

# Section B: Water Supply Tariff Methodology Primer and Financial Model

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## Abbreviations and Acronyms

BOI	Board of Investments
CBO	Community Based Organizations
Cu.m., m <sup>3</sup>	Cubic Meter
EPZ	Export Processing Zone
ESC	Economic Service Charge
EV	Equivalent Volume
KPI	Key Performance Indicator
LKR	Sri Lankan Currency
NRW	Non-Revenue Water
NWSDB	National Water Supply & Drainage Board
O & M	Operation and Maintenance
PUC	Public Utilities Commission
RSC	Regional Support Center
RWSS	Rural Water Supply system
YOY	Year-on-Year
YTD	Year to Date

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## Section 1 Introduction

1. This primer presents the guidelines and fundamentals of tariff setting for use of both the Public Utilities Commission of Sri Lanka (Commission) and the National Water Supply and Drainage Board (Board). It is a guide for the Board in the adoption of the proposed tariff methodology and for the Commission in the evaluation of future tariff proposals using this methodology. The excel-based financial model to facilitate tariff calculation based on the proposed tariff methodology was also developed separately.

### A. Tariff Objectives

2. Following are the objectives<sup>1</sup> that the methodology seeks to achieve:
- (a) **Good governance** requires that the tariff should at the very least be simple to implement, transparent and predictable.
  - (b) **Financial sustainability** requires the utility to have sufficient funds to meet their obligations as they occur.
  - (c) **Economic efficiency** aims to promote the efficient use of natural resources. This is applicable in setting a tariff and results if prices in an economy are all equal to the marginal social costs.
  - (d) **Fair pricing** involves setting a tariff with users paying the net social cost associated with the use of the public service unless the society has decided to subsidize some users.

### B. Cost Recovery Mechanism

3. The water supply tariff methodology is based on the recovery of all costs in the provision of water supply services and includes operating and maintenance costs, depreciation, loan interest charges, all taxes and levies.

4. Tariffs shall also be based on the levels of service that the Board commits to deliver and which has been agreed with the Commission. The proposed tariff should be able to adequately provide for the committed number of hours of service, service coverage, water quality and pressure and limit of non-revenue water percentage.

5. Following are examples of how tariff goals will be presented as part of a tariff proposal for submission to Commission:

- (a) To attain 100% recovery of revenue requirements covering operating and maintenance expenses including depreciation expenses, interest expenses on loans for capital improvements and all levies and taxes.
- (b) To attain operational improvements allowing the provision of the following level of service upon which the revenue requirements are based:
  - Increase service coverage by at least \_\_\_% per annum to attain a \_\_\_ service are coverage by the end of the five-year tariff period
  - Reduce non-revenue water to attain a nationwide level of not higher than \_\_\_ %;

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<sup>1</sup> Asian Development Bank, Technical Note Series 9 ,December 2003

- Provide a \_\_\_ hour service to the regional areas and twenty-four hour service in the Greater Colombo area;
  - Water pressure range of \_\_\_ to \_\_\_ psi within \_\_\_ % of the service area
  - Water quality in compliance with Drinking Water Standards
- (c) To permit low income households to tap to the system such that the average monthly water bill of these households are within 4% of average income of low-incomed households.

### C. Tariff Setting Guidelines

6. In the preparation of a tariff proposal, the following guidelines shall be considered:
- (a) Adopt the approval of a set of tariffs for five-years based on a complete business plan. The five-year schedule of tariff may be proposed to be implemented on a one-time basis or on staggered basis on the first year and 3<sup>rd</sup> year of the five-year tariff period;
  - (b) Adopt and commit to key performance indicators, also shown in the Tariff Model, as bases for projections and forecasts;
  - (c) Operating expenses shall include all costs under normal business operations but shall exclude non-recurring expenses arising from fortuitous events like typhoons, tsunamis, earthquakes, etc. and from activities not related to water supply and sewerage services.
  - (d) Use the Excel-based tariff model and submit the proposal in soft and hard copy;
  - (e) Test the affordability of tariffs to low-incomed households pegged at 4% of the average income of estate households;
  - (f) Indicate excess/deficiencies in attaining the KPIs in the tariff model to allow the Commission to establish policies for disallowances in succeeding tariff proposals
  - (g) Consider the use of price adjustment mechanism for extraordinary events and price increases

### D. Regulatory Requirements

7. Following are the steps to be complied with when seeking approval of tariffs from the Commission:
- (a) Beginning January of the 5<sup>th</sup> year of the tariff regulatory period, the NWSDB shall develop the 5-year corporate plan and corresponding business plan/financial projections. Among others the business plan shall establish the projected level of operations and how these are proposed to be met. It shall include projected supply and demand for water, the corresponding operation and maintenance costs and capital investment requirements that are necessary to meet the projected levels of services.
  - (b) After thorough consultation and deliberation with the six (6) regional support centers the Commercial, Finance, Engineering and Corporate Planning and Strategic Planning Divisions (under the Planning and Monitoring Departments)

- shall submit input data which shall be consolidated by the Corporate Planning Office.
- (c) The draft proposal shall then be reviewed by the General Manager of the NWSDB, and endorsed to the Board of Directors (BoD) of the NWSDB for approval.
  - (d) The final tariff proposal that was approved by the BoD shall then be forwarded to the PUSCL for its review and approval. The review and approval process including necessary validation tests and investigations shall take no longer than 6 months from the time it is received, that is at the latest by December 31 of the 5<sup>th</sup> year.
  - (e) The Commission shall inform the Board through the Ministry of its determination/decision on the proposal not later than 31 December. Should the Board find the decision of the Commission unacceptable, it can file for a motion for reconsideration with the Commission within 1 month from date of notice of decision. The PUC and NWSDB shall both act on the petition and final decision must be received by NWSDB not later than 3 months from filing of the petition.
  - (f) The final decision shall be binding and shall be published within one month from April 30 in a paper of national circulation for two (2) weeks. Within three months from its publication, the said rates shall be gazetted by the NWSDB and shall become binding and effective.

## Section 2 Tariff Setting and the Tariff Design Process

### A. Features of the Tariff Design

7. In observance of the tariff goals of good governance and economic efficiency, the new tariff design policies introduce fewer customer classification, a simpler tariff structure and fewer number of consumption slabs or blocks

8. To ensure that tariffs are simple and easily understood by customers, the classification of customers is now limited to seven(7) categories as follows:

**Table 1. Customer Categories**

No.	Category of Customers
1	"Domestic" or residential users with individual connections;
2	"Religious and schools" including charitable institutions, government and government assisted schools ;
3	Garden taps and Stand posts";
4	Government Institutions";
5	Commercial and Industrial" including commercial institutions, (water based), industrial institutions, companies engaged in property development and construction work, EPZ of the BOI, tourist hotels and guest houses, other commercial and private institutions ;
6	Shipping";
7	Bulk referring to bulk supplies to local government systems, RWSS maintained by CBOs.
8	Bowers" are bulk supplies of commercial in nature.

9. The above categories are grouped further into two (2) major types of users in the application of the tariff. Customers will either fall under the domestic or non-domestic for purposes of water and sewerage tariff calculation.

10. Domestic classification shall broadly refer to consumers under residential/domestic category, religious and schools connections, garden taps, stand posts and bulk supplies.

11. Non-domestic classification covers categories 4, 5, 6 and 8. These users consume significantly higher volume of water which generally can pass on the cost of water to their customers.

## B. Tariff Structure

12. The tariff structure is composed of two parts: the basic or the fixed charge and the usage charge.

13. **Fixed Charge.** Both domestic and non-domestic categories shall be subject to a basic or fixed charge. The fixed charge varies with meter size and will be charged to customers regardless of the level of consumption. The fixed charge is targeted to cover the administrative overhead costs, usually customer-related costs which are not related to production and distribution.

14. The fixed charge shall be determined and differentiated based on equivalent meter service factors. It is assumed that customers with bigger sized connections enjoy more convenience by getting more water at a faster rate than those with smaller sized connections. The standard meter service factors are shown in Table 2.

**Table 2. Equivalent Meter Service Factor**

Meter Size	Meter Service Factor	
	Domestic	Non-Domestic
1/2"	1.00	1.40
3/4"	2.80	2.80
1" - 2"	5.60	5.60
2" - 3"	14.00	14.00
>3"	28.00	28.00

14. **Usage Charge.** The usage charge is the amount to be paid on the volume of water consumed and is based on customer classification and level of consumption. All domestic (residential) consumers with usage of less than 15 cu.m. will have lower than base usage tariff. Increasing linear tariffs apply starting on the 16 cu.m. consumption slab.

15. For the usage tariffs, the revised consumption blocks and incremental factors (arbitrary and may be changed by the Board) between blocks are shown in Table 3.

**Table 3. Domestic (Residential) Consumption Blocks**

Domestic Connections	
Consumption Blocks	Increment Factors
0-6 cu.m.	0.25
7-15 cu.m.	0.50
16-25 cu.m.	1.00
25-40 cu.m.	2.00
>40 cu.m.	4.00

16. The incremental factors (which to some degree are arbitrary factors) may be determined by the Board, depending on the objectives that it wishes to achieve. As shown in Tables 3 and 4, the increment factors adopted results to a sharper increase after the 25 cu.m. block. This is being proposed as a mechanism to encourage water conservation.

17. For non-domestic categories, the usage factors are higher as follows:

**Table 4. Classification Usage Factors for Non-Domestic Connections**

Non-Domestic	
Classification	Usage Factors
Government	4.00
Commercial and Industrial	5.00
Shipping	20.00

### C. Application of the Tariff Structure

19. Domestic Connections. Tariffs for domestic users shall follow the following rate structure: All domestic connections shall be charged the base usage tariffs (1.0 factor) except residential connections with less than 16 cu.m. monthly consumption. Domestic connections, including users of stand post and garden taps, religious institutions and schools and bulk supplies will be charged the base (1.0 factor) fixed charge for ½" size connection (standard connection size).

20. The domestic residential connections shall be the only category subject to increasing usage charge or linear tariffs. Increasing tariffs shall apply starting on the 3<sup>rd</sup> block or in the 16<sup>th</sup> cu.m. of consumption. This means that whenever a consumer's total consumption falls within the 3<sup>rd</sup> block (16-25 cu.m.) or beyond, each unit consumed is charged outright with the unit rate per cubic meter in the applicable block. This method does not only aim to send a strong signal that increasing water use is costly but also ensures that only consumers with low water use (0-15 cu.m.) benefit from the subsidized rates in the first two consumption blocks of the tariff structure. The first two blocks, i.e., 1-6 cu.m. and 7-15 cu.m. are the two blocks where lower rates apply to allow affordability of water to low-income users.

21. Non-Domestic Connections. While the elimination or significant reduction of garden taps and stand posts is a long-term objective of the Board, employment of single usage or volumetric tariff to garden taps and stand posts will be continued. The use of block tariffs for users of garden taps and stand posts connections is perceived to create an undue burden to those who either cannot afford the individual connection or have large consumption due to the big number of users in the household. Similarly, since the consumption level of religious institutions, schools and bulk supplied water is high but the consumption of these consumers are not commercial in nature, a single usage tariff (base price at 16 cu.m. consumption) will be applied.

22. All non-domestic categories which includes the government institutions, commercial and industrial connections, and shipping shall not be subject to block tariffs but shall be charged higher tariffs based on their classification (usage charge) and also based on the bigger meter sizes which they may employ (fixed charge).

### Section 3 Data Requirements in Tariff Setting

23. Data Requirements. Following are the data requirements that need to be established in the calculation of the required tariff:

- (a) The annual revenue requirements (How revenue requirements are computed is discussed in another section)
- (b) Yearly number of connections and breakdown according to customer classification and meter size,
- (c) Annual consumption broken down according to customer classification, consumption blocks and meter size (see Table 5 below).

#### Section 3.1 Establishing the Revenue Requirements

24. To recover the revenues that will allow for the proper operation and maintenance of the system and sustain the system's viable operation, the first step in tariff setting is to establish the annual revenue requirements of the period during which the tariffs are to be implemented. These costs shall be composed of the following:

- (a) Operation and maintenance expenses ( personnel costs or salaries, training, and benefits of officers and employees of the Board, pumping and chemical costs, repair and maintenance costs, establishment costs, administration overheads, other direct expenses and other operating expenses)
- (b) Depreciation expense
- (c) Interest or financing charges
- (d) Levies and taxes.

25. The administration overheads shall be recovered from fixed / service charges while the rest of expenses, including levies and taxes, net of other operating income, will be recovered from usage charges.

26. Forecasting Revenue Requirements. The costs that are to be included must directly relate to the service provided, i.e., water supply or sewerage services. Expenses incurred from non-operating activities should not be included in the historical costs that are used as bases for forecasts of expenses. Table 5 shows the composition of the revenue requirements with projections based on 2005-2006 operations.

Table 5. Composition of Revenue Requirements

	Forecast years		2-year Average	Forecast years			3-year Average	5-year Average
	2008	2009		2010	2011	2012		
<b>Expenses</b>								
Personnel costs	2,358,865	2,651,226	2,505,045	2,911,156	3,217,798	3,495,219	3,208,057	2,926,853
Pumping costs	1,753,087	1,929,754	1,841,421	2,201,463	2,436,281	2,606,959	2,414,901	2,185,509
Chemical costs	388,045	427,150	407,598	487,293	539,270	577,049	534,537	483,762
Repairs and maintenance costs	284,487	321,070	302,779	361,267	402,621	445,602	403,163	363,009
Establishment costs	145,498	152,772	149,135	160,411	168,432	176,853	168,565	160,793
Other direct expenses	206,567	229,696	218,132	256,496	283,430	305,942	281,956	256,426
Depreciation expenses	1,666,888	2,064,019	1,865,454	2,425,997	2,740,093	3,153,641	2,773,244	2,410,128
Other operating expenses	154,096	162,783	158,440	172,687	181,279	185,894	179,953	171,348
Gratuity	235,886	265,123	250,505	291,116	321,780	349,522	320,806	292,685
Interest costs	1,345,982	1,283,353	1,314,667	1,386,514	2,111,770	2,309,232	1,935,839	1,687,370
<b>Expenses before Rebates &amp; Taxes</b>	<b>8,539,401</b>	<b>9,486,947</b>	<b>9,013,174</b>	<b>10,654,399</b>	<b>12,402,753</b>	<b>13,605,913</b>	<b>12,221,022</b>	<b>12,743,229</b>
Rebates	45,154	50,165	47,660	56,338	65,583	71,945	64,622	57,837
Taxation and levies	391,658	282,101	336,879	1,052,437	875,450	612,600	846,829	642,849
	<b>436,812</b>	<b>332,266</b>	<b>384,539</b>	<b>1,108,775</b>	<b>941,033</b>	<b>684,545</b>	<b>911,451</b>	<b>845,676</b>
<b>Income</b>								
Operating income	(924,579)	(1,028,100)	(976,340)	(1,148,055)	(1,268,610)	(1,369,372)	(1,262,012)	(1,147,743)
<b>TOTAL</b>	<b>8,051,635</b>	<b>8,791,112</b>	<b>8,421,373</b>	<b>10,615,118</b>	<b>12,075,176</b>	<b>12,921,085</b>	<b>11,870,460</b>	<b>10,490,825</b>

### A. Operating Expenses

27. In order to establish the level of operating expenses that will support the proper operation and maintenance of the system, the water utility must link the capacity of existing and projected supply against future water demand based on committed levels of service. This is to ensure that the infrastructure and supply based on programmed capital improvements are adequate otherwise, review and iteration of level of service input in the tariff evaluation has to be made. Operating expenses are then projected based on previous five years average actual costs and actual operational data. The calculation of projected operating expenses is discussed below:

28. **Administrative Overhead Costs.** These are costs that will be recouped from the fixed charges. They are expenses not directly related to production and distribution or generally customer-related expenses. (Please refer to Table 6)

$$= \text{Average actual administrative overhead for the past five years} \\ \times \text{projected annual escalation.}$$

$$= \text{Base year tariff Administrative Overhead Costs} \\ \times \text{projected annual escalation}$$

Table 6. Administration Overheads

Administration overheads

	Historical years			5-year Average	Base year 2007	Forecast years			5-year Average
	2002	2005	2006			2008	2011	2012	
<b>Status:</b>	Not updated	Not updated	Updated						
Total direct expenses (LKR 000's)	3,604,024	3,604,024	3,971,189	3,677,457	4,403,325	5,136,549	7,047,831	7,607,625	6,376,352
Administration overheads (LKR 000's)	559,113	999,274	1,354,149	931,862	1,107,937	1,751,529	2,403,264	2,594,150	2,174,294
% to direct expenses	15.51%	27.73%	34.10%	25.16%		34.1%	34.1%	34.1%	
YoY change		3.8%	35.5%	25.58%		58.1%	10.5%	7.9%	19.88%

29. The total personnel costs of the Board's officers and employees comprise the salaries, wages and other benefits received by them.

30. The number of development staff shall be projected based on an absolute number of additional employees in a year or based on a projected percentage (%) -over-last year-increase of development staff in a year. The absolute number of increase in staff shall be linked to development projects the Board may need to support. The “% increase in number of staff” based on a five-year trend shown in the historical data provided can also be used.

31. The number of operational staff may be projected in the same way with development staff. However, the total number of operational staff in a given year will be tested against a key performance indicator (Staff: 1000 connections). This committed KPI will be part of the commitments in the business / corporate plan submitted with the tariff proposal.

32. To compute for the total salaries or personnel costs, the five-year historical average salary of each employee will be used as reference for the base year salary per staff (year of evaluation) and subject to annual projected escalation. The number of staff multiplied by the annual salary rate per employee multiplied by escalation rate will give the annual personnel cost for the year.

**Table 7. Staff Number and Average Salary**

Staff numbers		Select the forecast method (development staff):			(Operational staff):				
Growth in development staff	1	1	Annual increase, %	1					
Growth in operational staff	2	2	Net additions	2					
	Historical years			5-year Average	Base year 2007	Forecast years			5-year Average
	2002	2005	2006			2008	2011	2012	
<b>Status:</b>		Not updated	Not updated	Updated					
<u>Development staff</u>									
1. Annual increase, %					5.0%	5.0%	5.0%	5.0%	
2. Net additions					50				
Number of development staff	1,638	1,638	1,638	1,638	1,720	1,806	2,091	2,195	1,996
Net additions		0	0	-		86	100	105	95
YoY growth		0.0%	0.0%			5.0%	5.0%	5.0%	
<u>Operational staff</u>									
1. Net additions					50				
2. Staff/1000 connections	7.0	7.0	6.8	7.0	7.00	7.00	7.00	7.00	
Number of operational staff	6,343	6,343	6,762	6,427	7,741	8,217	10,064	10,500	9,433
Net additions		0	419	105		476	619	436	552
YoY growth		0.0%	6.6%			6.1%	6.6%	4.3%	
<b>Total staff numbers</b>	<b>7,981</b>	<b>7,981</b>	<b>8,400</b>	<b>8,065</b>	<b>8,450</b>	<b>10,023</b>	<b>12,155</b>	<b>12,695</b>	<b>11,428</b>
YoY growth		0.0%	5.2%				6.3%	4.4%	

33. **Power/Fuel for Pumping.** This expense represents the power bill, fuel costs and other utility expenses incurred to operate the pumping facilities of the water supply system. This is projected by computing the cost of pumping per volume produced and multiplying it by the inflation rate. The unit cost of pumping is calculated as follows:

$$= \frac{\text{Actual total power /fuel cost}}{\text{Actual production volume (cu.m.)}}$$

34. **Chemicals.** This item includes the cost of chlorine and other chemicals used in the water treatment facilities of the water utility. This is projected by computing the cost of all chemicals per volume produced, and multiplying it by inflation. The unit cost of chemicals is calculated as follows:

$$= \frac{\text{Actual total chemicals cost}}{\text{Actual production volume (cu.m.)}}$$

**Table 8. Pumping and Chemical Costs**

Pumping costs									
	Historical years			5-year Average	Base year 2007	Forecast years			5-year Average
	2002	2005	2006			2008	2011	2012	
<i>Status:</i>	Not updated	Not updated	Updated						
Total pumping costs (LKR 000's)	1,217,702	1,217,702	1,343,888	1,242,939	1,565,999	1,753,087	2,436,281	2,606,959	2,185,509
YoY change		0.0%	10.4%			11.9%	10.7%	7.0%	
Pumping cost per cbm (LKR)	3.43	3.48	3.71	3.51	3.95	4.15	4.80	5.04	4.59
YoY change		0.4%	6.6%	2.0%		5.0%	5.0%	5.0%	5.0%
Chemical costs									
Total chemical costs (LKR 000's)	301,387	301,387	316,971	304,504	346,633	388,045	539,270	577,049	483,762
YoY change		0.0%	5.2%			11.9%	10.7%	7.0%	
Chemical cost per cbm (LKR)	0.85	0.86	0.87	0.86	0.87	0.92	1.06	1.12	1.02
YoY change		0.4%	1.5%	0.7%		5.0%	5.0%	5.0%	5.0%

35. **Repairs and maintenance.** This cost refers to the expenses incurred in maintaining the assets in good working condition without extending their useful life. It is projected by using the five-year actual average costs and multiplying it by the number of connections for the year. This may also be computed by getting the trend of actual repair and maintenance spent during the historical five-year period as a percentage-of- average assets for the period.

36. **Establishment expenses.** This account refers to office supplies, traveling, vehicles, postage and telephone expenses. The historical five-year average is escalated annually to project the current year's expense.

37. **Other direct operating expenses.** This includes rent, rates, security and other expenses. The expenses are projected either by increasing by the annual escalation rate or maintaining the expense for the year as a constant percentage of the historical five-year average direct expenses.

38. **Other operating expenses.** This expense includes provision for bad and doubtful debts, retiring gratuity expense and write-offs. It is projected at a specified percentage to direct expenses based on historical trend.

**Table 9. Repairs, Maintenance, Establishments and Other Direct Operating Costs**  
Repairs and maintenance costs

	Historical years			5-year Average	Base year 2007	Forecast years		
	2002	2005	2006			2008	2011	2012
<i>Status:</i>	Not updated	Not updated	Updated					
Repairs and maintenance costs (LKR 000's)	221,269	221,269	251,051	227,225	262,861	284,487	402,621	445,602
<i>YoY change</i>		0.0%	13.5%			8.2%	11.4%	10.7%
Repairs and maintenance costs per connection (LKR)	0.24	0.24	0.25	0.25	0.24	0.25	0.29	0.30
<i>YoY change</i>		0.0%	4.1%	4.1%		5.0%	5.0%	5.0%
<b>Establishment expenses</b>								
Establishment expenses (LKR 000's)	122,737	122,737	133,801	124,950	138,569	145,498	168,432	176,853
<i>YoY change</i>		0.0%	9.0%			5.0%	5.0%	5.0%
<b>Other direct operating expenses</b>								
Direct exp excluding other direct exp (LKR 000's)	3,462,906	3,462,906	3,794,748	3,529,275	4,226,244	4,929,982	6,764,401	7,301,682
Other direct expenses (LKR 000's)	141,118	141,118	176,442	148,183	177,081	206,567	283,430	305,942
<i>% to direct expenses</i>	4.08%	4.08%	4.65%	4.19%		4.19%	4.19%	4.19%
<i>YoY change</i>		0.0%	25.0%	6.26%		16.7%	10.5%	7.9%

### B. Depreciation Expense

39. The depreciation expense is computed on all assets in service, whether the assets are funded by loan or grant. The ultimate objective for this provision is the repayment of the principal loan amount and whatever replacement expenses that may be needed for a year. Any deficiency in the cash requirement for loan repayment and capital expenditures for the year is assumed to be funded by government grants. Conversely, excess provision will be part of a reserve fund of the Board.

40. The total projected depreciation expense is the aggregate of depreciation for three groups of assets: existing assets, assets turned over from current work in progress balance and assets turned over from work in progress projected for the next five years. The projected depreciation for the latter two asset categories will depend on the particular depreciation rate to be inputted in the tariff model. The depreciation rates of existing assets were derived from existing registers and schedules.

41. The work in progress which will become additions to the asset balances are derived from availments of loans for on-going projects, committed projects in the pipeline and loans projected to be availed by the Board. This will be itemized and inputted in the tariff model.

### C. Interest / Financing Charges

42. The interests and other financing charges that the Board will pay on its loans obtained to fund system improvement, rehabilitation and expansion will be included in the revenue requirement.

43. Interest and other financing charges are computed based on the inputs for a) disbursement rate of loans annually; b) interest rates c) amortization period of

loans. Loans shall include those a) currently being availed of, b) loans committed to be disbursed in the next five years and c) loans for the next five years that will be obtained before the submission of a tariff approval.

### D. Taxes

44. This item includes franchise taxes, value-added tax, and any other tax that Board will pay in the future as well as the percentage tax, projected at 1% of income before tax (using 2005-2006 historical data) and maximum LKR 60 Million ESC currently being paid by Board.

**Table 10. Forecast of Taxes and Levies**

	Forecast years					5-year Average
	2008	2009	2010	2011	2012	
<b>VAT</b>						
Revenue from water sales	9,949,885	10,646,439	13,528,448	14,404,934	14,864,135	12,678,768
Revenue from sewerage	220,311	244,805	272,943	301,318	325,021	272,880
	10,170,197	10,891,244	13,801,391	13,829,766	14,729,956	12,951,648
VAT amount	1,525,529	1,633,687	2,070,209	2,074,465	2,209,493	1,902,677
<b>VAT Payable</b>	<b>152,553</b>	<b>163,369</b>	<b>207,021</b>	<b>207,446</b>	<b>220,949</b>	<b>190,268</b>
<b>ESC</b>						
<b>ESC Payable</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>
<b>Corporate tax</b>						
Taxable profit	523,076	180,418	2,259,037	1,753,752	965,255	1,136,308
<b>Tax payable</b>	<b>183,077</b>	<b>63,146</b>	<b>790,663</b>	<b>613,813</b>	<b>337,839</b>	<b>397,708</b>
<b>TOTAL TAXES AND LEVIES</b>	<b>395,629</b>	<b>286,515</b>	<b>1,057,684</b>	<b>881,260</b>	<b>618,789</b>	<b>647,975</b>

### Section 3.2 Water Demand Projections

45. The tariff proposal to be submitted to the Commission will include a comprehensive business or corporate plan. The business plan shall contain the target operating levels and how these will be achieved. It shall include an asset management plan that defines the plan for the maintenance, replacement and expansion of facilities to improve operations, and ensure sustainability of service. The level of service that the Board will provide based on the proposed level of tariff shall be shown in the business plan. The plan will guide the Commission to determine the propriety of projected investments, adequacy of water supply to meet the projected water demand level and the corresponding forecast of operating expenses.

#### A. Projected Connections

46. Projections of water demand for the next 5 years shall be computed based on the following:

- (a) Number of connections that can be attained for the next five years. This shall be collected from the regional support centers and must be correlated to existing and future infrastructure capacity of the RSCs.
- (b) Breakdown of service connections by customer categories. Forecasting of connections according to customer categories will require an evaluation of growth trend either in individual RSCS or total figures available in the Board.

- (c) Average consumption per consumer category. This can be determined from the annual volume of water sold or billed for the past five years and the average consumption of water of each customer category.
- (d) Distribution of consumption for domestic (residential) connections. After establishing the billed water for each customer classification, the consumption of domestic/residential connections will be distributed in the five consumption blocks to compute the equivalent volume for the usage tariff.
- (e) The projected volume of water sold is calculated as follows:

Average served connection for the year for each consumer category :

$$\frac{(\text{Projected total connections for the year} + \text{Previous year's projected connection})/2}{\text{X Average annual consumption per connection (cu.m.)}}$$

- 47. The projected level of non-revenue water is then added to the projected volume of water sold. The existing supply is compared with the required production volume to determine any gap in supply that should be addressed.
- 48. The percentage of population served is computed as follows:

$$\% \text{ served} = \frac{\text{Total domestic connections} \times \text{average persons per household}}{\text{Population}} \quad \text{Total persons in the service area}$$

## B. Water Supply

49. The water supply requirement shall be projected to assess if there is enough supply to meet the projected water demand. The capacity of the existing production wells, springs, treatment plants and additional supply through purchase of bulk water supply, and others for each of the RSCs shall be indicated in the business plan.

50. A resulting water surplus or water shortage may signal a need for one or more the following actions to be undertaken:

- Augment supply
- Reduce unaccounted water
- Limit new connections
- Ration water
- Increase production hours / supply
- Commission/develop new or additional sources or purchase bulk water supply

51. The above options may require additional funds and the allocation of internally generated funds for capital expenditures, or the need for financing through loans, use of reserve funds or government funds.

52. In the projection of available water supply, the linkage of available water supply to the level of NRW can also be one of the key performance indicators against which their performance will be evaluated. A regulation policy or guideline shall be adopted that will allow the Board a realistic period of time to attain the desired level of non-revenue water. The level of non-revenue water to be projected will be linked to the prescribed period and is a critical factor in the resulting water supply level.

53. The illustration of water demand analysis is shown below.

**Table 11. Water Supply Coverage**  
Water supply coverage

	Historical years			5-year Average	Base year 2007	Forecast years			5-year Average
	2002	2005	2006			2008	2011	2012	
	Status: Not updated	Not updated	Updated						
Projected Population			20,027,644	20,027,644	20,277,921	20,683,479	21,949,474	22,388,463	21,527,532
YoY growth					1.2%	2.00%	2.00%	2.00%	2.0%
Total Connections	907,616	907,616	989,391	923,971	1,105,895	1,173,871	1,437,771	1,500,000	1,347,508
YoY growth		0.0%	9.0%	2.3%	11.8%	27.0%	12.6%	11.2%	16.2%
Persons per Household			6.3	6.3	5.9	5.9	5.9	5.9	5.9
Number of Served Population			6,227,225	1,245,445	6,472,935	6,946,269	8,419,701	8,784,119	7,899,607
YoY growth					4%	458%	13%	11%	102%
% Population Served			31.1%		31.9%	33.6%	38.4%	39.2%	37%
YoY growth						5%	4%	2%	4%

**Production capacity (000's cbm)**

Production capacity	2,143,000	2,143,000	2,143,000	2,143,000	2,143,000	2,143,000	2,143,000	2,143,000	2,143,000
YoY change		0.0%	0.0%			0.0%	0.0%	0.0%	
Annual production including NRW	354,700	349,784	362,281	353,852	396,183	422,395	507,078	516,764	474,035
Utilization	16.6%	16.3%	16.9%	16.5%	18.5%	19.7%	23.7%	24.1%	22.1%

54. The business plan to be submitted to the Commission must include an asset management plan that provides information on the assets including an inventory, periodic grading of condition and asset performance and remaining useful life. This information will guide the development of a schedule and strategies for rehabilitation or replacement of assets.

55. The strategies adopted by the Board, particularly the program for and financing of the rehabilitation or replacement, will support the amount of revenues to be allocated for capital expenditures. This amount shall be allocated from the revenues derived from the depreciation provision in the revenue requirements.

**Section 3.3 Calculating the Tariff**

**A. Computing the Fixed Charges**

56. To compute the fixed charges, the procedures are as follows:
- (a) Compute the equivalent connections which will serve as the denominator to get the base fixed charge or the monthly fixed tariff for 1/2" size connection.
  - (b) Classify connections by consumer category and meter size  
 Multiply by meter service ratio or factor  
 = Equivalent connections for fixed charges

**Table 12. Equivalent Connections for Fixed Charges Computation**

Meter Size	Meter Service Factor	Domestic Connections					Equivalent Connections
		Domestic	Religious & Schools	Stand posts & Garden Tops	Bulk	Total	
1/2"	1.00	971,731	4,828	5,825	36	982,420	982,420
3/4"	2.80	104,448	1,240	68		105,756	296,117
1" - 2"	5.60	12,656	1,439	410		14,505	81,230
2" - 3"	14.00	87	54	6		146	2,050
>3"	28.00	180	102	-		283	7,912
Total Equivalent Connections						1,103,111	1,369,729

- (c) Compute the base fixed charge per connection

Total Administration Overhead for the Year

Divide by the equivalent connections in #1 (Domestic) & #2 (Non-Domestic)

= Monthly Fixed Charge for 1/2" sized connection

**Table 13. Computation of Fixed Charges**

COMPUTATION OF FIXED CHARGES										
2008										
Meter Size	Meter Service Factor	Domestic Equivalent Connections	Meter Service Factor	Non-Domestic Connections					Equivalent Connections	Grand Total
				Government	Commercial & Industrial	Shipping	Bowser	Total		
1/2"	1.00	982,420	1.40	6,699	45,427	15	-	52,141	72,997	1,055,417
3/4"	2.80	296,117	2.80	1,739	11,016	-	-	12,756	35,716	331,833
1" - 2"	5.60	81,230	5.60	3,386	11,527	-	-	14,913	83,514	164,745
2" - 3"	14.00	2,050	14.00	816	298	-	-	1,114	15,592	17,642
>3"	28.00	7,912	28.00	515	216	-	-	731	20,462	28,375
Total Equivalent Conne		1,369,729							228,281	1,598,011
Total Administration Overhead Costs										1,849,586
Fixed Cost 1/2' Domestic Connection										96.45

- (d) Specific Fixed Charge of a Connection  
Base Fixed Charge (Computed in #2) x Applicable Meter Service Factor for Size of Connection and consumer category

The table would show a resulting figure of LKR 96 for base fixed charge. This was derived by dividing the total administrative overhead of LKR 1.85 Million by the total equivalent connection of 1.6 M or equivalent to LKR 96.

- (e) Compute the fixed tariff for a consumer, following the computation of the base fixed charge, the fixed charge per consumer category as illustrated in Table 14 is computed as follows:

For a residential 3/4" connection:

LKR 96 x 2.8 equivalent meter service factor = LKR 270

For a non-domestic, 1/2" connection

LKR 96 x 1.4 equivalent meter service factor = LKR 135

**Table 14. Fixed Charges for Domestic / Non-Domestic Connections**

Meter Size	Meter Service Factor	Domestic	Non-Domestic
		Fixed	Charges
½"	1.00	96.00	135.00
½"	1.40		
¾"	2.80	270.00	270.00
1" – 2"	5.60	540.00	540.00
2" – 3"	14.00	1,350.00	1,350.00
>3"	28.00	2,701.00	2,701.00

57. The complete computation of fixed and usage charges for all consumer categories is illustrated in Table 13.

### B. Computing the Usage Charges

58. To compute the base usage charge, the procedures are as follows:

(a) Compute the equivalent volume which will serve as the denominator to get the base usage charge per cu.m.

(a.i) Break down Consumption by consumer category  
Domestic, Stand posts, Religious institutions, Commercial, etc

**Table 15. Annual Consumption by Consumer Category**

Status:	5-year Average	Base year	Forecast years			5-year Average
		2007	2008	2011	2012	
Domestic	171,192,944	194,204,481	211,282,876	258,303,887	266,019,315	240,171,170
Religious and Schools	7,075,172	8,117,447	8,872,419	10,846,976	11,286,036	10,127,736
Garden Taps and Stand Posts	7,564,930	8,630,051	9,361,524	11,444,932	10,844,959	10,296,025
Government Institutions	35,692,468	40,825,266	40,765,676	52,990,849	55,402,486	48,948,623
Commercial and Industrial	26,922,811	30,549,289	33,272,183	40,676,909	41,043,825	37,510,328
Shipping	135,235	145,605	153,904	188,155	198,325	176,616
Bulk	5,200,396	5,845,481	6,371,854	7,789,910	8,210,952	7,312,160
<b>Sub-total</b>	<b>253,783,957</b>	<b>288,317,620</b>	<b>310,080,436</b>	<b>382,241,619</b>	<b>393,005,897</b>	<b>354,542,657</b>
Bowers	962,857	1,042,253	1,073,521	1,173,065	1,208,257	1,139,893
<i>YoY growth</i>	1.0%	3.0%	3.00%	3.00%	3.00%	3.0%
<b>Total</b>	<b>254,746,814</b>	<b>289,359,873</b>	<b>311,153,957</b>	<b>383,414,684</b>	<b>394,214,154</b>	<b>355,682,551</b>

(a.ii) Consumption of Domestic Connection (except Residential)  
Multiply by Classification Increment Factor  
= Equivalent Volume for Other Domestic Connections

(a.iii) Consumption of Non-Domestic Connection

Multiply by Classification Increment Factor  
=Equivalent Volume for Non-Domestic Connections

**Table 16. Equivalent Volume for Consumers Subject to Single Volumetric Charge**

Religious and Schools	8,872,419	10,846,976	11,286,036	10,127,736
Garden Taps and Stand Posts	9,361,524	11,444,932	10,844,959	10,296,025
Government Institutions	40,765,676	52,990,849	55,402,486	48,948,623
Commercial and Industrial	33,272,183	40,676,909	41,043,825	37,510,328
Shipping	153,904	188,155	198,325	176,616
Bulk	6,371,854	7,789,910	8,210,952	7,312,160
<b>Sub- total</b>	<b>98,797,560</b>	<b>123,937,732</b>	<b>126,986,582</b>	<b>114,371,487</b>
Browsers	1,073,521	1,173,065	1,208,257	1,139,893
<i>YoY growth</i>	3.00%	3.00%	3.00%	3.0%
<b>Total</b>	<b>99,871,081</b>	<b>125,110,797</b>	<b>128,194,839</b>	<b>115,511,381</b>
<b>CLASSIFICATION INCREMENT FACTOR</b>				
Religious and Schools	1.00	1.00	1.00	
Garden Taps and Stand Posts	1.00	1.00	1.00	
Government Institutions	4.00	4.00	4.00	
Commercial and Industrial	5.00	5.00	5.00	
Shipping	20.00	20.00	20.00	
Bulk	1.00	1.00	1.00	
Browsers	5.00	5.00	5.00	
<b>EQUIVALENT VOLUME</b>				
Consumption x Usage Increment Factor				
Religious and Schools	8,872,419	10,846,976	11,286,036	10,127,736
Garden Taps and Stand Posts	9,361,524	11,444,932	10,844,959	10,296,025
Government Institutions	163,062,702	211,963,398	221,609,945	195,794,493
Commercial and Industrial	166,360,917	203,384,544	205,219,123	187,551,639
Shipping	3,078,077	3,763,103	3,966,497	3,532,314
Bulk	6,371,854	7,789,910	8,210,952	7,312,160
Browsers	5,367,603	5,865,325	6,041,285	5,699,467
<b>Total</b>	<b>362,475,097</b>	<b>455,058,189</b>	<b>467,178,797</b>	<b>420,313,834</b>

(a.iv) Domestic Consumption broken down according to Consumption Blocks

**Table 17. Distribution of Domestic Consumption by Consumption Block**

<i>Status:</i>	Forecast years			5-year Average
	2008	2011	2012	
<b>Domestic Consumption</b>	211,282,876	258,303,887	266,019,315	240,171,170
<b>DISTRIBUTION OF CONSUMPTIONS BY BLOCKS</b>				
0 - 6	25%	25%	25%	
7 - 15	31%	31%	31%	
16 - 25	19%	19%	19%	
26 - 40	20%	20%	20%	
Over 40	5%	5%	5%	
<b>DOMESTIC CONSUMPTION BY BLOCKS</b>				
0 - 6	52,820,719	64,575,972	66,504,829	60,042,793
7 - 15	65,497,692	80,074,205	82,465,988	74,453,063
16 - 25	40,143,746	49,077,739	50,543,670	45,632,522
26 - 40	42,256,575	51,660,777	53,203,863	48,034,234
Over 40	10,564,144	12,915,194	13,300,966	12,008,559

(a.v) Multiply Domestic Consumption per Consumption Block by Quantity Block Increment Factor  
=Equivalent Volume for Domestic Connections

Table 18. Equivalent Volume for Domestic Connections

Annual consumption (cbm)				
Status:	Forecast years			5-year Average
	2008	2011	2012	
<b>Domestic Consumption</b>	211,282,876	258,303,887	266,019,315	240,171,170
<b>DOMESTIC CONSUMPTION BY BLOCKS</b>				
0 - 6	52,820,719	64,575,972	66,504,829	60,042,793
7 - 15	65,497,692	80,074,205	82,465,988	74,453,063
16 - 25	40,143,746	49,077,739	50,543,670	45,632,522
26 - 40	42,256,575	51,660,777	53,203,863	48,034,234
Over 40	10,564,144	12,915,194	13,300,966	12,008,559
<b>USAGE INCREMENT FACTOR</b>				
0 - 6	0.25	0.25	0.25	
7 - 15	0.50	0.50	0.50	
16 - 25	1.00	1.00	1.00	
26 - 40	2.00	2.00	2.00	
Over 40	4.00	4.00	4.00	
<b>EQUIVALENT VOLUME (Consumption x Increment Factor)</b>				
0 - 6	13,205,180	16,143,993	16,626,207	15,010,698
7 - 15	32,748,846	40,037,103	41,232,994	37,226,531
16 - 25	40,143,746	49,077,739	50,543,670	45,632,522
26 - 40	84,513,150	103,321,555	106,407,726	96,068,468
Over 40	42,256,575	51,660,777	53,203,863	48,034,234
	212,867,498	260,241,166	268,014,460	241,972,454

(a.vi) Summation of (a.i) to (a.v)  
= Total Equivalent Volume

- (b) Total Revenue Requirement for the Tariff period  
Divide by Total Equivalent Volume  
= Rate per equivalent volume (EV) or the Base usage tariff

Table 19. Computation of Base Usage Tariff

Status:	Forecast years			5-year Average
	2008	2011	2012	
<b>REVENUE REQUIREMENTS</b>	8,055,606	12,080,986	12,927,274	10,495,952
<b>EQUIVALENT VOLUME</b>	575,342,595	715,299,355	735,193,256	662,286,287
<b>BASE USAGE CHARGE/CBM (LKR)</b>	14.00	16.89	17.58	15.85

- (c) Compute the tariff rate for a consumer category and per quantity block of domestic (residential) connections

As shown in Table 19, the base usage charge of LKR 15.85 was also derived by dividing the total revenue requirement of LKR 10,496 M by the equivalent volume of 662 Million.

For the 16-25 cu.m. block of domestic/residential consumers, the rate would be:  
= Rate per EV X Incremental Factor  
= 15.85 X 1.00 or 16 / cu.m.

For the 26-40 cu m consumption block, this would be 15.85 X 2 or 32 / cu.m. (Please refer to Table 19)

**Table 20. Tariff Computation**

COMPUTATION OF FIXED CHARGES															
2008															
Meter Size	Meter Service Factor	Domestic Connections						Equivalent Connections	Non-Domestic Connections					Equivalent Connections	Grand Total
		Domestic	Religious & Schools	Stand posts & Garden Tops	Bulk	Total	Meter Service Factor		Government	Commercial & Industrial	Shipping	Bowser	Total		
1/2"	1.00	971,731	4,828	5,825	36	982,420	982,420	1.40	6,699	45,427	15	-	52,141	72,997	1,055,417
3/4"	2.80	104,448	1,240	68		105,756	296,117	2.80	1,739	11,016	-	-	12,756	35,716	331,833
1" - 2"	5.60	12,656	1,439	410		14,505	81,230	5.60	3,386	11,527	-	-	14,913	83,514	164,745
2" - 3"	14.00	87	54	6		146	2,050	14.00	816	298	-	-	1,114	15,592	17,642
>3"	28.00	180	102	-		283	7,912	28.00	515	216	-	-	731	20,462	28,375
Total Equivalent Connections							1,103,111	1,369,729						228,281	1,598,011
Total Administration Overhead Costs															1,849,586
Fixed Cost 1/2' Domestic Connection															96.45
COMPUTATION OF USAGE CHARGES															
2008-2009															
Consumption Block	Increment Factor	Block Consumption						Equivalent Volume	Non-Domestic Connections					Equivalent Volume	Grand Total
		Domestic	Religious & Schools	Stand posts & Garden Tops	Bulk	Total	Government		Commercial & Industrial	Shipping	Bowser	Total			
Increment Factor		1.00	1.00	1.00	1.00			Increment Factor	4.00	5.00	20.00	1.00			
0 - 6	0.25	13,536,598		-		13,536,598	13,536,598						-	-	
7 - 15	0.50	33,570,764				33,570,764	33,570,764						-	-	
16 - 25	1.00	41,151,259				41,151,259	41,151,259						-	-	
26 - 40	2.00	86,634,229				86,634,229	86,634,229						-	-	
Over 40	4.00	43,317,114	9,143,084	9,203,684	6,610,328	68,274,211	68,274,211		43,544,709	33,753,539	159,664	1,089,624	78,547,535	-	68,274,211
Total Equivalent Volt		218,209,964	9,143,084	9,203,684	6,610,328	236,556,732	243,167,061	174,178,835		168,767,695	3,193,278	5,448,118	351,587,924	351,587,924	594,754,985
Total Revenue Requirement															8,425,566
Usage Charge / cu.m.															14.17

59. The rate structure for the water utility is shown in Table 21.

**Table 21. Tariff Schedule**

2008-2009													
Meter Size	Meter Service Factor	DOMESTIC	NON-DOMESTIC	Consumption Block	Increment Factor	DOMESTIC / RESIDENTIAL	STAND POSTS / GARDEN TAPS	BULK	RELIGIOUS / SCHOOLS	GOVERNMENT	COMMERCIAL / INDUSTRIAL	SHIPPING	BOWSER
		<b>FIXED CHARGES</b>					<b>USAGE CHARGES</b>						
				Increment Factor		1.00	1.00	1.00	1.00	4.00	5.00	20.00	5.00
1/2"	1.00	96				4	14	14	14	57	71	283	71
1/2"	1.40		135	0 - 6	0.25								
3/4"	2.80	270	270	7 - 15	0.50	7	14	14	14	57	71	283	71
1" - 2"	5.60	540	540	16 - 25	1.00	14	14	14	14	57	71	283	71
2" - 3"	14.00	1,350	1,350	26 - 40	2.00	28	14	14	14	57	71	283	71
>3"	28.00	2,701	2,701	Over 40	4.00	57	14	14	14	57	71	283	71
Average Consumption / Month						17	128	20,606	100	352	42	889	89,460
Average Water Bill		(SLR)				235	1,796	288,487	1,401	20,040	2,982	251,524	6,351,664
Average Rate / cu.m.		(SLR)				14	14	14	14	57	71	283	71

### C. Affordability Test

60. As a measure of affordability of tariffs to the poor, a spending of 5% of the average income of such households has been internationally acknowledged as a limit to allocated spending for water. In this case, the guideline adopted sets that the water bill for 0-15 cu.m. consumption must not exceed 4% of the average income of households in estates. Sri Lanka Central Bank data show the lowest income brackets are in estates. (see Table 22)

**Table 22. Affordability Analysis**

AFFORDABILITY ANALYSIS	Forecasts				
	2008	2009	2010	2011	2012
Average Monthly Household Income (Estate) (LKR)	14,621	15,586	16,615	17,711	18,880
@ 4% Affordability to Pay	585	623	665	708	755
Average Monthly Water bill (Domestic) @ 17 cum ave use (LKR)	334	334	395	395	395
% Spent on Water (Monthly Water Bill)	2.28%	2.14%	2.38%	2.23%	2.09%
% Annual Increase in Average Income	6.60%				

### D. Tariff Sufficiency Test

61. The following table is prepared to evaluate the sufficiency of tariffs against the forecast revenue requirements. Minor difference in the aggregate revenues computed is deemed due to rounding off to the nearest whole figure of the proposed tariff.

**Table 23. Test of Sufficiency of Tariff**

TEST OF SUFFICIENCY OF TARIFF	Forecasts				
	2008	2009	2010	2011	2012
REVENUE REQUIREMENT TO BE RECOVERED FROM FIXED CHARGES	1,751,529	1,947,642	2,174,885	2,403,264	2,594,150
REVENUES FROM FIXED CHARGES	1,782,541	1,927,105	2,268,688	2,409,535	2,535,458
REVENUE REQUIREMENT TO BE RECOVERED FROM USAGE CHARGES	8,055,606	8,795,526	10,620,366	12,080,986	12,927,274
REVENUES FROM USAGE CHARGES	8,167,344	8,719,334	11,259,759	11,995,399	12,328,677
Difference due to averaging of tariffs					

## Section 4 Proposed Recovery Framework for Sanitation and Sewerage Services

62. Sanitation and Sewerage Charges. To enable the NWSDB generate sufficient funds to cover the costs of providing sewerage services and provide funds for sanitation where there are no existing sewerage systems, it is proposed that a single volumetric tariff be charged for domestic connections at the base sewerage tariff and for non-domestic connections at twice the base sewerage tariff. For illustrative purposes, the model shows two schemes where (i) only sewered domestic connections and all non-domestic connections are subject to the sewerage tariff and (ii) all connections are charged the sewerage tariff. The report illustration shows the first scheme (resulting to higher sewerage tariff).

63. Sewerage Fee.- . The tariff shall be applied on a uniform basis nationwide and shall be differentiated between domestic and commercial/industrial connections. It shall be calculated based on actual water consumption. Industry practice, assumes that almost all water consumed eventually becomes wastewater, hence the sewerage charge shall be equal to average sewerage charge multiplied by the cubic meter consumption with 90% discharge factor applied.

64. The proposed framework for setting sewerage tariff shall follow the tariff setting methodology for water supply and shall consider the principles on cost recovery adopted under the draft national policy on sanitation as follows:

#### **Cost Recovery Principles**

- (i) Sewerage tariff will be a national tariff and shall be applied uniformly across the country.
- (ii) The domestic and commercial consumers shall be charged based on the water consumption using a single volumetric tariff;
- (iii) Indicate the tariff charge separately in the monthly water bill where:
  - domestic sector shall make payments based on the base sewerage tariff
  - non-domestic connections shall make payments based on the commercial tariff which is twice the base sewerage tariff.

65. Tariff for sewer connections: The tariff for sewer connections shall be based on the recovery of all costs to operate the system, which, per national policy ,shall include only the recovery of operation and maintenance costs:

- Personnel cost
- Pumping cost
- Chemicals
- Repairs and maintenance
- Establishment Expenses
- Other Operation and Maintenance Expenses

66. Other costs such as taxes and other levies have been incorporated in the recovery of water supply tariff and are not to be included in the calculation.

67. For ease in implementation, the sewerage tariff shall be a uniform rate to be applied based on the volume of water consumed but differentiated between domestic and commercial/industrial customers. It is assumed that more treatment costs are required in the treatment of industrial wastewater, hence the commercial/industrial customers shall be charged more.

68. Average sewerage tariff is calculated by dividing revenue requirements by the equivalent volume. The resulting average tariff is then expressed as a unit rate for domestic connections and commercial/industrial connections twice the former's rate.

$$\text{Average Tariff} = \frac{\text{RR}}{\text{EV}}$$

RR = revenue requirements ( O & M Expenses)  
 EV = equivalent volume of domestic and commercial/industrial consumption  
 computed as:  
 Domestic : actual consumption x 1  
 Non-Domestic: actual consumption x 2

69. The data supporting the computation of the sewerage tariff shall be presented in the tariff model and shown in the following table. The five-year historical data showing the number of sewer connections with the ratio of commercial connections shall be presented. This is to get the ratio of sewer connections to total service connections.

70. The ratio of sewer connections to total water supply connections shall be used to determine the weighted ratio of sewerage expenses to total water supply expenses. In the absence of concrete data of forecasts of sewer connections for the next five years which ideally, should be used to project the corresponding sewerage expenses, the average historical sewerage expense ratio to total is used to forecast the sewerage expenses. These shall represent the revenue requirements to be recovered from the sewerage tariff.

71. Table 24 below shows that sewerage connections currently number 8.5% of the total water connections. The expense of LKR 128 Million represents 34% of the weighted total water expense for sewer connections numbering 8.5%-of-total connections (Table 25). The proportionate water expense **was obtained and used** to compute for the relative sewerage expense. This ratio is now used to forecast the sewerage expenses for the next five years assuming a growth rate for sewer connections (% of sewer connections to total connections) for the forecast period. It was further assumed that only 90% (discharge factor) of the initial revenue requirement will be recovered from the sewerage revenue hence the factor used is 35.6%. The revenue requirement for sewerage is computed at 32% x weighted average water expense for 8.5%-of-total sewer connections.

**Table 24. Historical Data Relating to Sewerage**

	Historical					Five-Year Average (Historical)
	2002	2003	2004	2005	2006	
	Not updated	Not updated	Not updated	Not updated	Not updated	
<b>NUMBER OF SEWERAGE CONNECTIONS</b>						
Western RSC	37,083	37,083	37,083	37,083	37,083	37,083
Other RSC	41,055	41,055	41,055	41,979	42,021	41,433
<b>TOTAL NUMBER OF SEWERAGE CONNECTIONS</b>	<b>78,138</b>	<b>78,138</b>	<b>78,138</b>	<b>79,062</b>	<b>79,104</b>	<b>78,516</b>
assumed % sewer commercial connections	20%	20%	20%	20%	20%	20%
<b>TOTAL NUMBER OF WATER CONNECTIONS</b>	<b>907,616</b>	<b>907,616</b>	<b>907,616</b>	<b>907,616</b>	<b>989,391</b>	<b>923,971</b>
<b>SEWERAGE CONNECTIONS AS % TO WATER CONNECTIONS</b>	<b>8.6%</b>	<b>8.6%</b>	<b>8.6%</b>	<b>8.7%</b>	<b>8.0%</b>	<b>8.5%</b>

**Table 25. Computation of Revenue Requirements for Sewerage**

Status:	5-year Average	Base year	Forecast years					5-year Average
		2007	2008	2009	2010	2011	2012	
Total water expenses (LKR 000's)	4,495,851	6,469,040	7,278,061	8,087,216	9,016,773	9,954,154	10,737,190	9,014,679
(Excluding depreciation and finance charges)	10.52%							
Total sewerage connections as % to water connections	8.51%	8.51%	8.51%	8.51%	8.51%	8.51%	8.51%	8.51%
Weighted average water expenses (LKR 000's)	381,200	550,304	619,125	687,958	767,033	846,773	913,384	766,855
<b>Total sewerage expenses (LKR 000's)</b>	<b>128,174</b>	<b>158,636</b>	<b>211,483</b>	<b>198,318</b>	<b>262,006</b>	<b>244,100</b>	<b>311,997</b>	<b>245,581</b>
% to weighted average water expenses	34.16%	28.83%	34.16%	28.83%	34.16%	28.83%	34.16%	32.03%
YoY change	0.00%		33.3%	-6.2%	32.1%	-6.8%	27.8%	16.04%
Estimated sewerage rev as a % to water rev			32.0%	32.0%	32.0%	32.0%	32.0%	32.03%
Revenue Requirements for Sewerage			198,280	220,324	245,649	271,186	292,519	245,592

61. Table shows that using the derived figure for sewerage revenue base, the resulting sewerage tariff is LKR 1.37 for the 5-year projected period. Using the rounded figure of LKR 1.40 and LKR 2.80 for domestic and non-domestic sewerage tariff, respectively, the average five-year revenue is LKR 250 Million from sewerage revenue. This was computed by adding up the products of (average) 20,483 Million cbm to the 1.40 domestic sewerage tariff and 157,996 Million cbm to the LKR 2.8 non-domestic sewerage rate. A comparison of resulting sewerage revenues to the sewerage revenue requirements shows there are adequate revenues to cover the latter. Table 26 presents the figures for the foregoing discussion. Table 27 shows the tariff for Option 2 where all connections, domestic and non-domestic will be charged for sewerage. The resulting tariff is only half as much than if only the sewer domestic connections were billed. The net income from sewerage which will be incorporated as a line item in the NWSDB income statement is presented in Table 28.

62.

**Table 26. Computation of Sewerage Tariff (Option 1)**

Status:	Forecast years					5-year Average
	2008	2009	2010	2011	2012	
<b>OPTION 1</b>						
<b>SEWERAGE TARIFF FOR SEWERED DOMESTIC &amp; ALL NON-DOMESTIC</b>						
<b>Sewerage Revenue Base</b>						
(90% of water consumption - cbm)	153,755	166,447	181,073	193,661	197,461	
Sewered Domestic	18,277	19,153	21,052	22,609	21,325	20,483
Non-Domestic	135,478	147,294	160,021	171,052	176,135	157,996
<i>Base Sewerage Tariff (Domestic)</i>	1.29	1.32	1.36	1.40	1.48	1.37
<b>Sewerage Tariff</b>						
- Domestic	1.40	1.40	1.40	1.40	1.40	1.40
- Non-Domestic	2.80	2.80	2.80	2.80	2.80	2.80
Sewerage Revenue	215,257	233,026	253,502	271,126	276,445	249,871

**Table 27. Computation of Sewerage Tariff (Option 2)**

Status:	Forecast years					5-year Average
	2008	2009	2010	2011	2012	
<b>OPTION 2</b>						
<b>SEWERAGE TARIFF FOR ALL CONNECTIONS</b>						
<b>Sewerage Revenue Base</b>						
(90% of water consumption - cbm)	386,419	410,856	449,504	478,444	492,067	
Domestic	235,889	247,197	271,703	288,386	296,361	267,907
Non-Domestic	150,531	163,660	177,801	190,058	195,706	175,551
<i>Base Sewerage Tariff (Domestic)</i>	0.51	0.54	0.55	0.57	0.59	0.55
<b>Sewerage Tariff</b>						
- Domestic	0.60	0.60	0.60	0.60	0.60	0.60
- Non-Domestic	1.20	1.20	1.20	1.20	1.20	1.20
Sewerage Revenue	231,852	246,514	269,702	287,066	295,240	266,075

**Table 28. Income from Sewerage**

	Forecast years					5-year Average
	2008	2009	2010	2011	2012	
(Option 1: Sewered Domestic & Non-Domestic)						
<b>Sewerage</b>						
Revenue	215,257	233,026	253,502	271,126	276,445	249,871
Expenses	(211,483)	(198,318)	(262,006)	(244,100)	(311,997)	(245,581)
<b>INCOME FROM SEWERAGE</b>	<b>3,773</b>	<b>34,708</b>	<b>-8,504</b>	<b>27,026</b>	<b>-35,553</b>	<b>4,290</b>

## Section 5 Financial Monitoring of the NWSDB

44. To enable the regulator to review and assess the financial performance of the NWSDB, a number of key performance indicators (KPIs) were selected and included in the tariff model. The chosen KPIs for tariff review purposes are meant to capture the regulated entity's operational

performance and allow the regulator to effectively monitor and to report on this performance to the regulated entity, its customers and other stakeholders.

45. The role of the regulator is to evaluate performance in terms of (i) attainment of targets, (ii) assessment of the need to undertake audits and (iii) effect enforcement of disallowances as may be provided for in the regulation policies and guidelines.

46. The choice of KPIs are related to the levels of service, performance targets, required improvement in operations set during the tariff setting period. These should be agreed upon between the regulator and the regulated entity including how these should be reported periodically.

47. The proposed financial and operational key performance indicators for the tariff model are as presented and explained below:

- (a) Marketing Effort KPIs measure the operator's performance in terms of the sales made during the period. Significant departure from target performance could indicate the operator's failure in terms of metering, billing or even the reliability of water supply.
- (b) Profitability KPI that shows the ratio of net income to gross operating revenues is used to indicate the earning ability of the service provider. Other ratios showing profitability measured against assets or capital utilized may be adopted but in this instance may not prove to be relevant considering that no return on investment is included in the cost recovery framework;
- (c) Efficiency in Cost Control measures the effectiveness of implementing cost control. The Operating Ratio shows the relationship of expenses to operating revenues while the Operating Cost / cbm billed indicates the average operating costs spent for every cbm of water billed.
- (d) Collection Effort is being measured to assess the effectiveness of implementing collection policies including the enforcement of penalties and disconnection. The recovery of expenses through tariffs hinges primarily on the level of collection of revenues. In addition to measuring the average collection period of the service provider, the ratio of collected water bills within the billing month or "on-time" efficiency or the ratio of collected water bills for the year in terms of total billing for the year (collection efficiency) may also be measured.
- (e) Financial Liquidity denotes overall ability to meet financial obligations. It results from combined efforts in marketing, cost control, collection efficiency and even production efficiency. The current ratio, adopted as the KPI for this model, shows the available current assets which include cash, receivables, inventory and deposits to pay all liabilities due within the year. The minimum ratio required is 1:1.
- (f) Production efficiency which impacts heavily on profitability measures the ability to meet standards on water production and to

meet water demand and minimize losses. Non-revenue water reflects unsold water produced and therefore the technical efficiency of the service provider. It results from leakages, illegal connections, system testing and water from fire hydrants, etc. Metering of connections is another measure that has to be monitored because of its effect on revenue generation.