,147	92,719	95,348
Unaccounted For Water (UFW, ML)	51,057	47,214	39,636	32,345	31,501	30,789	30,049	29,280	28,481
UFW (% Water Produced)	46.45%	42.32%	35.00%	28.14%	27.00%	26.00%	25.00%	24.00%	23.00%
<b>SEWERAGE SERVICE OPERATIONS</b>									
Connections									
Domestic	21,856	24,042	26,446	29,091	32,000	35,200	38,720	42,592	46,851
Commercial	2,991	2,680	2,948	3,243	3,567	3,924	4,316	4,748	5,222
Government	182	200	220	242	266	292	322	354	389
Trade waste connections	490	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
<b>Total Connections</b>	<b>25,519</b>	<b>28,021</b>	<b>30,714</b>	<b>33,675</b>	<b>36,932</b>	<b>40,516</b>	<b>44,457</b>	<b>48,793</b>	<b>53,562</b>
Total Sewage Treated and Disposed (ML)	15,448	16,676	18,713	20,988	22,986	25,182	27,606	30,282	33,287
Total Volume Effluent to Sewer (ML)	11,390	12,675	14,210	15,939	17,456	19,125	20,967	22,999	25,280
Inflow and Infiltration (ML)	4,058	4,000	4,503	5,049	5,529	6,057	6,640	7,283	8,007
Inflow and Infiltration (% Volume to Sewer)	36%	32%	32%	32%	32%	32%	32%	32%	32%
<b>PROFIT AND LOSS STATEMENT</b>									
<b>Water</b>									
Operating Revenues	\$ 32,443,927	\$ 35,513,117	\$ 40,584,526	\$ 116,428,617	\$ 119,734,914	\$ 123,160,148	\$ 126,672,138	\$ 130,261,777	\$ 133,906,622
Operating Expenses (Cash)	\$ 59,448,631	\$ 66,173,959	\$ 69,132,302	\$ 72,313,665	\$ 74,697,732	\$ 77,110,587	\$ 79,634,309	\$ 82,220,001	\$ 84,830,839
Depreciation	\$ 16,235,026	\$ 18,798,447	\$ 21,561,882	\$ 24,336,219	\$ 25,698,936	\$ 25,920,652	\$ 27,109,612	\$ 28,362,814	\$ 29,605,729
Net Interest Expense	\$ 1,075,938	\$ 1,052,900	\$ 1,002,388	\$ 3,483,517	\$ 3,416,512	\$ 3,264,389	\$ 3,107,691	\$ 2,946,278	\$ 2,780,006
<b>Net Income, Water</b>	<b>\$ (44,315,668)</b>	<b>\$ (50,512,189)</b>	<b>\$ (51,112,046)</b>	<b>\$ 16,295,216</b>	<b>\$ 15,921,736</b>	<b>\$ 16,864,520</b>	<b>\$ 16,820,526</b>	<b>\$ 16,732,684</b>	<b>\$ 16,690,047</b>
<b>Sewer</b>									
Operating Revenues	\$ 3,003,696	\$ 3,447,735	\$ 4,093,610	\$ 4,529,974	\$ 4,913,750	\$ 5,335,910	\$ 5,801,784	\$ 6,315,872	\$ 6,892,731
Operating Expenses (Cash)	\$ 10,293,727	\$ 10,168,705	\$ 11,128,652	\$ 12,151,079	\$ 12,905,553	\$ 13,693,785	\$ 14,547,864	\$ 15,456,089	\$ 16,418,035
Depreciation	\$ 6,837,351	\$ 7,840,387	\$ 8,921,686	\$ 10,007,250	\$ 10,540,465	\$ 10,086,327	\$ 10,551,553	\$ 11,041,916	\$ 11,528,253
Net Interest Expense	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Net Income, Sewer</b>	<b>\$ (14,127,382)</b>	<b>\$ (14,561,357)</b>	<b>\$ (15,956,728)</b>	<b>\$ (17,628,355)</b>	<b>\$ (18,532,268)</b>	<b>\$ (18,444,202)</b>	<b>\$ (19,297,632)</b>	<b>\$ (20,182,133)</b>	<b>\$ (21,053,557)</b>
<b>Net Income, WSD</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>
<b>Non-Operating Expenses</b>	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Non-Operating Income</b>	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Extraordinary Items</b>	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Net Profit (Loss) Before Income Tax</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>
Income Tax	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Net Profit (Loss) After Income Tax</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>

**BALANCE SHEET**

<b>Equity and Reserves</b>	\$ 214,541,126	\$ 307,051,854	\$ 405,567,708	\$ 483,889,072	\$ 561,669,733	\$ 642,260,048	\$ 724,757,204	\$ 807,579,569	\$ 888,353,643
Represented by:									
Current Assets	\$ 14,411,831	\$ 14,876,213	\$ 14,313,061	\$ 54,505,384	\$ 95,301,711	\$ 136,847,729	\$ 179,145,509	\$ 222,181,998	\$ 265,983,329
Non-Current Assets	\$ 316,664,927	\$ 416,598,558	\$ 516,748,387	\$ 552,851,401	\$ 585,199,497	\$ 619,466,115	\$ 654,760,168	\$ 689,498,246	\$ 721,269,632
<b>Total Assets</b>	<b>\$ 331,076,758</b>	<b>\$ 431,474,770</b>	<b>\$ 531,061,447</b>	<b>\$ 607,356,785</b>	<b>\$ 680,501,209</b>	<b>\$ 756,313,844</b>	<b>\$ 833,905,678</b>	<b>\$ 911,680,244</b>	<b>\$ 987,252,961</b>
Current Liabilities	\$ 12,158,294	\$ 12,865,054	\$ 13,554,651	\$ 19,564,364	\$ 20,074,388	\$ 20,595,094	\$ 21,144,855	\$ 21,713,551	\$ 22,294,962
Non-Current Liabilities	\$ 104,377,338	\$ 111,557,862	\$ 111,939,088	\$ 103,903,349	\$ 98,757,087	\$ 93,458,702	\$ 88,003,619	\$ 82,387,124	\$ 76,604,356
<b>Total Liabilities</b>	<b>\$ 116,535,632</b>	<b>\$ 124,422,916</b>	<b>\$ 125,493,739</b>	<b>\$ 123,467,713</b>	<b>\$ 118,831,475</b>	<b>\$ 114,053,796</b>	<b>\$ 109,148,474</b>	<b>\$ 104,100,675</b>	<b>\$ 98,899,318</b>
<b>Net Assets</b>	<b>\$ 214,541,126</b>	<b>\$ 307,051,854</b>	<b>\$ 405,567,708</b>	<b>\$ 483,889,072</b>	<b>\$ 561,669,733</b>	<b>\$ 642,260,048</b>	<b>\$ 724,757,204</b>	<b>\$ 807,579,569</b>	<b>\$ 888,353,643</b>

**STATEMENT OF CASH FLOWS**

Net Cash Flows, Operating Activities	\$ (31,011,049)	\$ (34,582,598)	\$ (31,940,929)	\$ 34,396,270	\$ 40,025,259	\$ 40,774,724	\$ 41,492,869	\$ 42,204,955	\$ 42,947,440
Net Cash Flows, Investing Activities	\$ 116,277,773	\$ 125,350,534	\$ 125,845,011	\$ 61,813,363	\$ 56,094,475	\$ 53,931,699	\$ 56,845,743	\$ 56,379,146	\$ 53,398,142
Net Cash Flows, Financing Activities	\$ 147,288,822	\$ 159,933,132	\$ 157,785,941	\$ 61,813,363	\$ 56,094,475	\$ 53,931,699	\$ 56,845,743	\$ 56,379,146	\$ 53,398,142
Cash increase/(decrease) for year	\$ -	\$ -	\$ -	\$ 34,396,270	\$ 40,025,259	\$ 40,774,724	\$ 41,492,869	\$ 42,204,955	\$ 42,947,440
<b>Closing Balance</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 34,396,270</b>	<b>\$ 74,421,529</b>	<b>\$ 115,196,253</b>	<b>\$ 156,689,122</b>	<b>\$ 198,894,076</b>	<b>\$ 241,841,516</b>

**KEY PERFORMANCE INDICATORS**

Operating Ratio	2.62	2.64	2.48	0.98	0.99	0.99	1.00	1.00	1.01
Current Ratio	1.19	1.16	1.06	2.79	4.75	6.64	8.47	10.23	11.93
Rate of Return on Net Fixed Assets	-18.46%	-15.62%	-12.98%	-0.24%	-0.45%	-0.26%	-0.38%	-0.50%	-0.60%
Debt/(Debt + Equity) Ratio (%)	32.73%	26.65%	21.63%	17.68%	14.95%	12.70%	10.83%	9.26%	7.94%

*Appendix 2*

## **PROFIT AND LOSS**

## Water and Sewerage Department

### PROJECTED PROFIT AND LOSS STATEMENT

Financial Years	2007	2008	2009	2010	2011	2012	2013	2014	2015	
<b>Operating Revenues</b>										
Water Sales	\$ 32,262,460	\$ 35,125,984	\$ 40,030,771	\$ 115,731,608	\$ 119,272,022	\$ 122,697,507	\$ 126,198,921	\$ 129,777,771	\$ 133,423,587	
Water Connection Fees	\$ 181,468	\$ 387,133	\$ 553,755	\$ 697,009	\$ 462,893	\$ 462,640	\$ 473,216	\$ 484,006	\$ 483,034	
Social Service Obligations	\$ 5,350,000	\$ 4,900,000	\$ 4,400,000	\$ 3,900,000	\$ 3,900,000	\$ 3,900,000	\$ 3,900,000	\$ 3,900,000	\$ 3,900,000	
Sewerage Fees	\$ 2,974,404	\$ 3,418,869	\$ 4,052,554	\$ 4,484,813	\$ 4,864,073	\$ 5,281,266	\$ 5,741,675	\$ 6,249,753	\$ 6,819,999	
Sewerage Connection Fees	\$ 29,292	\$ 28,866	\$ 41,055	\$ 45,161	\$ 49,677	\$ 54,644	\$ 60,109	\$ 66,120	\$ 72,732	
<b>Total Operating Revenue</b>	<b>\$ 40,797,623</b>	<b>\$ 43,860,852</b>	<b>\$ 49,078,136</b>	<b>\$ 124,858,591</b>	<b>\$ 128,548,664</b>	<b>\$ 132,396,057</b>	<b>\$ 136,373,922</b>	<b>\$ 140,477,649</b>	<b>\$ 144,699,353</b>	
<b>Operating Expenses</b>										
<b>Headquarters</b>										
Personnel Costs	\$ 797,000	\$ 2,644,675	\$ 2,644,675	\$ 2,644,675	\$ 2,644,675	\$ 2,644,675	\$ 2,644,675	\$ 2,644,675	\$ 2,644,675	
Training	\$ 421,013	\$ 431,538	\$ 442,326	\$ 453,384	\$ 464,719	\$ 476,337	\$ 488,245	\$ 500,452	\$ 512,963	
Administration	\$ 810,654	\$ 980,520	\$ 840,758	\$ 856,377	\$ 872,386	\$ 888,796	\$ 905,616	\$ 922,856	\$ 940,528	
Depreciation	\$ 23,072,377	\$ 26,638,833	\$ 30,483,568	\$ 34,343,469	\$ 36,239,400	\$ 36,006,978	\$ 37,661,164	\$ 39,404,729	\$ 41,133,983	
Bad Debts (uncollectible revenue)	\$ 1,550,422	\$ 1,541,794	\$ 1,322,500	\$ 2,404,328	\$ 2,482,722	\$ 2,559,575	\$ 2,638,812	\$ 2,720,550	\$ 2,804,872	
<b>Total Operating Expenses, HQ</b>	<b>\$ 26,651,465</b>	<b>\$ 32,237,360</b>	<b>\$ 35,733,827</b>	<b>\$ 40,702,234</b>	<b>\$ 42,703,903</b>	<b>\$ 42,576,362</b>	<b>\$ 44,338,513</b>	<b>\$ 46,193,263</b>	<b>\$ 48,037,020</b>	
<b>Social Service Costs</b>										
Rural, Non-Commercial Supplies	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	
Community Education & Awareness	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	
Monitoring Sampling & Analysis	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	
Free Allowances as Directed by Governmen	\$ 650,000	\$ 700,000	\$ 700,000	\$ 700,000	\$ 700,000	\$ 700,000	\$ 700,000	\$ 700,000	\$ 700,000	
Fire Hydrants & Fire Fighting	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	
Redundancy Costs	\$ 1,500,000	\$ 1,000,000	\$ 500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Total Operating Expenses, SSO</b>	<b>\$ 5,350,000</b>	<b>\$ 4,900,000</b>	<b>\$ 4,400,000</b>	<b>\$ 3,900,000</b>	<b>\$ 3,900,000</b>	<b>\$ 3,900,000</b>	<b>\$ 3,900,000</b>	<b>\$ 3,900,000</b>	<b>\$ 3,900,000</b>	
<b>Water Supply</b>										
Personnel Costs	\$ 9,733,500	\$ 11,767,050	\$ 11,767,050	\$ 11,767,050	\$ 11,767,050	\$ 11,767,050	\$ 11,767,050	\$ 11,767,050	\$ 11,767,050	
Administration	\$ 13,093,872	\$ 13,415,218	\$ 13,744,599	\$ 14,082,214	\$ 14,428,269	\$ 14,782,976	\$ 15,146,550	\$ 15,519,214	\$ 15,901,194	
Raw Water Purchase	\$ 10,992,426	\$ 11,157,312	\$ 11,324,672	\$ 11,494,542	\$ 11,666,960	\$ 11,841,964	\$ 12,019,594	\$ 12,199,888	\$ 12,382,886	
Chemicals, Electricity, and Fuel	\$ 9,813,127	\$ 10,209,332	\$ 10,621,534	\$ 11,050,378	\$ 11,496,537	\$ 11,960,710	\$ 12,443,624	\$ 12,946,035	\$ 13,468,731	
Repairs and Maintenance	\$ 13,058,673	\$ 15,312,405	\$ 17,630,082	\$ 19,021,214	\$ 20,359,197	\$ 21,697,377	\$ 23,113,815	\$ 24,558,490	\$ 25,993,448	
<b>Total Operating Expenses, Water</b>	<b>\$ 56,691,598</b>	<b>\$ 61,861,317</b>	<b>\$ 65,087,937</b>	<b>\$ 67,415,399</b>	<b>\$ 69,718,014</b>	<b>\$ 72,050,078</b>	<b>\$ 74,490,633</b>	<b>\$ 76,990,677</b>	<b>\$ 79,513,310</b>	
<b>Sewer</b>										
Personnel Costs	\$ 3,152,000	\$ 1,639,150	\$ 1,639,150	\$ 1,639,150	\$ 1,639,150	\$ 1,639,150	\$ 1,639,150	\$ 1,639,150	\$ 1,639,150	
Chemicals, Electricity, and Fuel	\$ 1,310,037	\$ 1,449,535	\$ 1,667,263	\$ 1,916,733	\$ 2,151,617	\$ 2,416,170	\$ 2,714,984	\$ 3,052,528	\$ 3,439,405	
Sludge Disposal Costs	\$ 308,957	\$ 333,518	\$ 374,258	\$ 419,764	\$ 459,711	\$ 503,644	\$ 552,127	\$ 605,630	\$ 665,744	
Repairs and Maintenance	\$ 4,700,678	\$ 5,460,616	\$ 6,242,087	\$ 6,714,933	\$ 7,170,290	\$ 7,625,948	\$ 8,107,931	\$ 8,599,572	\$ 9,088,227	
<b>Total Operating Expenses, Sewer</b>	<b>\$ 9,471,672</b>	<b>\$ 8,882,820</b>	<b>\$ 9,922,758</b>	<b>\$ 10,690,580</b>	<b>\$ 11,420,768</b>	<b>\$ 12,184,911</b>	<b>\$ 13,014,192</b>	<b>\$ 13,896,880</b>	<b>\$ 14,832,526</b>	
<b>Total Operating Expenses</b>	<b>\$ 98,164,735</b>	<b>\$ 107,881,497</b>	<b>\$ 115,144,521</b>	<b>\$ 122,708,212</b>	<b>\$ 127,742,685</b>	<b>\$ 130,711,351</b>	<b>\$ 135,743,337</b>	<b>\$ 140,980,820</b>	<b>\$ 146,282,856</b>	

<b>Financing Charges</b>										
Interest Expense										
Nadi/Lautoka Project Loan	\$ 1,075,938	\$ 1,052,900	\$ 1,002,388	\$ 950,613	\$ 897,544	\$ 843,147	\$ 787,391	\$ 730,242	\$ 671,663	
Suva/Nausori Project Loan	\$ -	\$ -	\$ -	\$ 2,532,904	\$ 2,518,968	\$ 2,421,241	\$ 2,320,299	\$ 2,216,036	\$ 2,108,343	
Foreign Exchange Gains/(Losses)										
<b>Total Financing Charges</b>	<b>\$ 1,075,938</b>	<b>\$ 1,052,900</b>	<b>\$ 1,002,388</b>	<b>\$ 3,483,517</b>	<b>\$ 3,416,512</b>	<b>\$ 3,264,389</b>	<b>\$ 3,107,691</b>	<b>\$ 2,946,278</b>	<b>\$ 2,780,006</b>	
<b>Net Operating Profit/(Loss)</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>	
<b>(Profit/(Loss) without Depreciation)</b>	<b>\$ (35,370,673)</b>	<b>\$ (38,434,712)</b>	<b>\$ (36,585,206)</b>	<b>\$ 33,010,330</b>	<b>\$ 33,628,868</b>	<b>\$ 34,427,296</b>	<b>\$ 35,184,058</b>	<b>\$ 35,955,281</b>	<b>\$ 36,770,473</b>	
<b>Non-Operating Expenses</b>										
<b>Non-Operating Income</b>										
Liquidated Damages										
Interest Received										
<b>Total Non-Operating Income</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>Net Profit/(Loss) Before</b>										
<b>Extraordinary Items</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>	
<b>Extraordinary Items</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	
<b>Net Profit/(Loss) Before Income Tax</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>	
<b>Income Tax</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	
<b>Net Profit/(Loss) After Income Tax</b>	<b>\$ (58,443,050)</b>	<b>\$ (65,073,545)</b>	<b>\$ (67,068,774)</b>	<b>\$ (1,333,139)</b>	<b>\$ (2,610,532)</b>	<b>\$ (1,579,682)</b>	<b>\$ (2,477,106)</b>	<b>\$ (3,449,448)</b>	<b>\$ (4,363,510)</b>	
Revenue										
O&M	\$ 76,168,296	\$ 82,295,564	\$ 85,663,342	\$ 91,848,260	\$ 94,919,796	\$ 97,968,761	\$ 101,189,864	\$ 104,522,368	\$ 107,928,880	
Depreciation	\$ 23,072,377	\$ 26,638,833	\$ 30,483,568	\$ 34,343,469	\$ 36,239,400	\$ 36,006,978	\$ 37,661,164	\$ 39,404,729	\$ 41,133,983	

*Appendix 3*

## **BALANCE**

**Water and Sewerage Department**

**PROJECTED BALANCE SHEET**

Financial Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Equity &amp; Reserves</b>									
Government Equity	\$ 272,984,176	\$ 430,568,450	\$ 596,153,078	\$ 675,807,580	\$ 756,198,773	\$ 838,368,770	\$ 923,343,032	\$ 1,009,614,847	\$ 1,094,752,430
Asset Revaluation Reserve									
Retained Earnings	\$ (58,443,050)	\$ (123,516,595)	\$ (190,585,369)	\$ (191,918,508)	\$ (194,529,040)	\$ (196,108,722)	\$ (198,585,829)	\$ (202,035,277)	\$ (206,398,787)
<b>Total Equity &amp; Reserves</b>	\$ 214,541,126	\$ 307,051,854	\$ 405,567,708	\$ 483,889,072	\$ 561,669,733	\$ 642,260,048	\$ 724,757,204	\$ 807,579,569	\$ 888,353,643
Represented by:									
<b>Current Assets</b>									
Cash at Bank and Fixed Deposits	\$ -	\$ -	\$ -	\$ 34,396,270	\$ 74,421,529	\$ 115,196,253	\$ 156,689,122	\$ 198,894,076	\$ 241,841,516
Accounts Receivable	\$ 7,752,110	\$ 7,708,971	\$ 6,612,499	\$ 12,021,642	\$ 12,413,609	\$ 12,797,877	\$ 13,194,060	\$ 13,602,752	\$ 14,024,359
Inventory	\$ 6,659,721	\$ 7,167,242	\$ 7,700,562	\$ 8,087,472	\$ 8,466,573	\$ 8,853,599	\$ 9,262,328	\$ 9,685,170	\$ 10,117,455
Asset Replacement Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Current Assets									
<b>Total Current Assets</b>	\$ 14,411,831	\$ 14,876,213	\$ 14,313,061	\$ 54,505,384	\$ 95,301,711	\$ 136,847,729	\$ 179,145,509	\$ 222,181,998	\$ 265,983,329
<b>Non Current Assets</b>									
Net Fixed Assets	\$ 316,664,927	\$ 416,598,558	\$ 516,748,387	\$ 552,851,401	\$ 585,199,497	\$ 619,466,115	\$ 654,760,168	\$ 689,498,246	\$ 721,269,632
Deferred Charges									
<b>Total Non-Current Assets</b>	\$ 316,664,927	\$ 416,598,558	\$ 516,748,387	\$ 552,851,401	\$ 585,199,497	\$ 619,466,115	\$ 654,760,168	\$ 689,498,246	\$ 721,269,632
<b>Total Assets</b>	\$ 331,076,758	\$ 431,474,770	\$ 531,061,447	\$ 607,356,785	\$ 680,501,209	\$ 756,313,844	\$ 833,905,678	\$ 911,680,244	\$ 987,252,961
<b>Current Liabilities</b>									
Accounts Payable and Accrued Charges	\$ 9,084,906	\$ 9,791,666	\$ 10,481,263	\$ 11,001,590	\$ 11,511,615	\$ 12,032,320	\$ 12,582,081	\$ 13,150,777	\$ 13,732,188
Current Portion of Long Term Debt	\$ 3,073,388	\$ 3,073,388	\$ 3,073,388	\$ 8,562,774	\$ 8,562,774	\$ 8,562,774	\$ 8,562,774	\$ 8,562,774	\$ 8,562,774
Provisions and Allowances	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Total Current Liabilities</b>	\$ 12,158,294	\$ 12,865,054	\$ 13,554,651	\$ 19,564,364	\$ 20,074,388	\$ 20,595,094	\$ 21,144,855	\$ 21,713,551	\$ 22,294,962
<b>Working Capital (Current Assets less Current Liabilities)</b>	\$ 2,253,537	\$ 2,011,159	\$ 758,409	\$ 34,941,020	\$ 75,227,323	\$ 116,252,635	\$ 158,000,655	\$ 200,468,447	\$ 243,688,368
<b>Non Current Liabilities</b>									
Long Term Debt	\$ 104,377,338	\$ 111,557,862	\$ 111,939,088	\$ 103,903,349	\$ 98,757,087	\$ 93,458,702	\$ 88,003,619	\$ 82,387,124	\$ 76,604,356
<b>Total Non-Current Liabilities</b>	\$ 104,377,338	\$ 111,557,862	\$ 111,939,088	\$ 103,903,349	\$ 98,757,087	\$ 93,458,702	\$ 88,003,619	\$ 82,387,124	\$ 76,604,356
<b>Total Liabilities</b>	\$ 116,535,632	\$ 124,422,916	\$ 125,493,739	\$ 123,467,713	\$ 118,831,475	\$ 114,053,796	\$ 109,148,474	\$ 104,100,675	\$ 98,899,318
<b>Net Assets</b>	\$ 214,541,126	\$ 307,051,854	\$ 405,567,708	\$ 483,889,072	\$ 561,669,733	\$ 642,260,048	\$ 724,757,204	\$ 807,579,569	\$ 888,353,643
Memo Items									
Revenue collection rate (receipts/invoices)	78%	80%	85%	90%	90%	90%	90%	90%	90%
Uncollectible revenue (% AR)	20%	20%	20%	20%	20%	20%	20%	20%	20%

*Appendix 4*

## **CASH FLOWS AND DEBT**