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# Orissa Water Sector Reform: Financial Due-Diligence for Corporatization Business Plan, India

## Final Report

Indo-USAID Financial Institutions Reform and Expansion Project—  
Debt & Infrastructure Component (FIRE-D Project)

USAID-TCGI Contract No. 386-C-00-04-00119-00

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## **Orissa Urban Water Sector Reform**

### **Institutional and Financial Due-diligence and Preparation of Corporate Business Plan for Setting Up a Corporatised Operating Entity**



### **Base Line Report and Corporatisation Plan for Bhubaneswar City Water Services**

**Draft for Discussion**

**USAID-Financial Institutions Reform and Expansion Project  
January 2008**



**DHIYA CONSULTING PRIVATE LTD**

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## Acronyms

AE	Assistant Engineer
BBSR	Bhubaneswar
Capex	Capital Expenditure
CDP	City Development Plan
CE	Chief Engineer
CoE	Corporatised Entity
EBIDTA	Earnings Before Interest, Depreciation and Tax Adjusted
EE	Executive Engineer
FIRE (D)	Financial Institution Reform and Expansion Project (Debt)
FIs	Financial Institutions
FY	Financial Year Starting April 1 to Subsequent March 31
GO	Government Order
GoO	Government of Orissa
JBIC	Japanese Bank for International Cooperation
JE	Junior Engineer
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KL	Kilo Litres
LPCD	Litres Per Capita Day
MIS	Management Information Systems
ML	Million Litres
MLD	Million Litres per Day
NMR/DLR	Nominal Muster Roll/Daily Labour Rate
O&M	Operations and Maintenance
Opex	Operational Expenditure
OWSSB	Orissa Water Supply and Sewerage Board
P and L	Profit and Loss Account
PH	Public Health
PH I	Public Health Division I
PH II	Public Health Division II
PH III	Public Health Division III
PH(U)	Public Health Engineer Office (Urban)
PHEO	Public Health Engineering Organisation
SCP	Special Component Pan
SE	Superintending Engineer
SS	Sewage Services
TSP	Tribal Sub Plan
ULB	Urban Local Body
USAID	United States Agency for International Development
WPI	Wholesale Price Index
WS	Water Supply
XDBMS	Database Management Systems
y-o-y	Year-on-Year

## **Base Line Report on Corporatisation Plan for Bhubaneswar Water Services**

### **1. Executive Summary**

Orissa State faces the combined challenges of relatively low household incomes, a large number of small towns and villages, very weak capacity at municipal level to provide water and sanitation services, and, relative to most other Indian states, a low percentage of the population covered by water and sanitation services.

Historically, Public Health Engineering Organisation (PHEO) has been functioning as an arm of the State Government in providing water supply (“WS”) and sewage services (“SS”) to 103 urban local bodies (“ULBs”) and in serving a population of ~56 lakhs as per the 2001 Census.

USAID FIRE (D) project is assisting the Government of Orissa (“GoO”) in undertaking urban water sector reforms. The objectives of the reform program include the following:

- Enable the state to implement decentralization of water and sanitation services.
- Set up a corporatised operating entity (COE) carved out of PHEO with certain rights, incentives, penalties and liabilities, which shall provide water and sewage services to the cities of Bhubaneswar, Cuttack and Puri through incentive-based operating contracts between the COE and the respective municipal authorities. This will help PHEO transition from being a state department to a commercialized service provider.
- Improve the performance of the Bhubaneswar water and sewerage system through incentive-based operating contracts. Over the long term, this will make the water system sustainable and will free resources for development of other social infrastructure.
- Based on the lessons learnt from the three pilots cities, the decentralization model will be replicated in other municipalities in Orissa.

In order to set up the COE and transfer the business undertaking, the GoO is required to:

- (a) Delineate the WS and SS services in the cities of Bhubaneswar, Puri and Cuttack.
- (b) Value the assets and liabilities of the business undertaking.
- (c) Finalise the options for the PHEO personnel carrying out the existing functions in these ULBs – either transfer or send on deputation to the COE or staff the new entity independently.
- (d) Define the final consideration to be agreed between the respective municipal corporations and GoO under a transfer scheme.

The key outcome of this study is to ensure that the newly formed COE shall function as an autonomous body that provides improved water services, is accountable to the municipal government of the city, is regulated through a contracting framework, and operates as a financially viable entity with declining financial support (subsidy) from the GoO.

#### ***1.1. PHEO***

PHEO provides water services in 102 of the 103ULBs) in the state except Paradeep NAC. It also manages the partial sewage services in the State’s three largest cities viz. Bhubaneswar, Cuttack and Puri. Earlier PHEO undertook the role of developing all

infrastructure assets followed by operations, maintenance and management of services. With the establishment of Orissa Water Supply and Sewerage Board (OWSSB), however, the role of developing infrastructure has been assigned to OWSSB and PHEO's role is now limited to management of the services.

As per the current provisions, PHEO is governed by the regular conduct of business followed by all departments in State Government. Its administrative and financial management follow general rules of business and there are no special acts governing the PHEO. Orissa Public Works Department Code (Volumes I & II) sets out the organisation, conduct of business, duties and powers under administrative, technical, financial functions. Water tariffs are set by Orissa Water Works (Urban Local Bodies) Rules, 1980, amended from time to time by Government Gazette Notification.

The water supply status at the end of March 2006, according to a recent report, is shown in the following table.

Urban Water Supply Status in Orissa<sup>1</sup>

Parameter	Bhubaneswar	Orissa
Number of urban local bodies	1	103
Total urban population (2001 Census) (lakhs)	6.47	55
Total urban households (2001 Census) ('000s)	144	1,087
Total number of wards	47	1,757
Wards covered by water supply	17	1,059
Wards partially covered with water supply	26	497
Wards not covered with water supply	4	201
Population covered by piped water supply (lakhs)	3	39
Proportion of coverage (%)	42	63
Installed capacity of water supply (mld)	217	666
Average production (mld)	206	640
Average rate of supply (lpcd)	256	116
House service connections ('000s)	53	186
Standposts ('000s)	1	19
Hand pumps/tube wells	2	18

Urban water services are headed by the Chief Engineer PH (Urban) and the Chief Engineer (CE), who report directly to the Secretary, Government of Orissa, who in turn reports to the Minister, Urban Development. The CE's office is located in Bhubaneswar and there are four circle offices located at Bhubaneswar, Cuttack, Behrampur and Sambalpur, which are responsible for the functions in the respective regions.

### ***1.2. Bhubaneswar City Water Services***

Bhubaneswar City gets ~ 206 million litres of treated water per day ("MLD") out of a capacity of 294 MLD of water from the rivers Mahanadi, Daya and Kuakhai in addition to ground water sources. The Munduli Water Treatment Plant with a capacity of 115

<sup>1</sup> PHEO website.

MLD is currently supplying only 25 MLD in single shift operations. There is scope to increase the supply to its full capacity of 115MLD with the increase in demand.

The City's water supply connects 42% of the population and the average supply over the entire population works out to 233 litres per capita day ("LPCD") against an industry norm of 150 LPCD.

As for the sewage business, only a small population is covered (estimated ~35%). Sewage collected through drains, pipes, etc is treated partially in oxidation ponds/aerated tanks. Both the untreated sewage and treated effluent drain into Gangua Nallah flowing along the eastern side of city which finally discharges into the river Daya.

Bhubaneswar City's water profile vis-à-vis the state's other ULBs:

- Bhubaneswar gets one third of the total water supplied to all ULBs
- The average service level is 233 LPCD as against 118 LPCD in other ULBs
- Cost of supply per kilo litre ('KL') is ~Rs.3.54 as against Rs.3.78/ KL in other ULBs
- Recovery per KL is Rs.1.20 as against Rs.1.11 in other ULBs.

The City is currently under the jurisdiction of PH I, PH II and PH III divisions of PHEO.

With a ratio of 39 staff per 1,000 connections, PH divisions of Bhubaneswar stands high when compared to better functioning water utilities like in case of Bangalore the staff ration is 5 per 1000 connections.

Using analysis from the PH II Rent Division and water tariff/realisation rates across categories, the sale quantity of water has been estimated at 83 MLD with revenue of ~Rs. 11 crores servicing 52,279 connections. Given water input at 206 MLD and assuming a 15% technical loss (30.9 MLD), the quantity of unaccounted water stands at 93 MLD, which is more than that sold.

As against the operations and maintenance ("O&M") cost of Rs.26.9 crores, the recovery is only Rs.10.7 crores, leaving a gap of Rs.16.2 crores. This estimate is without taking into account the economic costs such as depreciation and cost of financing the business by way of loan or equity. Electricity charges account for ~ 50% of total costs. Even with low tariffs, collections are only at 51% with low rates of recovery from the Government-domestic category of consumer.

Water tariffs in Orissa state are fixed by the State Government as per the Orissa Water Works (Urban Local Bodies) Rules, 1980. The prevailing tariffs vary between Rs.2.54/KL for domestic supplies to Rs.8.4/KL for commercial supplies. Tariff increases are mandated at 5% year-on-year ("y-o-y") in a recent Government Order ("GO") notification. Based on the input quantity of water, the average cost of supply is Rs. 3.58 per KL with the average realisation at Rs.1.20 per KL.

The average capital expenditure is Rs.15 crores per year for the city.

### ***1.3. Billing and Collection***

Billing for the city of Bhubaneswar is carried out centrally from the PH II Rent Sub Division under the control of PH Division II and is controlled through a computer database. Monthly billing is practiced but delivery of bills to consumers is erratic and some consumers may not be receiving their bills in time for payment. A 2% rebate on the current bill is given for payment within the due date and a 5% penalty is levied on delayed payments. Recently PH Rent Division has started the commendable job of cleaning up the consumer database and has identified so far close to Rs.157 lakhs of bad debts for write-off.

The overall collection efficiency stands at 51% with 60% from domestic private category, 42% from commercial, and 88% from industrial category. The lowest collection stands at 30% from Government-domestic consumers.

#### ***1.4. Profit and Loss Account of Water Services in Bhubaneswar City***

Based on generally accepted accounting principles, PHEO's Profit and Loss account is worked out for its segregated accounts from that of Government's general Receipts and Payments and is shown in the following table.

##### **Profit & Loss Account**

Year Ending	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
<b>Income</b>					
Revenue from Water Charges	691.07	718.29	768.54	838.88	901.73
Revenue from Sewerage Services	29.95	30.69	30.00	29.55	20.77
Connection Charges					37.46
Other Income	80.83	101.82	102.39	113.67	136.30
Subsidy					
Total	801.85	850.80	900.93	982.10	1,096.26
<b>Expenditure</b>	<b>Mar-03</b>	<b>Mar-04</b>	<b>Mar-05</b>	<b>Mar-06</b>	<b>Mar-07</b>
Treatment Costs					200.29
Electricity	1,714.99	1,021.58	1,040.06	1,325.33	1,311.58
Employee Expenses	537.35	453.14	433.76	473.67	536.49
Less: Expense Capitalised	(26.53)	(66.52)	(66.78)	(147.68)	(251.76)
Net Employee Expenses	510.82	386.63	366.98	325.99	284.73
Repairs & Maintenance	498.71	631.32	747.25	1,203.66	1,081.30
Less: Expense Capitalised	31.11	(167.97)	(104.22)	(118.95)	(184.27)
Net Repairs & Maintenance	529.82	463.34	643.03	1,084.71	897.03
Total O & M Expenditure	2,755.62	1,871.55	2,050.07	2,736.02	2,693.64
Management Contract Fees					
EDBITA	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)
Depreciation	-	-	-	-	-
EBIT	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)
Interest	-	-	-	-	-
PBT	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)
Tax	-	-	-	-	-
PAT	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)

#### ***1.5. Balance Sheet for the Water Services Business in Bhubaneswar City***

The water services business in Bhubaneswar City is valued to prepare the Balance Sheet duly taking into account the following factors:

- Physical asset details such as capacity, length of water mains, year of construction etc. are sketchy.
- Historical values are not recorded systematically.

- Current replacement costs estimates are available.
- Discounted cash flows (“DCF”) would not be relevant as the Department is currently heavily subsidised and future cash flows are also dependent on subsidy.

Since the available data do not cover all the required parameters, a Reverse Net Depreciated Replacement Cost concept has been developed to arrive at the estimated historical cost. The steps involved are:

- Assumptions have been made in the case of other assets like inventory of chemicals, cash balances, payables etc to arrive at the asset side of the Balance Sheet.
- Using current prudent financing norms of funding infrastructure projects, the capital structure of the business has been fixed at 70% debt, assumed to be funded by GoO at an 8% interest rate and repayable in 10 years. The balance is treated as equity, which is assumed to carry a return of 16% per annum.

Opening Balance Sheet as of March 31, 2007

<b>Balance Sheet</b>	Mar-07
	Rs. Lakhs
Gross Block	16,559.08
Less: Acc.Depreciation	(4,977.95)
<b>Net Block</b>	<b>11,581.13</b>
Capital Work in Progress	
Current Assets	
Inventory	270.33
Receivables	869.00
Cash & Bank Balances	130.40
Advances	44.71
<b>Total Current Assets</b>	<b>1,314.44</b>
Current Liabilities	
O&M Payable	260.81
Rep & Main Payable	113.81
Other Refundable Deposits	90.25
Addnl Cash from GoO	
<b>Total Current Liabilities</b>	<b>464.86</b>
Net Working Capital	849.58
<b>NET ASSETS</b>	<b>12,430.70</b>
Financed by	
Loan from Government	8,701.49
Grant	
Equity From Government	3,729.21
Reserves and Surplus	
<b>TOTAL</b>	<b>12,430.70</b>

### **1.6. Business Plan for the CoE Managed WS and SS for Bhubaneswar City**

The Business Plan for the new corporate operating entity (COE) is prepared for a period of 8 years, i.e., from FY 2008 to FY 2015.

The quantity of water sold has been arrived at using calculations involving the growth of population, type of consumers, and the consumption expected therein. This estimate is checked against the availability of water, loss reduction expected, and the supply thereof.

Expenses have also been projected using average inflation at 5%. Based on the asset values, and useful life and age of the assets, depreciation charges have been calculated.

Based on the Bhubaneswar City Development Plan (“CDP”) and discussions with the PHEO, capital expenditure (“capex”) for the projection period has been compiled as also the method of its funding. Under the Jawaharlal Nehru National Urban Renewal Mission (“JNNURM”) scheme, 80% of the capex is treated as grant from the Government of India and the balance 10% contribution from GoO and BMC is assumed to be raised as loan from financial institutions.

By corporatising the services, a gradual performance efficiency improvement is contemplated as listed below:

- Improving collection efficiency to 95%
- Increasing coverage to 95%
- Reducing losses to 22%
- Increasing the tariff by 8% year-on-year.

**Projected Water Services Business FY 2008 – FY 2015**

WATER SUPPLY	Unit	Mar-07	Mar-11	Mar-15
Total population (Lakhs)	Lakhs	8.83	9.92	10.91
Production Capacity	MLD	206.00	251.00	251.00
Service level	LPCD	233	253	<b>230</b>
Urban poor	%	30%	27%	23%
Service level for urban poor	LPCD	50	50	50
Population	Lakhs	2.65	2.68	2.51
Consumers per connection	Number	15	15	15
Urban poor connections	Number	17,668	17,856	16,724
Balance population	Lakhs	6.18	7.24	8.40
Consumers per connection	Number	10	10	10
Possible consumers	Number	61,838	72,416	83,985
Total consumers	Number	79,506	90,272	100,709
Conversion to COE consumers	%	42%	62.0%	95.0%
Domestic Paying Consumers	Number	33,581	55,969	95,674
Other consumers	Number	19,350	19,389	19,428
Grand total consumers	Number	52,931	75,357	115,101
Incremental consumers	Number		6,295	14,349
Ratio of possible to total consumers	%	67%	83%	114%
Average Revenue per consumer	Rs./Year	2,029	2,594	3,345
Total Revenue	Rs. Lakhs	1,073.74	1,954.91	3,850.33

Profit & Loss account – FY 2008 to FY 2015

**Profit & Loss Account**

Rs Lakhs

Year Ending	Mar-08	Mar-11	Mar-15
<b>Income</b>	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
Revenue from Water Charges	1,230.33	1,954.91	3,850.33
Revenue from Sewerage Services	66.65	84.68	123.98
Connection Charges	159.66	309.56	492.10
Other Income	139.03	147.54	159.70
Subsidy	3,749.48	4,111.96	3,119.95
<b>Total</b>	<b>5,345.15</b>	<b>6,608.64</b>	<b>7,746.06</b>
<b>Expenditure</b>			
Treatment Costs	210.31	243.45	295.92
Electricity	1,377.16	1,594.24	1,937.81
Employee Expenses	563.32	652.11	792.65
Less: Expense Capitalised	(84.50)	(97.82)	(118.90)
Net Employee Expenses	478.82	554.29	673.75
Repairs & Maintenance	1,135.37	1,314.33	1,597.58
Less: Expense Capitalised	(170.31)	(197.15)	(239.64)
Net Repairs & Maintenance	965.06	1,117.18	1,357.94
Total O & M Expenditure	3,031.35	3,509.17	4,265.42
Management Contract Fees	454.70	526.38	639.81
EDBITA	1,859.09	2,573.10	2,840.82
Depreciation	388.50	593.88	1,064.48
EBIT	1,470.59	1,979.22	1,776.35
Interest	873.92	1,382.55	1,179.68
PBT	596.67	596.67	596.67
Tax	-	-	-
PAT	596.67	596.67	596.67

Government Support – FY 2008 to FY 2015

Cash outflow for GoO Rs. Lakhs

Parameter	Mar-08	Mar-11	Mar-15
Subsidy Accounted	3,749.48	4,111.96	3,119.95
Less: Return Earned	596.67	596.67	596.67
Less: Interest Earned	661.31	452.48	174.03
Less: Loan Repaid	870.15	870.15	870.15
Add: Cash support	-	-	-
<b>Net Outflow for GoO</b>	<b>1,621.34</b>	<b>2,192.65</b>	<b>1,479.10</b>

**1.6.1. Scenario 1 – Business as Usual**

Growth of the business in the context of ‘business as usual’ is projected based on the following assumptions:

- Coverage continues to remain at the current level of 42% for the increased population.
- Number of consumers added per year is approximately 1,000 based on the past trend.
- Losses would continue at the present level even though it is likely that there would be further increases with continued deterioration of the assets.
- Collection efficiency would gradually increase considering the recent efforts by the management of the PH II Rent Division.
- Tariff increase at 5% year-on-year.
- Rate of growth of other consumers such as Commercial, Government - Domestic, Industrial, etc. is based on the past growth trend.

### Scenario I (Business as Usual) – Results

#### Scenario I

Business as usual	Mar-08	Mar-11	Mar-15
No of consumers added is ~1000 per year and unaccounted losses at same level			
Revenue from Water Charges	1,140.61	1,391.62	1,797.86
Subsidy	3,937.32	4,844.25	5,568.38
Total Revenue	5,345.15	6,608.64	7,746.06
EBDITA	1,859.09	2,573.10	2,840.82
EBIT	1,470.59	1,979.22	1,776.35
PBT	596.67	596.67	596.67
PAT	596.67	596.67	596.67
DSCR	0.94	1.03	1.27
Outflow for GoO	1,809.18	2,924.95	3,927.52
Total outflow for GoO			24,069.42

#### 1.6.2. Scenario 2 – Efficiency Improvement by COE Management

In the ‘aggressive’ scenario, growth in the business is projected based on the following assumptions:

- Coverage increases from 42% to 95% by the year 2015 for the increased population.
- Number of consumers added per year would be over 5,000 due to reforming the connection policies, streamlining and simplifying the procedures, and introducing aggressive connection campaigns.
- Losses would be reduced from the present level of 45% to 22% by the year 2015 by introducing improved operating practices for reduction of non-revenue water and introduction of active leakage control methods coupled with prudent asset management practices.
- Collection efficiency would gradually increase to 95% by introduction of incentives and streamlining of the billing and collection systems.
- Tariff increase at 8% year-on-year in line with the JNNURM reform agenda and also considering gradual improvement in service levels and customer services.

### Scenario II CoE Changed Management with improved efficiencies

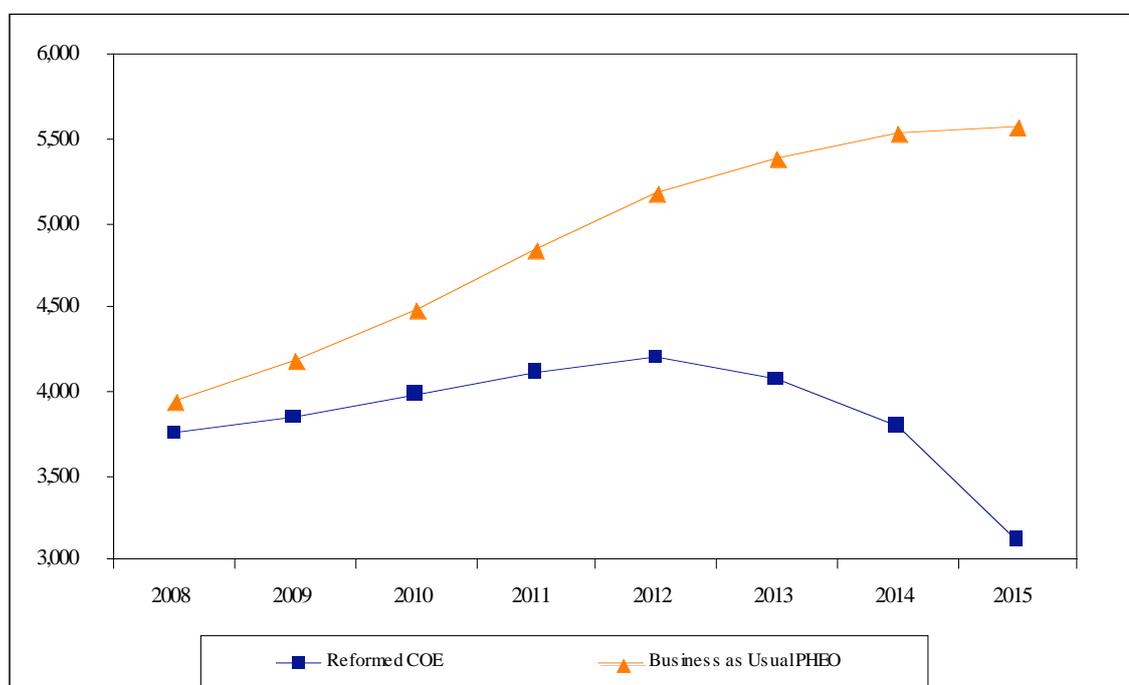
Parameter	Mar-08	Mar-11	Mar-15
Revenue from Water Charges	1,230.33	1,954.91	3,850.33
Subsidy	3,749.48	4,111.96	3,119.95
Total Revenue	5,345.15	6,608.64	7,746.06
EBDITA	1,859.09	2,573.10	2,840.82
EBIT	1,470.59	1,979.22	1,776.35
PBT	596.67	596.67	596.67
PAT	596.67	596.67	596.67
DSCR	0.94	1.03	1.27
Outflow for GoO	1,621.34	2,192.65	1,479.10
Total outflow for GoO			15,801.28

The following table and graph projects the impact on the GoO subsidy for the two scenarios.

#### Subsidy in Rs. Lakhs

Subsidy Levels	Mar-08	Mar-11	Mar-15
Aggressive Case	3,749.48	4,111.96	3,119.95
Business as Usual	3,937.32	4,844.25	5,568.38

#### Subsidy Outflow Under the Two Scenarios



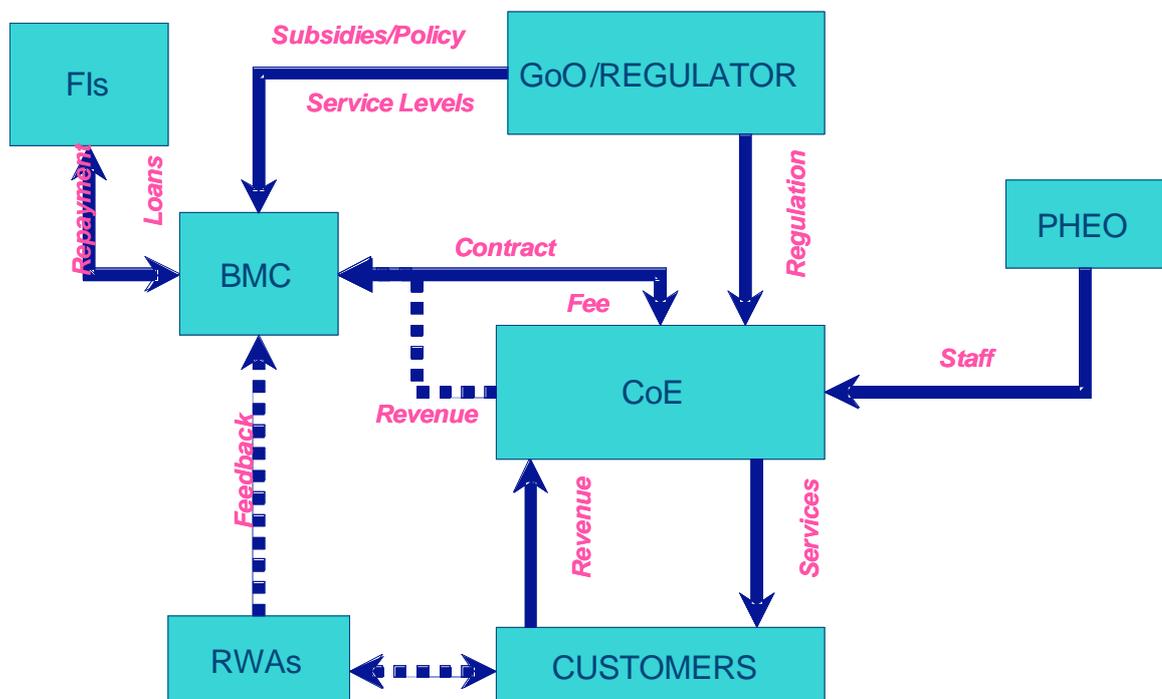
From the tables above and the chart, it can be seen that by introducing water sector reforms there would be a significant reduction in subsidy levels for GoO, which would

amount to over Rs.90 crores in a span of eight years. These projected reductions in subsidy would continue into the future. The net gain of about Rs.30 crores annually can be reinvested in other social sector infrastructure such as housing, education and livelihoods for urban poor. While GoO gains in terms of freeing up precious financial resources, the customers would benefit from improved water services leading to improved public health. The PHEO employees would also gain from better management autonomy and an improved working environment coupled with incentives for higher performance.

### 1.7. Transfer of the Undertaking to the BMC, Managed by CoE

As per the agreed reform agenda under JNNURM, GoO plans to transfer the State WS and SS undertaking (assets, liabilities, rights, claims, proceeding, etc.) to Bhubaneswar Municipal Corporation for a certain consideration as mutually agreed between GoO and BMC. The structure of the reformed organisation shall be as depicted in the following figure.

Corporatised Water Services Structure for Bhubaneswar City



Four steps have been identified in carrying out the transfer of the undertaking from GoO to BMC, which will be managed by COE. Activities in Steps 1 & 2 can be carried out in parallel.

In Step 1, GoO prepares the scheme to transfer the undertaking including the assets, liabilities, rights, claims, proceedings, etc. to BMC.

In Step 2, the charter for the COE is prepared and the registration of the company as per the Company's Act is carried out. The activities include preparing the Memorandum and Articles of Association, arranging signatories to the Memorandum of Association and the initial seeding of equity for the company. GoO can transfer or depute PHEO employees

to COE with necessary employment security conditions for carrying out the WS and SS business. The specialised management skills unavailable at present could be sourced from the open market.

In Step 3, the transfer scheme is notified and the business undertaking is transferred to BMC. BMC is given a provisional period to verify and value the individual assets and finalise the Opening Balance Sheet.

In Step 4, the BMC and the COE would set out and formalise the management contract, which will define the scope of work, efficiencies to be achieved, fees to be granted, and service conditions to be full filled, etc. The management contract will also have clauses on arbitration and dispute resolution.

## **2. Introduction**

### ***2.1. Background***

Orissa State faces the combined challenges of relatively low household incomes, a large number of small towns and villages, very weak capacity at the municipal level to provide water and sanitation services, and relative to most other Indian states, a low percentage of the population covered by water and sanitation services.

Historically, Public Health Engineering Organisation (PHEO) has been functioning as an arm of the State Government in providing water supply (“WS”) and sewage services (“SS”) to the people in 103 urban local bodies (“ULBs”) and in serving a population of ~56 lakhs as per 2001 Census.

Water supplies in the urban areas in the state are generally characterised by intermittent supplies, low coverage, low tariffs and high losses both in physical and financial terms.

Currently, financial operating losses of the water systems in the state are large. For example in Bhubaneswar, it is estimated that the cost of a cubic meter of water is approximately Rs.3.58, while the price realised is only Rs.1.20 based on the volume of water produced. The actual cash realized from customers would even be less than that, indicating an operating loss, of over Rs.16crore (USD \$ 4m) in Bhubaneswar city and a rather large operating loss of Rs.70 crore (USD \$ 17.5m) per annum from the urban water services in the State.

The entire WS and SS services are funded and the management is subsidised by the state, developed and managed by PHEO with little involvement from the Urban Local Bodies (ULBs). As PHEO being the state owned department governed by the state civil service, financial and accounting rules, it suffers from the common deficiencies listed below.

- Less efficient operations
- Low cost recovery
- High subsidy
- Low accountability to ULB/Citizens
- Centralised government control
- Surplus staff

As such there is a pressing need to improve the water services by increased involvement of ULBs by introducing business approach and functional autonomy in PHEO to meet the demands of the growing population and to ensure long term self sustainability of the water services.

Under the 74<sup>th</sup> Constitution Amendment, the state is required to decentralize local water and sanitation services to municipalities. The Government of Orissa has issued a reform notification consistent with the decentralization requirement and also in tune with the Jawaharlal Nehru National Urban Renewal Mission (“JNNURM”) reform agenda.

Under this notification, state-owned water and sewerage assets have to be transferred to municipalities. The notification also envisions devolving revenues of municipal utilities

to the municipalities, turning over investment responsibilities to local governments, and using contracts to provide services.

To decentralize, the State needs to decide the future roles of PHEO, local governments and State financial support to cover the capital and operating subsidies to municipal water utilities. These decisions will be most effective if they are part of a well-designed reform initiative.

In addition, PHEO's ability to improve the performance of the water services as a State Government department is limited unless some fundamental changes in organization, responsibilities and corporate governance are made. For example, PHEO has limited authority to rapidly increase the number of connections and eliminate illegal connections as they can not connect a property which has no planning permissions from the respective planning authorities. This procedural limitation seriously affects the ability to connect commercial customers and also the urban poor living in the slums without land titles finally leading to illegal connections. Another important organisational aspect is the inability to reward the staff based on performance as the staff are governed by the state civil service rules.

Today, many city or town water utilities in the State have low coverage, high levels of non-revenue water, and low revenue collection rates. A large proportion of expenditure goes toward paying for electricity that is now subsidized by the State. In the entire service delivery regime, there is little accountability to the customer or the municipality. There is clearly a need to reform both at the level of the State's relationship with municipalities, and in the way municipalities manage water and sanitation services.

The Government of Orissa has expressed an interest in carrying out a state-wide reform of the urban water and sanitation sector. The prime objective of the reform is to improve the quality of water and sanitation services in the State. Another objective is to implement the policy of municipal service decentralization. USAID FIRE (D) project has been assisting the Government of Orissa ("GoO") in examining options for reform.

Following discussions with USAID representatives under the FIRE (D) project, the State has evaluated the options for reforming the water services and decided to explore the Corporatisation of services as the most preferred option. The decision of the Government is to Corporatise the management of water services with piloting in Bhubaneswar, Cuttack and Puri Municipal Corporations, which are committed to a reform agenda under JNNURM. The rationale for starting with these cities is that the level of technical competence would be high compared to other municipalities, demand for improved quality of services is relatively high, and the ability of the public to pay for improved services is also higher than in other areas of the state.

The objectives of the Corporatisation program include the following:

- Enable the state to implement decentralization of water and sanitation services.
- Set up a corporatised operating entity (COE) carving out of PHEO with certain rights, incentives, penalties and liabilities, which shall provide water and sewage services to the cities of Bhubaneswar, Cuttack and Puri through incentive-based operating contracts between the COE and the respective municipal authorities.

This will help PHEO transition from being a state department to a commercialized service provider.

- Improve the performance of the Bhubaneswar water and sewerage system through incentive-based operating contracts. Over the long term, this will make the water system sustainable and will free resources for development of other social infrastructure.
- Based on the lessons learnt from the three pilot cities, the decentralization model will be replicated in other municipalities in Orissa.

In order to set up the COE and transfer the business undertaking, the GoO is required to:

- Delineate the WS and SS services in the cities of Bhubaneswar, Puri and Cuttack.
- Value the assets and liabilities of the business undertaking.
- Finalise the options for the PHEO personnel carrying out the existing functions in these ULBs – either transfer or send on deputation to the CoE or staff the new entity independently
- Define the final consideration to be agreed between the respective municipal corporations and GoO under a transfer scheme.

In the background of above-mentioned objectives and actions required by GoO, the FIRE (D) project proposes to undertake a detailed financial and institutional due diligence of PHEO, in particular of the water and sewerage services in the three cities of Bhubaneswar, Cuttack and Puri.

This due diligence will establish the base line of financial and human resources and prepare a business plan duly estimating the capital funds, declining subsidies and transition arrangements required for enabling instituting the CoE for managing service provision in these three cities with appropriate contractual arrangements with the local city/municipal corporations. The tasks envisaged under the study are:

- a. Preparing a base line report setting out the organisational, commercial and financial activities of the PHEO in the three cities.
- b. Development of a business plan for the COE. The key outcome of this study is to ensure that the newly formed COE functions as a viable entity with declining financial support (subsidy) from the GoO.

The detailed Terms of Reference for this project is in Appendix A.

## ***2.2. Report Structure***

This report presents the study findings on the water and sewage services in the jurisdiction of the Bhubaneswar Municipal Corporation.

Section 3 details the background of PHEO services, statutory provisions governing it and the focus of its three distinct businesses. Section 4 looks at the organisation structure of PHEO, specially focussing on the office of the Chief Engineer and the Public Health (“PH”) Division, along with the functions carried on therein.

WS and SS business is geographically segregated between Bhubaneswar City and other cities in Section 5. Section 6 details the business of WS and SS in the city of Bhubaneswar, along with the water accounting and tariff overview.

Section 7 looks into the details of the past financials of the three PH divisions serving the city of Bhubaneswar and Section 8 details the asset valuation of the WS and SS business.

Section 9 sets out the business plan with its assumptions for the proposed COE in carrying out the business of WS and SS in Bhubaneswar City. Section 10 looks at the transfer of business to BMC and the management contract for the COE. Section 11 sets out the roles, responsibilities and structure for the newly formed COE and Section 12 summarises the implementation plan for operationalising the transfer scheme and the areas of institutional strengthening activities required.

### **3. Public Health Engineering Organisation**

PHEO in Orissa functions under the administrative control of the Housing and Urban Development Department (HUDD) of Government of Orissa. As per the Department's website and its vision and mission statements, the Department aims to provide an adequate quantity of water round the clock at reasonable rates to all consumers in its jurisdiction.

PHEO provides water services in all ULBs (102 of the 103ULBs) in the State except Paradeep NAC. It also manages the sewage services in the State's three largest cities viz. Bhubaneswar, Cuttack and Puri. Earlier PHEO undertook the role of developing all infrastructure assets followed by operations, maintenance and management of services. With the establishment of Orissa Water Supply and Sewerage Board (OWSSB), however, the role of developing infrastructure has been assigned to OWSSB and PHEO's role is now limited to management of services. During the year 2006, Government of Orissa, on launching the JNNURM program, has contemplated revisions to this set up wherein PHEO, in addition to managing all services, would also undertake the development of water supply infrastructure, while OWSSB would exclusively deal with the development of sewerage infrastructure in the state. In addition to the services provided, PHEO collects connection charges and tariffs from its consumers, which are the two major sources of revenue for PHEO.

The main functions of WS & SS are planning, design, detailed engineering, procurement, construction management, supervision, contract management, operations, maintenance and management of related financial, administrative and social tasks. PHEO is the implementing agency of water supply schemes under the State Government Plan, Central schemes, Tribal & Sub-Component schemes, etc., including those under recent JNNURM and UIDSSMT programs.

Apart from this, PHEO carries out "deposit works" for urban local bodies, new suburban colonies, etc. In this scheme of things, PHEO doesn't own the assets but charges a percentage of the capital expenditure as its fees.

Further, PHEO maintains the WS and sewerage services in all State owned buildings and staff quarters, including important buildings such as Raj Bhavan, State Secretariat, etc.

#### ***3.1. Statutory Provisions***

As per the current provisions, PHEO is governed by the regular conduct of business followed by departments in State Government. Its administrative and financial management follow the general rules of business and there are no special acts governing the PHEO. Orissa Public Works Department Code (Volumes I & II) sets out the organisation, conduct of business, duties and powers under administrative, technical, financial functions. This code details the powers, duties, responsibilities of various offices, officers, etc. This along with the Orissa General Financial Rules, Delegations of Power sets out the framework under which PHEO functions.

Water tariffs are set by the Orissa Water Works (Urban Local Bodies) Rules, 1980, amended from time to time by Government's Gazette Notification.

As per the 74<sup>th</sup> Amendment to the Constitution and specifically Article 243 (W), Twelfth Schedule, the functions carried out by PHEO fall under the jurisdiction of the municipal corporation, which in the case of Bhubaneswar is the Bhubaneswar Municipal Corporation (BMC). BMC came into existence as a full fledged corporation under the Orissa Municipal Corporation Act, 2003.

**Figure 1 - Select Extract from Twelfth Schedule**



Source; CDP Document

### 3.2. Water Services Business

The status of water supply at the end of March 2006, according to a recent report, is shown in the following table.

**Table 1 - Urban Water Supply Status in Orissa<sup>2</sup>**

Parameter	Bhubaneswar	Orissa
Number of urban local bodies	1	103
Total urban population (2001 Census) (lakhs)	6.47	55
Total urban households (2001 Census) ('000s)	144	1,087
Total number of wards	47	1,757
Wards covered by water supply	17	1,059
Wards partially covered with water supply	26	497
Wards not covered with water supply	4	201
Population covered by piped water supply (lakhs)	3	39
Proportion of coverage (%)	42	63
Installed capacity of water supply (mld)	217	666
Average production (mld)	206	640
Average rate of supply (lpcd)	256	116
House service connections ('000s)	53	186
Standposts ('000s)	1	19
Hand pumps/tube wells	2	18

<sup>2</sup> PHEO Website.

**Table 2 - Water Supply Status in the Major Cities in Orissa<sup>3</sup>**

ULB	Population '000s		Demand mld	Production	
	2001	2006		mld	LPCD
Cuttack	535	615	92	115	187
Bhubaneswar	647	804	121	206	256
Puri	157	179	27	21	117
Berhampur	308	349	21	33	95
Sambalpur	154	170	10	21	123
Rourkela (CT)	224	254	16	27	105

An analysis of the above status indicates the following:

- The percentage of households connected, at 18% in the state and 42% in Bhubaneswar implying that most of the water sources are either privately owned or developed by citizen societies and not provided by PHEO. This could also indicate the possibility of a large number of illegal connections.
- As against the requirement of demand at tap, the production capacity in the major cities indicates very high capacity that could facilitate full coverage; however, the coverage is very low.
- The State has reasonably good water resources and surplus electricity, but the level of drinking water coverage and service levels is low clearly pointing to the need for reform in the sector and greater efficiency and accountability to the citizen.

### ***3.3. Sewage Services Business***

Compared to the water supply business, sewerage coverage is very insignificant, with only the cities of Bhubaneswar and Cuttack partially covered. Even within these cities ~ 10.5% have toilet facilities within the premises. Of these ~ 85% have water closet facilities.

Closed drainage for wastewater disposal covers ~ 5% of the households, whereas open drainage accounts for another ~16% only.

### ***3.4. Other Business of PHEO***

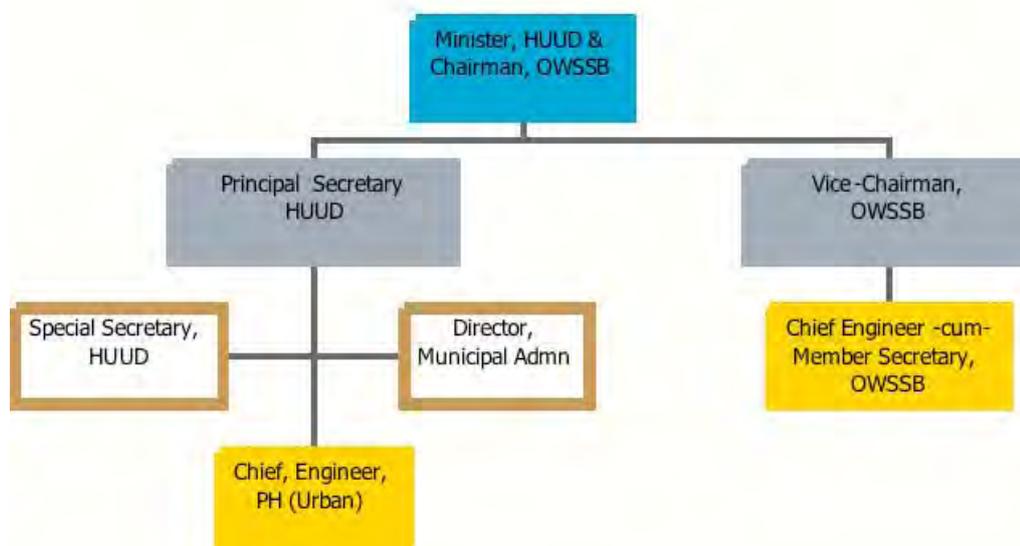
Apart from the primary function of WS & SS, PHEO is also engaged in construction and maintenance of public health sanitation facilities in all residential and non-residential (offices) buildings owned by GoO.

<sup>3</sup> Sectoral Report on Urban Water Supply and Sanitation, PHEO, June 2006.

#### 4. Water and Sewage Services Organisation Structure

PHEO functions under the administrative control of the Housing and Urban Development Department (HUDD) of Government of Orissa headed by the Principal Secretary. HUDD functions under the Ministry of Housing and Urban Development headed by a Cabinet Minister.

Figure 2 - WS&SS Organisation Structure



##### 4.1. PHEO Management Structure

Urban water services are headed by the Chief Engineer PH (Urban). The Chief Engineer (CE) reports directly to the Secretary, Housing and Urban Development Department, Government of Orissa. The CE's office is located in Bhubaneswar. There are four Circle Offices located at Bhubaneswar, Cuttack, Behrampur and Sambalpur, which are responsible for WS & SS functions in the respective regions.

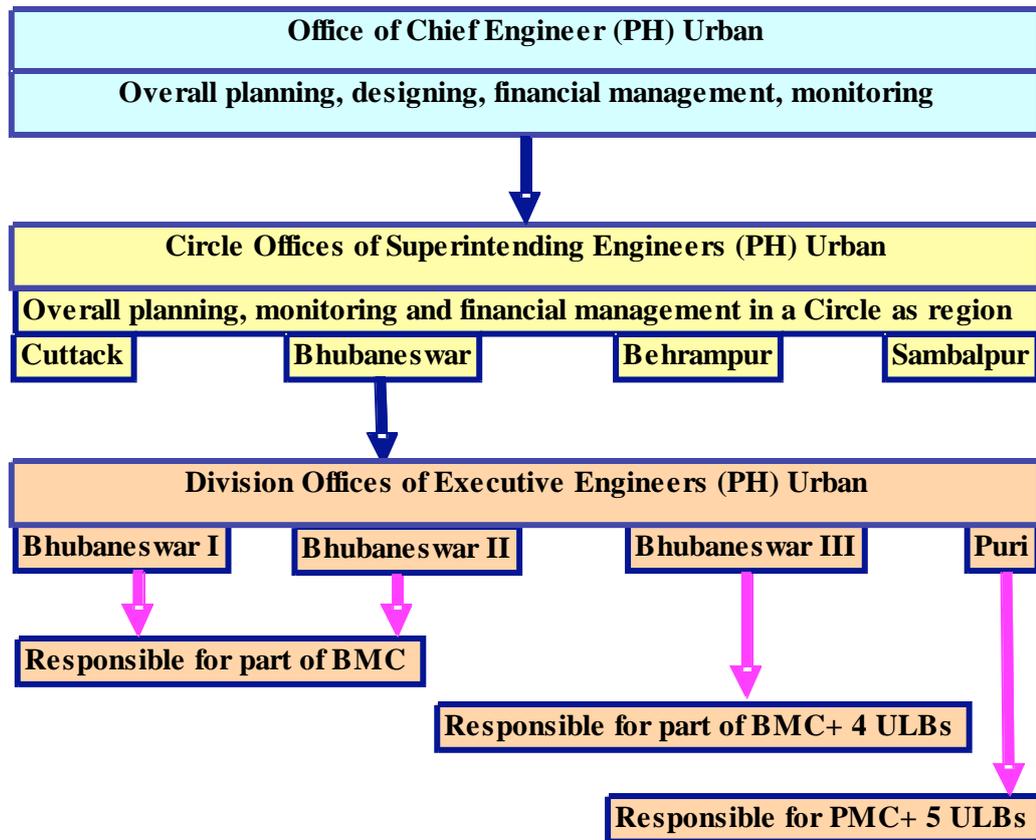
The organisation structure overseen by the CE is as follows:

- Four Circle Offices each headed by a Superintending Engineer, who oversees the activities of the Divisional Offices.
- 13 Divisional Offices each headed by an Executive Engineer, who oversees the activities of the Sub-Divisional Offices (headed by an Assistant Engineer) and Section Offices (headed by a Junior Engineer).

Functionally, Divisions carry out the major activities, including planning of works and O&M responsibility, along with collection of revenue/water and sewage tax.

The major functions carried out by the different organisational units are given in the following diagram.

Figure 3 - PHEO Organisation Structure



#### 4.2. Employee Profile

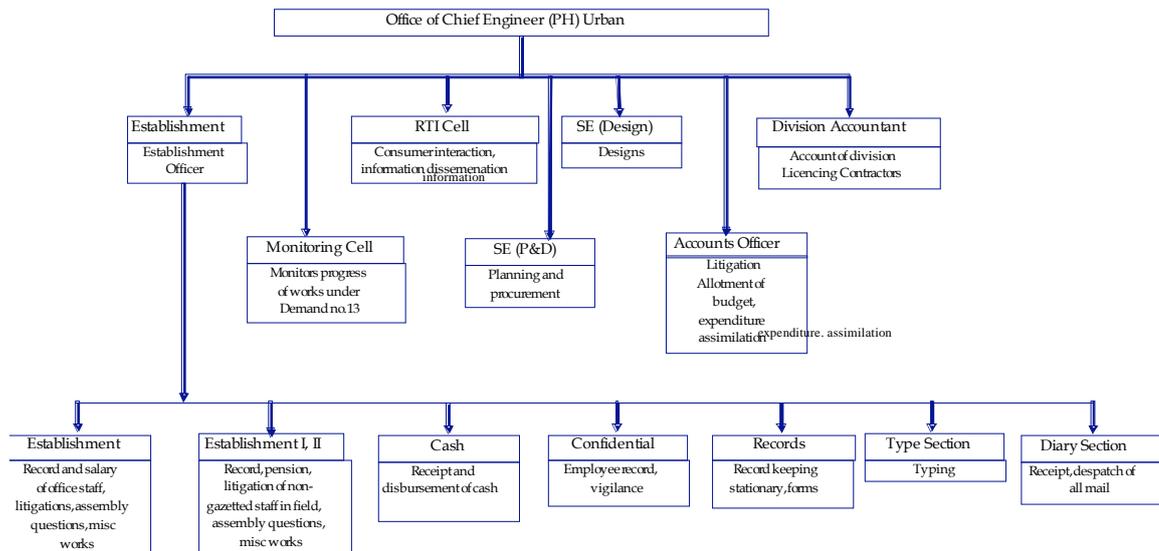
PHEO employs 7280 staff in located in various offices across the state. It is typically over staffed with 39 staff per 1000 connections when compared to utilities like Bangalore Water Supply and Sewerage Board where in the staff ratio is 5 per 1000 connections. The employee profile is shown in the following table.

Employee Profile	Bhubaneswar	Orissa
Engineers	62	269
Accounts Officers	3	
Ministerial	436	659
Daily Wages	818	3359
Temporary	354	2993
Total Employees	1673	7280
Staff per 1000 Connections	32	39
Average Number per ULB	1673	71
Number of Ministerial to Engineers	7	2
Number of Field staff to Engineers	19	24
ML Handled per Staff	45	33

### 4.3. Chief Engineer PH (Urban) Office

The office of Chief Engineer PH (Urban) is the principal organisation unit reporting to the GoO, which controls both technical and financial functions. The organisation structure of the CE's office is shown below.

**Figure 4 - Functions of CE PH (U)**



As in any government system, the decisions and activities follow the typical pyramid structure. The main functions of the CE (PH) Urban office are:

- Planning of WS and SS systems across the State (103 ULBs) – one circle for Bhubaneswar and 9 other ULBs, one for Cuttack and 5 other ULBs, and two for the rest of the State
- Survey, investigate, design, budget, procure and execute all major works of the State (under various Plan heads, including Tribal Sub-Plan, Special Components Plan), Central schemes, etc.
- Planning and procurement of materials.
- Employee-related details, records, etc., including pensions, recoveries, investigations, etc.
- Review and consolidation of accounts of all divisions.
- Annual reporting to Government.

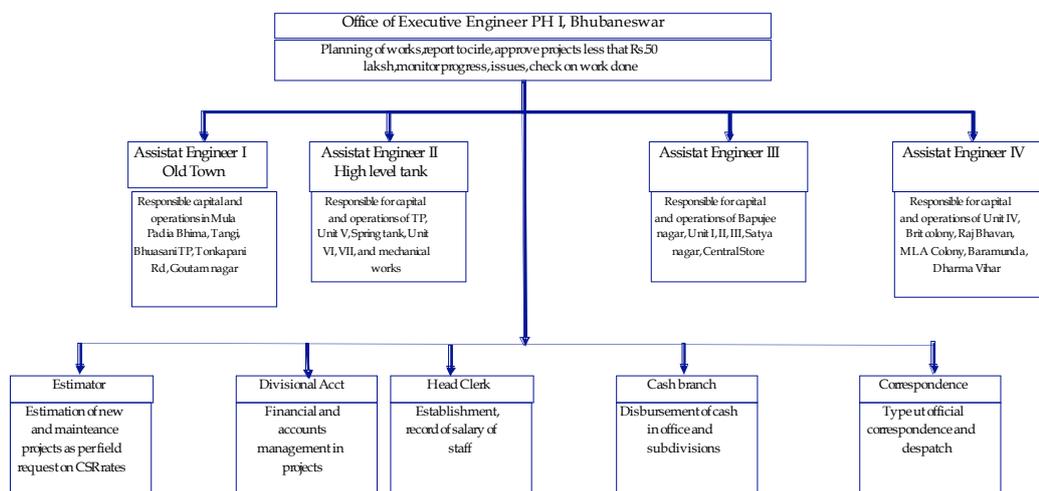
Annually, and periodically the CE (PH) Urban office carries out a review of all Divisional activities. Divisional heads (in the rank of EE) present physical and cumulative progress reports of the various schemes under implementation, the coverage of population/ward in terms of WS and SS, utilisation of budget allocated, O&M performance parameters, employee profile, etc. In fact, the MIS used in the present assignment is mostly derived from these reports, as there are no separate documents capturing such data. For example, electricity consumption and cost, chemicals

consumption and cost, segregation of data between various sub-divisions, etc.<sup>4</sup> are derived from these reports.

#### 4.4. Management Structure – Public Health Division Structure

The typical structure of a Divisional Office is given below.

**Figure 5 - Organisation Structure of PH Division**



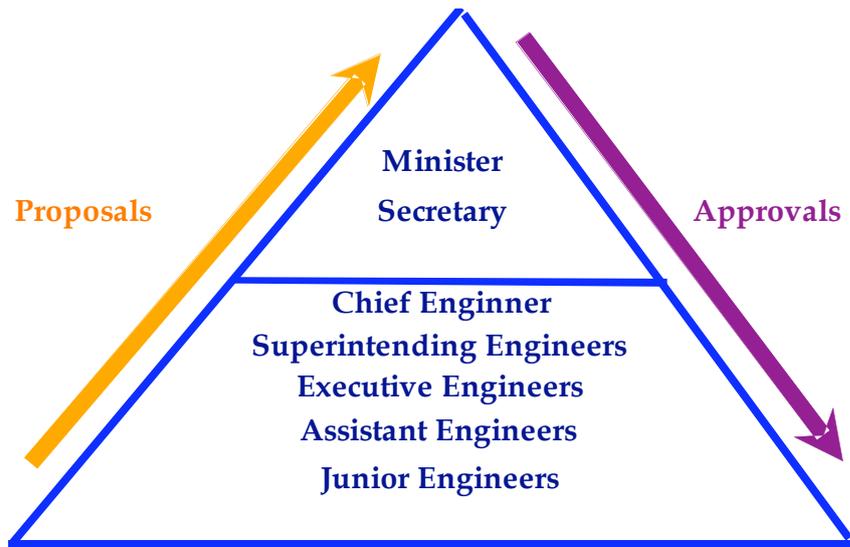
The functions carried out at the division level are:

- Preparation of O & M budgets – Non-plan expenditure
  - 2,215 – WS & SS system
  - 2,059 – Maintenance of Government’s non-residential buildings
  - 2,216 – Maintenance of Government residential buildings.
- Preparation of budget for Plan expenditure for all three heads, as well as for “Relief against Natural Calamities”.
- Plan, execute and supervise construction works (non-OWSSAB projects).
- Carry out deposit works for ULBs, private layouts, etc.
- Supervision of water quality monitoring – field testing; separate samples are sent to labs for detailed testing (Appendix B).
- Handling of consumer grievances and complaints.

While preparing the O&M budgets, the Divisions (under guidance from Government and CE’s office), usually build in certain efficiencies for key elements such as power consumption, chemicals, etc.

**Figure 6 - Decision Flows**

<sup>4</sup> This has been particularly useful while segregating the PH III Division’s O&M between the City of Bhubaneswar and the other three ULBs served by this Division.



For new capital projects, detailed proposals are prepared at the Junior Engineer’s level, reviewed at the next hierarchical level, and presented to the GoO for approval in the State’s budget. The process details of giving new connections and addressing consumer complaints is given in Appendix C.

PHEO also carries out “deposit works” for external agencies such as ULB or private residential colonies who approach PHEO to set up a distribution system within their jurisdiction/area. Based on the request, an estimate is prepared and the cost of the project is collected as “deposit” from the concerned person and the work is carried out by PHEO. For this PHEO earns a “fee”, called departmental charges, equal to 15% of the project cost. Additionally 2% is collected as audit and pension charges.

## **5. Bhubaneswar City – Water and Sewage Services**

### ***5.1. Profile of the City***

Bhubaneswar, Orissa's capital city, covers ~135 sq. km. of municipal area and has a development area of ~233 sq. km. Bhubaneswar has a population of ~ 8.8 lakhs with 30% considered urban poor. The city lies on the western bank of the River Kuakhai and the River Daya flows on the south eastern part of the city.

The city has grown from a modest ~16,000 population in 1951 to a current size of 8.8 lakhs due to variety of reasons such as shifting of the State capital from Cuttack, natural increase and large scale immigration. All the municipal functions and services are governed by the Bhubaneswar Municipal Corporation (BMC), while town and country planning still rests with the Bhubaneswar Development Authority (BDA).

The decadal growth rate of the city during 1991-2001 had been 30.28 percent and the city is experiencing even increased growth rate due to the recent economic opportunities created by the state and private sector. As per the projections in Bhubaneswar City Development Plan, the population is expected to increase to 10laksh in 2011 and 15lakhs by 2031.

### ***5.2. Water Supply and Sewage Services***

PHEO provides the water supply and sewage services across the City. In order to provide effective and efficient service, PHEO has set up an organisational structure, including Circles, Divisions, Sub-Divisions and Sections. Three divisions viz., PH I, PH II and PH III (partly) cover the various activities of the business in the City. PHIII covers near towns of Khurdah, Jatni, Balugaon, and Banapur,

#### **5.2.1. Water Supply**

The water sources for the City of Bhubaneswar are mainly the Mahanadi, Daya and Kuakhai Rivers. Apart from this, groundwater supports ~ 20 % of daily supply.

Water is treated at conventional water treatment works located at Palasuni (Kuakhai river), Bhuasuni (Daya river) and Munduli (Mahanadi river). The combined water treatment capacity of all the water works is 217.24 MLD, which far exceeds the present demand at tap. As such the Munduli water works, with a capacity of 115MLD, functions in a single shift producing about 25 MLD only. The average production from all the treatment works is estimated to be 166 MLD.

**Table 3 – Production Capacity in Bhubaneswar city**

Bhubaneswar Water Production Capacity		
Location	Year	Capacity in MLD
Palasuni	1954	6.8
Palasuni II	1960	13.6
Palasuni III	1974	27.24
Palasuni IV	1987	41
Bhuasnu I	1968	6.8
Bhuasnu II	1975	6.8
Mundali I	1996	115
Total		217.24

In addition to the surface treated water, groundwater is extracted through high yield production tube wells having an installed capacity of ~ 76.8 MLD with output estimated at ~ 40 MLD.

Though PHEO treats and supplies water, it is not compulsory for consumers to avail of the water services from PHEO. They can opt for their own individual bore wells/wells within their premises for sourcing water. In these cases, they are required to obtain a “No-Objection Certificate” from the PHEO (a practice that is seldom observed).

Treated water is supplied to the City directly or through storage tanks. The storage tanks are either elevated or at ground level or underground. The storage capacity of these tanks is ~63.9 ML which is reasonably enough when considering the requirement of one third of demand at tap.

Water is either pumped or released by gravity through the transmission main system and fed into distribution mains to reach the consumers. The transmission mains are defined as water mains with pipes having a diameter > 150 mm. Distribution mains are those equal to or below 150 mm.

For connecting to the distribution mains, consumers pay a connection charge; for the water consumed, they pay on a volumetric basis or at a flat rate per tap. Consumers are categorised based on the type of connection and nature of use – domestic, commercial, industrial and institutional, etc. Consumers are usually expected to pay according to the meter, but due to certain legacy issues these meters are not properly maintained and are often not in working condition.

WS to the City’s poorer sections is done through hand pumps, tube wells or through public stand-posts. For stand-posts, ULBs pay the tariff to the PHEO. In these cases, the tariff is based on an approximate volumetric analysis. The following table sets out the growth of Bhubaneswar population and the water supply coverage.

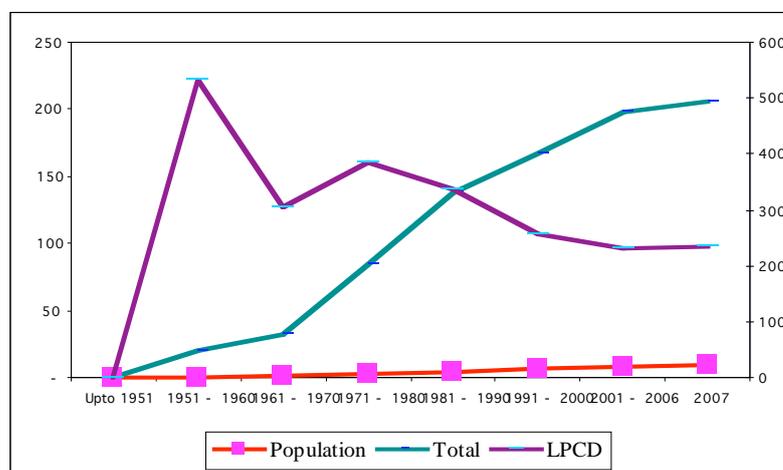
**Table 4 - LPCD in Bhubaneswar City**

Year	Population	Area	Capacity added	Cumulative Capacity	Yearly Supply	Cumulative Supply	Cumulative Tubewell Capacity	Cumulative Tubewell Production	Total capacity	Service level
	Lakhs	Sq KM	MLD	MLD	MLD	MLD	MLD	MLD	MLD	LPCD
Upto 1951	0.2	26.1	-	-	0	-	-	-	-	0
1951 - 1960	0.4	50.3	20.40	20.40	20.40	20.40	-	-	20.40	534
1961 - 1970	1.1	65.1	6.80	27.20	6.80	27.20	9.54	4.97	32.17	305
1971 - 1980	2.2	92.9	34.04	61.24	34.04	61.24	44.36	23.11	84.35	385
1981 - 1990	4.1	124.7	41.00	102.24	41.00	102.24	69.20	36.04	138.28	336
1991 - 2000	6.5	135.0	115.00	217.24	25.00	127.24	76.29	39.74	166.98	258
2001 - 2006	8.6	135.0	-	217.24	30.00	157.24	76.80	40.00	197.24	230
2007	8.8	135.0	-	217.24	8.76	166.00	76.80	40.00	206.00	233

Source: Data from PH Divisions

It can be seen from the table that the service level in LPCD over the entire population (though the coverage is only 42%) is quite high as compared to that of the standard assumed for the sector<sup>5</sup>.

Chart 1 - Supply, Population and LPCD 1951-2007



### 5.2.2. Sewage Services

About a third of Bhubaneswar consumers are connected to the underground sewerage system. Sewage is generally collected through gravity sewers and either gravitated or pumped to the sewage treatment plants. In many areas the untreated sewage flows into the natural valleys.

Currently sewage is partially treated by treatment plants in the form of oxidation ponds and aerated lagoons located at various places. Both the untreated sewage and the partially treated effluent flow into the Gangua Nallah on the eastern side of the city, which finally discharges into the Daya River.

Those consumers not covered by underground sewer mains have their own soak pits/septic tanks. Community toilets also exist but are few in number.

<sup>5</sup> As per the CPHEEO it is assumed that in urban areas, normative standard of supply is ~150 lpcd.

### 5.2.3. Operational Review of Water and Sewage Services

The three PHEO divisions, PHI, PHII and PHIII, manage Bhubaneswar's water and sewage services in terms of water production, distribution, sewage collection, sewage treatment & disposal, billing, and collection of revenue. The key parameters of the operations for each division are shown in the following table.

**Table 5 - Key Parameters of WS in Bhubaneswar City**

<b>Water Supply as of 2006-07</b>	PH I	PH II	PH III	BBSR	Orissa
Total Wards				47	1,757
Fully Covered				17	1059
Partial Cover				26	497
Uncovered				4	201
% Uncovered				9%	11%
MLD Handled	51.86	95.10	59.04	206.00	659.6
Annual Quantum in Million Ltrs	18,930	34,712	21,548	75,190	240,741
No of Connections				52,279	185,877
<b>Employee Profile</b>					
Engineers	20	19	23	62	269
Accounts Officers	1	1	1	3	
Ministerial	110	304	22	436	659
Daily Wages	280	281	257	818	3359
Temporary	125	114	115	354	2993
Total Employees	536	719	418	1673	7280
Staff per 1000 Connections				32	39
Average Number per ULB				1673	71
Number of Ministerial to Engineers	6	16	1	7	2
Number of Field staff to Engineers	20	21	16	19	24
ML Handled per Staff	35	48	52	45	33
Source: Annual Planning Document of PH Divisional Office, 2005-06 & 2006-07 & Establishment, PH Divisional Offices, Strategic Roadmap for Institutional Restructure of Urban Water and Sewerage Services in Orissa, Sep 2006					

A comparison of the Bhubaneswar City operations with that of the rest of the ULBs in Orissa is presented in the following table.

**Table 6 - Comparison of Operations between Bhubaneswar and Rest of ULBs in Orissa**

<b>As of 2005-06</b>	Population	Supply MLD	Number of Connections	Expenditure Rs Lakhs	Revenue Rs Lakhs
All ULBs	56.1	659.6	185,877	9,101.3	2,663.6
Bhubaneswar	8.0	199.7	52,279	2,581.8	977.3
% of BBSR	14%	30%	28%	28%	37%
		LPCD		Per KL	
BBSR		248		3.54	1.34
Orissa		118		3.78	1.11
Source: Internal MIS, CE, PH(U), PHEO					

The PHEO is seen largely as engineering-driven with negligible support from the accounts function – this could be the reason for the non-availability of a database across geographic areas such as asset register, accounts, finance, etc.

Considering the comparison between BBSR and the rest of Orissa, it can be seen that:

- The ratio of ministerial staff-to-engineers in Bhubaneswar is high.
- The rest of Orissa has a better field staff-to-engineer ratio.
- Given the high density in Bhubaneswar, the ratio of the volume of treated water handled per staff is high
- Bhubaneswar accounts for about 30% of the total water supply in the state.
- Staff per 1,000 consumers is comparable given the volumes handled.
- PH II staff strength is high as it handles billing and collection across the City for all PHEO divisions.
- Nominal muster roll and daily rated employees account for ~70% of the total staff of the divisions.

### 5.3. Water Supply and Sewage Services – Billing Systems

#### 5.3.1. Consumer Connections

There are 52,279 water connections in the city as of March 2007. PH II Rent Sub-division facilitates providing new WS and SS connections. It collects the necessary details for registration of new connections and updates the computer database. Verification of connections, disconnection notices and consumer interface is also carried out the PH Rent Sub-division. Network expansion, maintenance of connections, service quality and standards are the responsibility of individual PH Divisions, under whose jurisdiction the consumer comes.

**Table 7 -Comparison of Past Growth in Consumers**

Growth in Connections				
Category	Mar-04	Mar-05	Mar-06	Mar-07
Domestic- Govt	0	66	0	0
Domestic - Pvt	1153	3255	458	507
Institutional	45	12	22	12
Industrial	3	2	0	3
Commercial	13	13	0	10
ULB & Standposts	0	2	34	-24
Total	1214	3350	514	508

As seen above, an average of about 500 connections per year have been added during the last three years. The application process to sanction a connection is depicted in Appendix D.

#### 5.3.2. Tariff Setting

Water tariffs in Orissa State are fixed by the State Government as per the Orissa Water Works (Urban Local Bodies) Rules, 1980. The tariff is worked out by the PHEO and proposals are sent to the HUDD. Changes in water tariff require the approval of the State Cabinet. Neither PHEO nor the ULBs have any autonomy on tariff fixation. Historically, there has been no regular periodic revision of tariffs and past revisions were on an ad hoc basis without any reference to the actual cost of supply. In 1996, the Government ordered that there shall be an automatic increase in the water tariff at the rate of 10% every year

and that the tariff structure and the annual rate of increase would be reviewed every 5 years however this was not followed in true spirit until recently. Now that the State has a very reform-minded administration, tariffs were again revised during July 2006. The tariffs prevailing at present in the State are shown in the following table.

**Table 8 – Urban Water and Sewerage Tariffs in Orissa**

Category	Unit Rate	Rate in Rupees Effective from		
		Aug-96	Nov-05	Jul-06
<b>Water Supply charges</b>				
<b>Consumption charges</b>				
Domestic metered	Rs/Kl	1.50		2.54
Domestic un-metered up to 2 taps	Rs/ month	30.00		50.00
For extra taps each	Rs/ month/ tap	10.00		17.33
Non-Domestic	Rs/Kl	3.50	8.00	8.40
Commercial	Rs/ Kl	3.50	8.00	8.40
Industrial	Rs/ Kl	3.00	8.00	8.40
Public standposts	Rs/ month	30.00	100.00	105.00
<b>Connection charges</b>				
Domestic	Rs/ connection	3000.00		3000.00
Private apartments up to 25 flats	Rs/ connection		10000.00	10000.00
26 to 50 flats	Rs/ connection		20000.00	20000.00
More than 50 flats	Rs/ connection		30000.00	30000.00
Institutional	Rs/ connection	4000.00	5000.00	5000.00
Industrial/ Commercial	Rs/ connection	5000.00	6000.00	6000.00
Public stand post	Rs/ connection		3000.00	3000.00
<b>Sewerage charges</b>				
<b>Service charges</b>				
Domestic	Rs/ month	20.00		20.00
Institutional up to 4 WC	Rs/ month		100.00	100.00
Institutional more than 4 WC	Rs/ month		200.00	200.00
Domestic sewage from private apartments, Commercial and Industrial establishments				
4" sewer	Rs/ month		200.00	200.00
6" sewer	Rs/ month		500.00	500.00
8" sewer	Rs/ month		800.00	800.00
<b>Connection charges</b>				
Domestic	Rs/ connection	1500.00		1500.00
Private apartments up to 25 flats	Rs/ connection		5000.00	5000.00
26 to 50 flats	Rs/ connection		10000.00	10000.00
More than 50 flats	Rs/ connection		15000.00	15000.00
Institutional	Rs/ connection	2000.00	2500.00	2500.00
Industrial/ Commercial	Rs/ connection	2500.00	3500.00	3500.00

### 5.3.3. Billing System

Billing for the city of Bhubaneswar is carried out centrally from the PH II Rent Sub-Division under the jurisdiction of PH II Division and is controlled through a computer database. The database is updated annually based on the type of connection and volumetric assessment (based on the size of connection and also the volume of sump in a

property) for un-metered connections and tariff rates. In the case of metered connections, bills are raised on the meter readings at the appropriate tariffs.

Meters are the responsibility of the consumer. The consumer pays a fee to PHEO for testing it. Meter readings are to be done at the last day of every month by the field staff of the PH Rent Division.

The PH Rent Division's billing process is as follows:

- Monthly billing is practiced, but delivery of bills to consumers is erratic and some consumers may not be receiving their bills in time for payment (it is difficult to ascertain from the database, as to which consumers have been billed and which have not). Only when the consumer turns up for payment is PHEO sure the bill has been delivered to the consumer.
- Bills are printed on the 2<sup>nd</sup> of each month and distribution starts.
- Bills are distributed within about 10 days, latest by the 13<sup>th</sup>.
- Last date of payment of bills with rebate and without penalty is the 15<sup>th</sup>.
- If the customer pays the billed amount on or before the scheduled date, i.e., the 15<sup>th</sup>, a rebate of 2% is given on the amount due for the current month.
- No rebate is allowed on the arrears.
- If the customer does not pay the amount due on or before the 15<sup>th</sup> but pays it on or after the 16<sup>th</sup>, but before the end of the month, he/she is charged a penalty of 5% of the billed amount.

In the case of State Government employees, water rent is deducted from their payroll. Usually, the PH II Rent Division is not notified of this entry. Currently efforts are being undertaken to trace this and account for it at least by way of memorandum entry in the receipts and expenditure of the Division. There is no metering and meter reading practiced in the government owned residential buildings.

It is the responsibility of the concerned PH Division to collect the amount due from the consumers. Consumers can pay their bills either at cash collection counters, cheque drop boxes situated at various locations or to the mobile squad, which does door-to-door collection.

Recently the PH Rent Division has started the commendable job of cleaning up the consumer database. It has identified so far close to Rs. 157 lakhs of bad debts for write off. In the process of such, it is verifying consumer details, connection types, tariff, etc.

#### **5.3.4. Collection Efficiency**

The historical trend in collection efficiency is presented in the following table.

**Table 9 -Collection Efficiency Across Years**

Collection % (overall) = Collection/(Opening Arrearars+ Current Demand)					
	02-03	03-04	04-05	05-06	06-07
Domestic- Govt	23%	30%	50%	37%	30%
Domestic - Pvt	46%	48%	98%	59%	60%
Institutional	57%	54%	53%	45%	52%
Industrial	46%	83%	73%	72%	88%
Commercial	24%	25%	28%	32%	42%
ULB & Standposts	64%	0%	0%	0%	32%
Total	44%	45%	66%	49%	51%

It can be seen from the table above that except for the Industrial consumers; collection efficiencies in other categories need large-scale improvements. Institutional consumers, who contribute ~ 30% of billing and are hardly 615 in number, have a collection efficiency of only 52%.

Similarly, Domestic - Government consumer collections are low at 30%. Given that total collection efficiency is ~50%, arrears have now mounted to more than a year's demand. Some of the opening arrears may not be recoverable at all and may require write-off.

Further sanitisation may be required to ensure that the accounts receivable passed on to the BMC is of good quality and is collectable within a reasonable period. Securitisation of receivables, amnesty of penal interest schemes or using private collection agencies can improve the scenario and generate the much needed cash for the sector<sup>6</sup>.

The low collection efficiency is principally due to the low capacity of staff and infrastructure available for generating bills, delivering the same and collection facilities. In the past one year this issue is being addressed by the management of Rent Division and they are introducing outsourcing methods for bill generation and are introducing more collection centres and methodologies. However due the centralised control of administration the decision making is slow which results in delay in these localised reform measures.

#### ***5.4. Water Accounting – Quantification of Production, Supply, Sales and Loss***

In the following sections, the flow and revenue accounting of the water supply and sewage services is presented.

Water accounting helps in quantifying the loss in water supply and sewage services. This loss can be segregated into technical (due to the inherent structure of the transmission and distribution network) and non-technical or commercial loss. Such analysis helps the business entity in implementing suitable interventions.

Due to the legacy issues of inaccurate consumer database, malfunctioning metering and poor estimation of water consumption, it is difficult to construct an accurate measure of

<sup>6</sup> Similar initiatives have been tried out in the electricity sector and have significantly reduced arrears across various states.

the water chain for the city. However, an attempt has been made to detail the water accounting with the following existing data:

- (a) Input quantity as measured and reported.
- (b) Sales quantity for each category of consumer, as estimated by the PH II Rent Division (ideally this should have been aggregated from individual meter readings).
- (c) Sales quantity derived using the revenue demand and average tariff rate, for each category of consumer. This is based on:
  - i. Demand numbers, as received from PH II Rent, adjusted for arrears;
  - ii. Tariff rates for each category, as per current notification; and
  - iii. Dividing the demand with tariff rate to arrive at the quantum sold.
- (d) Items (b) & (c) compared for reasonableness and accuracy.
- (e) Calculation of total loss, as difference between input and sales.
- (f) Technical loss is assumed at 15% and the balance is treated as “unaccounted loss” or commercial loss.

#### 5.4.1. Sale Quantification – Assessment by PH II Rent Division

The PH II Rent Division, based on its knowledge of the system, level of input, type of consumer and consumption pattern has calculated the sale quantity for each category, which is abstracted in the following table.

**Table 10 -Estimation of Water Quantum Sold**

Consumption - MLD by Category	Connections				Consumption in	
	Tap	OHT	Sump	Total	Mill. Litres per month	May-07 MLD
As assessed by PH II Rent	Number	Number	Number	Number		
Domestic	36856	6362	8384	51602	2000	66.7
Institutional	100	181	394	675	400	13.3
Industrial	11	25	29	65	15	0.5
Commercial	18	26	167	211	25	0.8
ULB			16	16	35	1.2
Standpost	212			212	10	0.3
<b>Total</b>	<b>37197</b>	<b>6594</b>	<b>8990</b>	<b>52781</b>	<b>2485</b>	<b>82.8</b>

Source: PH II Rent, Bhubaneswar

#### 5.4.2. Sale Quantification – Calculation of ‘Current Demand’

Revenue demand as provided by the PH II Rent Division includes the opening arrears from the previous years. This is the ‘demand’ for the year and GoO uses this number to set collection targets. However, for accounting purposes, the income for the year should exclude the opening arrears.

The following table presents the original ‘demand’ numbers as given by the PH II Rent Division and the corrected revenue demand. Figures for 2002-03 have not been adjusted, as the opening arrears for that year is not known.

**Table 11 -Adjusted Demand of Water Rent in Bhubaneswar City**

Demand as per PH Rent, Bhubaneswar <i>All numbers Rs. in Lakhs</i>	Demand including arrears					Current demand without arrears
	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07	Mar-07
Domestic- Govt	435	369	234	338	402	189
Domestic - Pvt	813	895	466	970	942	543
Institutional	522	456	518	528	599	308
Industrial	24	18	15	15	18	14
Commercial	33	45	40	45	49	19
ULB/ Standpost	78	39	50	77	78	1
Total	1905	1822	1323	1974	2089	1074

There seems to be a certain inconsistency in the data, as seen above (the database needs to be sanitised), as the average revenue in 2004-05 and 2005-06 seems to be out of the range as compared to 2003-04 or 2006-07. This obviously affects the analysis based on these numbers.

Further, there are other systemic issues, which distort the reliance that can be placed on the database. Some of these are:

- PH Rent Division updates its database once a year, with the demand values for all consumers at the appropriate tariff rates, whereas the divisions record income only on receipt (typical cash accounting method of Government departments).
- PH Rent Division calculates annual demand on the basis of 2% rebate but reconciliation based on actual receipt of income is not carried out.
- PH Rent's database is not fully sanitised, i.e., there is no physical verification of consumers and hence there could be excess/under-billing.

It is our understanding, based on anecdotal evidence, that the database is currently being sanitised and, therefore, the data for FY 2006-07 would be more authentic for future use.

Given the above, differences in revenue as set out by the PH II Rent Division and as per consolidated accounts are as follows:

**Table 12 -Comparison of Demand between MIS and Accounts**

Revenue from Water <i>All numbers Rs. in Lakhs</i>	Financial year ending				
	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
From PH Rent Records	1905	755	318	1518	1074
From Accounts Wing	691	718	769	839	902

The accounting figures are on a consolidated basis and are not available consumer category-wise. Hence, for the purpose of the calculations in water accounting only the category-wise demand data from PH II has been considered.

#### 5.4.3. Sale Quantification – Comparison of Two Methods

The sale quantity as per the estimation provided by PH II Rent Division has been compared with the sale quantity derived using 'demand' and tariff rates. It can be seen from the table below that the variation is not significant.

**Table 13 -Comparison of Water Sold - Estimation and Tariff Method**

Consumption in MLD by Category	As per PH Rent Division	Average Realisation Method	Difference
Category	May-07	Mar-07	
Domestic - Government		14.7	
Domestic - Private		53.2	
Total Domestic	66.7	67.9	(1.2)
Institutional	13.3	13.2	0.2
Industrial	0.5	0.5	0.0
Commercial	0.8	0.8	0.0
ULB	1.2	-	1.2
Standposts	0.3	0.3	0.0
Total	82.8	82.7	0.2

*Source: PH II Rent Division*

#### 5.4.4. Sale Quantification – Last Five Years Using Average Tariff Method

Tariff rates for the last three years have been increasing at 5% annually, as directed by the GO on tariffs. The following table sets out the average tariff rates for different category of consumer.

**Table 14 -Category-wise Realisation per KL**

Categorywise Water Tariff in Rs. per KL						
Year	Domestic-Private	Institutional	Commercial	Industrial	Domestic-Govt.	Standpost
2003	2.42	5.64	5.64	4.83	3.24	0.50
2004	2.42	5.64	5.64	4.83	3.24	0.50
2005	2.54	8.00	8.00	8.00	3.24	0.70
2006	2.66	8.40	8.40	8.40	3.40	0.74
2007	2.80	8.82	8.82	8.82	3.52	0.77

*Source: Internal MIS, CE, PH (U)*

Tariff rates for the Government-Domestic and stand-post categories have been calculated using assumption such as number of taps, volumetric analysis and discussions with officials.

Given the corrected revenue demand and the average tariff rates, average sale quantity across the last five years is calculated and is set out below. Due to the inconsistency in the revenue demand for the period 2003-04 to 2005-06, as explained earlier, the sale quantity also varies rapidly during this period. This situation point out to the urgent need for introduction of systems and procedures to capture correct and accurate data pertaining to revenue demand, sale of water, etc.

**Table 15 -MLD Sold on the Basis of Average Tariff**

Consumption in MLD as assessed from current demand and average tariff					
Category	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Domestic - Govt.	36.7	2.8	2.0	17.8	14.7
Domestic - Private	92.2	51.7	0.5	98.8	53.2
Total Domestic	128.9	54.5	2.5	116.6	67.9
Institutional	25.4	13.0	10.6	9.2	9.6
Industrial	1.4	0.3	0.4	0.4	0.4
Commercial	1.6	1.0	0.2	0.5	0.6
ULB/Standpost	42.7	6.2	4.4	10.0	0.3
Total	200.0	74.9	18.1	136.7	78.8

#### 5.4.5. Water Accounting – Quantification of Loss

Based on the above, the water accounting for FY 2007 is set out below. For the purpose of estimating the losses, the earlier years' data have been discarded, as they show abnormalities due to errors in the database. Assumptions in the calculations are as follows:

- Technical loss assumption @ 15% – as per CDP, Sep. 2006.
- Total treatment plant capacity is considered as 166MLD, as against the existing 217.24 MLD, since the treatment plant at Munduli is considered to operate in a single shift producing 25 MLD.
- The surface water side of equation is unknown, but can be assumed as 100% of treatment plant capacity (since there's no open canal supplying water and most of the intake is through pipes).
- Production from tube wells is based on the “Delphi system”, as there is no MIS to calculate the actual production, hour-on-hour.
- Unaccounted loss is taken as the difference between treatment capacity less technical loss and sales.

**Table 16 -Water Accounting**

<b>Water Accounting - Quantification of Supply, Sales and Loss</b>		
Category	Unit	Mar-07
Surface Water	MLD	NA
Less: Evaporation	MLD	NA
Input into Treatment Plant	MLD	NA
Treatment Plant	MLD	166
Production Tube Wells	MLD	40
Total Supply	MLD	206
Sales	MLD	83
Total Unaccounted Quantity	MLD	123
Categorised as		
Technical Loss - Assume @ 15%	MLD	(31)
Commercial Loss and Leakage	MLD	(92)
UfW at	%	<b>45%</b>

It can be seen from the above that unaccounted water at ~92 MLD (2007) is more than the sale quantity, which is 83MLD for that year. Approximately 60% of water is lost in treatment, transmission and distribution.

The interventions that are urgently needed are ring fencing and improving accountability in terms of managing and reducing the commercial loss, rather than capacity augmentation or other technical improvements. This may require intensive metering; systematic accounting of water in each ward/Division/Circle; MIS to capture details of billing, collection and balance for each consumer; and formation of anti-theft squads, etc. The need for structured organisational efficiency improvements necessitates a full transformation of PHEO from a monopolistic state department to a commercially viable, financially accountable and professionally managed organisation.

Based on this initial review and evaluation of options for reforming the water services, as well discussions with PHEO and GoO, it is proposed to corporatise the PHEO services into a new corporate operating entity (COE). This corporatised entity would provide water and sewage services to consumers through an operating contract between the respective ULB, which would be delegated with the ownership of the assets.

## 6. Financial Analysis – Bhubaneswar City’s Water Supply and Sewage Services

### 6.1. Financial Function in PHEO

The PHEO functions as an arm of Government. Its cash flows are through the Treasury of the Government. Collections from consumers are deposited into the Treasury account, while payment for all expenses is through Treasury only.

Every year, PHEO prepares a budget for Plan and Non-Plan expenditure. Plan expenditure usually is for capital expenditure prepared for various schemes.

Non-Plan expenditure covers Operations and Maintenance expenses such as Repairs and Maintenance, Payroll, Chemicals, Administrative Expenses, etc. For ease of monitoring and also for capturing relevant transactions, various relevant account heads have been identified as listed below.

**Table 17 – Accounting Categories**

Head of Account	Category	Purpose
2215	Non-Plan	Operating Expenditure for Water Supply and Sanitation
4215	Plan	Capital Expenditure
4059	Plan	Maintenance of Government Buildings
4216	Plan	Relief from Natural Calamities

The schemes and their accounting codes are pre-defined. Any deviation has to be explicitly stated and approved by the Finance Department of the Government for claiming expenses or payment.

Since the cash flows are through Treasury, PHEO maintains a Management Information System to understand its receipts and payments position. The accounts are not maintained in an accrual system, except that certain provisions are made at the end of the year for outstanding expenses or payments for schemes. Thus, in certain years, the expense accounts would include arrears paid in the subsequent period, income not fully recognised in the year in which the same has been incurred, etc.

Budgetary approvals have to be obtained from concerned officers (based on delegation of powers and the Orissa General Financial Rules) prior to making payments or incurring expenses. Since receipts and payments pass through the Treasury, there’s no separate account for subsidy (Treasury finances the difference between receipts and income).

Audit of transactions is carried out by the State Auditor General and the details (budget head-wise) are laid before the Government yearly, during the budget process. New budgets are also approved during this period.

## 6.2. Segregation of Water and Sewage Services

As per the current proposal, WS and SS services across the city of Bhubaneswar are to be transferred to BMC and O&M given to COE. PHEO PH I, II and III Divisions currently service the city of Bhubaneswar. The jurisdiction areas of PH I and PH II fall entirely within the city limits.

PH III services four other outlying ULBs apart from Bhubaneswar City. Thus, the activities, finances and accounts of PH III Division need to be segregated between those pertaining to Bhubaneswar City and the other ULBs.

Using the accounting data, as well as the MIS prepared by the Division, the financials of PH III have been segregated between the city of Bhubaneswar and other ULBs as presented in the following table.

**Table 18 – Segregation of PH III Expenditure between BBSR and Other ULBs**

Segregation of PHIII Expenditure and Revenue for FY 07		Rs. Lakhs					
ULB	Expenditure during FY 2006-07					Total	Revenue
	Energy	Chemicals	Establishment	Rep & Maint.			
Bhubaneswar	338.6	67.1	121.9	165.4	692.9	59.4	
Khurda	44.1	7.6	21.1	24.5	97.3	19.3	
Jatni	21.7	1.0	18.2	8.7	49.6	4.0	
Balugaon	4.2	0.6	1.3	6.5	12.6	0.6	
Banapur	0.4	0.1	1.1	2.1	3.8	0.0	
Total	409.0	76.4	163.6	207.2	856.2	83.3	
% of BBSR to total	83%	88%	74%	80%	81%	71%	

*Source: Presentation of EE to CE - Annual Outcome Based review of works for the year 2006-07 & Plan & Prog for 2007-08*

The financials, as culled from the receipts and payments, are presented below. Income from water and sewage services is basically accounted on a cash basis.

## 6.3. Expenditure

### 6.3.1. Revenue Expenditure

The expenditure account has been analysed to understand whether expenditure is properly accounted or whether any adjustments are required. It is the consultant understands that the major expenditure on Electricity has been properly accounted and has no outstanding/arrears included in it. In the case of Repairs and Maintenance, certain capital expenditure has been booked under this head. This has been excluded to ensure that the matching accounting principle has been followed. Due to non-availability of data, Electricity expense for 2003 could not be verified and segregated between arrears and current costs.

Electricity expenses currently account for ~1/2 of the total operating expenditure. PHEO is currently evaluating options for improving efficiency in this area.

It may be worthwhile for the organisation to petition the Orissa Electricity Regulatory Commission to consider a “Cost to Serve Study” for this sector and also look into the cascading effect that the electricity tariff has on the water tariff. PHEO can also consider improving the efficiency of its motors and other treatment plant machinery. Historical expenditure and its composition and growth are shown in the following tables.

**Table 19 -Expenditure Composition– Five-Year Profile**

<b>Expenditure</b>	<b>Mar-03</b>	<b>Mar-04</b>	<b>Mar-05</b>	<b>Mar-06</b>	<b>Mar-07</b>
Treatment Costs					200.29
Electricity	1,714.99	1,021.58	1,040.06	1,325.33	1,311.58
Employee Expenses	537.35	453.14	433.76	473.67	536.49
Less: Expense Capitalised	(26.53)	(66.52)	(66.78)	(147.68)	(251.76)
Net Employee Expenses	510.82	386.63	366.98	325.99	284.73
Repairs & Maintenance	498.71	631.32	747.25	1,203.66	1,081.30
Less: Expense Capitalised	31.11	(167.97)	(104.22)	(118.95)	(184.27)
Net Repairs & Maintenance	529.82	463.34	643.03	1,084.71	897.03
<b>Total O &amp; M Expenditure</b>	<b>2,755.62</b>	<b>1,871.55</b>	<b>2,050.07</b>	<b>2,736.02</b>	<b>2,693.64</b>

**Table 20 -Expenditure Composition and Growth – Five-Year Profile**

<b>Composition of Expenses</b>	<b>Mar-03</b>	<b>Mar-04</b>	<b>Mar-05</b>	<b>Mar-06</b>	<b>Mar-07</b>
Treatment Costs	0%	0%	0%	0%	7%
Electricity	62%	37%	38%	48%	48%
Employee Expenses	20%	16%	16%	17%	19%
Less: Expense Capitalised	-1%	-2%	-2%	-5%	-9%
Net Employee Expenses	19%	14%	13%	12%	10%
Repairs & Maintenance	18%	23%	27%	44%	39%
Less: Expense Capitalised	1%	-6%	-4%	-4%	-7%
Net Repairs & Maintenance	19%	17%	23%	39%	33%
Year-on-Year Growth in Expenditure		-32%	10%	33%	-2%
Year-on-Year Growth in Exp w/o Capitalisation		-23%	5%	35%	4%

The capitalisation of Employee Expenses and Repairs and Maintenance shows large variations depending on the level of capex in that particular year. Repairs and Maintenance expenses show an upward trend as expected; since the network system is ageing Gross Employee Expenses show a stable trend (this includes payment towards NMR/DLR also).

### **6.3.2. Average Cost to Serve**

Using the water accounting analysis and the Profit and Loss account, ‘Average Cost to Serve’ has been worked out. This is very useful in understanding the costs of service provision, as well as structuring tariff recoveries in future. Of course, a more scientific approach is needed to conduct a proper Cost to Serve study across different categories like urban poor, domestic, commercial and industrial including understanding the issues of cross-subsidies.

**Table 21 –Average Cost to Serve**

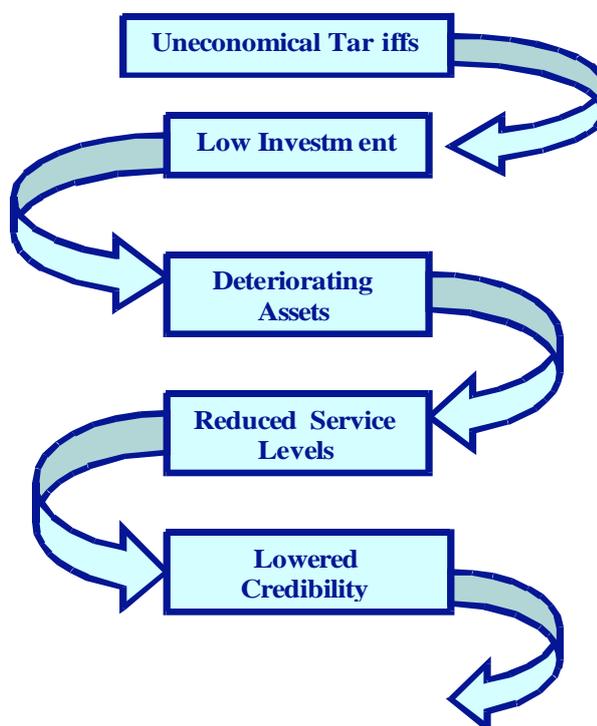
Revenue & Expenditure - Rs/ KL

	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Sale in Million Ltrs	25,952	7,447	5,692	7,356	30,234
Revenue from Water Charges	2.66	9.65	13.50	11.40	2.98
Subsidy					-
Total Income	3.09	11.43	15.83	13.35	3.63
Expenditure					
Treatment Costs	-	-	-	-	0.66
Electricity	6.61	13.72	18.27	18.02	4.34
Net Employee Expense	1.97	5.19	6.45	4.43	0.94
Net Repairs & Maintenance	2.04	6.22	11.30	14.75	2.97
Total Expenditure	10.62	25.13	36.01	37.19	8.91
EBIDTA	(7.53)	(13.71)	(20.19)	(23.84)	(5.28)

It can be seen that during FY 2006-07 the average revenue at Rs.2.98 per KL is just adequate to meet the direct expenses of Repairs and Maintenance. The major costs of treatment, electricity and employees are thus not recovered at all.

As such for ensuring full cost recovery the tariff needs to be doubled immediately, which would result in a huge tariff shock. In fact, this is the root of the downward spiral effect in the water sector where in low cost recovery results in less investment in asset management leading into deteriorating service levels which in turn leads less credibility for effecting the tariff reform.

**Figure 7 – Downward Spiral Effect in Water Sector**



As the Government and PHEO do not maintain an adequate Assets Register, the economic cost of asset usage by way of depreciation is not calculated and incorporated into the tariff. Further, since the sector is not segregated from GoO accounts, the funding structure in terms of grants or loans from GoO are not ascertained and hence, there is no charge for recovery of the capital costs included in the prevailing tariffs.

If these items are taken into consideration, the tariff increases would have to be at least 150%. Of course, this can be partly off set by the increase in efficiency (reduction of technical and commercial loss, which is over 60% at present).

In this scenario, tightening water usage and distribution loss can save substantial amounts to the Department, as can be seen in the following table, where the savings in production costs have been worked out using the estimated system input volume.

**Table 22 – Savings in Production Cost**

Savings Calculations				
Savings in production per annum	%	1%	5%	10%
Total input volume	MLD	206.00	206.00	206.00
Volume of water saved per annum	1000KL	752	3,760	7,519
Production cost saved per annum	Rs. Lakhs	26.94	134.68	269.36

### **6.3.3. Capital Expenditure**

This head reflects the Capital expenditure carried out under various heads of WS and SS (heads of 4215), Maintenance of Government buildings (4059 & 4216 heads), and the “Relief against Natural Calamities”.

The total capex handled by the Department in a year is ~ Rs 22 crores. Given this background, it may be difficult to envisage that PHEO can handle the large-scale expenditure as set out in the recently completed JNNURM CDP.

As explained under the head “Revenue expenditure” above, the departmental charges, i.e., capitalised Expenditure of Employees and Repairs and Maintenance, are levied as a percentage of capital expenditure in that year. Thus, if the capital expenditure is high, the departmental charges are high, irrespective of the linear correlation between the effort involved and capital expenditure.

**Table 23 -Capital Expenditure Across Various Heads**

Category	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
<b>Water Supply</b>	Rs Lakhs				
Works	172.83	194.41	232.36	590.73	919.62
Department Charges	19.04	27.44	22.06	63.23	125.60
<b>Total</b>	<b>191.87</b>	<b>221.85</b>	<b>254.43</b>	<b>653.96</b>	<b>1,045.22</b>
<b>Sewer Services</b>					
Works	29.83	49.89	57.57	163.10	220.00
Department Charges	4.21	7.02	3.04	23.44	30.02
<b>Total</b>	<b>34.03</b>	<b>56.92</b>	<b>60.61</b>	<b>186.54</b>	<b>250.02</b>
<b>Relief Against Natural Calamities</b>	<b>255.21</b>	<b>158.79</b>	<b>303.22</b>	<b>100.45</b>	<b>60.60</b>
<b>Deposit Works</b>					
Works	-	-	-	422.23	570.98
Department Charges	-	-	-	63.33	85.65
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>485.56</b>	<b>656.62</b>
<b>Grand Total</b>	<b>481.11</b>	<b>437.56</b>	<b>618.25</b>	<b>1,426.51</b>	<b>2,012.46</b>
<b>Govt Maintenance - 2059</b>					
Works	46.61	23.14	23.79	61.76	124.09
Department Charges	6.53	3.29	2.59	8.67	17.46
<b>Total</b>	<b>53.14</b>	<b>26.43</b>	<b>26.38</b>	<b>70.43</b>	<b>141.54</b>
<b>Govt Maintenance - 2216</b>					
Works	74.10	57.44	41.46	34.52	41.39
Department Charges	10.42	8.08	3.75	4.92	5.91
<b>Total</b>	<b>84.52</b>	<b>65.53</b>	<b>45.21</b>	<b>39.44</b>	<b>47.30</b>
<b>Grand Total</b>	<b>137.66</b>	<b>91.96</b>	<b>71.59</b>	<b>109.87</b>	<b>188.85</b>
<b>Total Capex Handled</b>					
Works	578.57	483.68	658.39	1,372.79	1,936.66
Department Charges	40.20	45.83	31.45	163.59	264.64
<b>Total Capex Handled</b>	<b>618.77</b>	<b>529.52</b>	<b>689.84</b>	<b>1,536.38</b>	<b>2,201.31</b>

#### ***6.4. Other Business of PHEO – Maintenance of Government Buildings***

As mentioned earlier, maintenance of Government buildings is one of the functions historically carried out by PHEO. This is a line of business, which needs not be transferred to BMC and can continue to function within the PHEO. The table above details the expenditure for this line of business, which is part of the budgetary allocation under Plan and Non-Plan heads.

For all its lacunae in terms of database maintenances or accounting systems, it should be appreciated that there is a certain amount of sophistication in Government's way of working. This is amply shown in the following table, as the costs are tracked separately for the above two heads of 2059 and 2216.

**Table 24 -PHEO – Maintenance of Government Buildings**

<b>2059 - Maintenance of Non-Residential Buildings of Government</b>				Rs Lakhs	
	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Employee cost	65.19	67.25	59.13	56.38	62.72
Temporary workers cost	19.16	10.03	3.40	3.18	3.70
Maintenance of critical buildings	59.70	100.37	134.18	156.50	259.40
Other works	63.42	106.35	65.66	224.44	227.38
Proportionate charges	39.67	51.34	49.51	51.16	70.13
<b>Total</b>	<b>247.15</b>	<b>335.34</b>	<b>311.87</b>	<b>491.66</b>	<b>623.32</b>
<b>2216 - Maintenance of Residential Buildings of Government</b>				Rs Lakhs	
	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Employee cost	82.72	83.83	80.00	74.48	78.37
Temporary workers cost	24.61	12.04	5.63	4.20	8.39
Maintenance of critical buildings	70.67	66.14	40.20	235.26	241.32
Government residential buildings	1.17	0.23	212.14	184.50	417.39
Other works	28.08	88.18	81.62	61.01	510.62
Proportionate charges	25.18	33.82	56.27	75.99	230.20
<b>Total</b>	<b>232.44</b>	<b>284.23</b>	<b>475.86</b>	<b>635.44</b>	<b>1,486.29</b>
<b>Grand Total</b>	<b>479.58</b>	<b>619.57</b>	<b>787.74</b>	<b>1,127.10</b>	<b>2,109.61</b>

**6.5. Income**

Revenue demand as provided by the PH II Rent Division includes the opening arrears from the previous years. This is the ‘demand’ for the year and GoO uses this number to set collection targets. However, for accounting purposes as noted previously, the income for the year should exclude the opening arrears.

The following table presents the original ‘demand’ numbers as given by the PH II Division and the corrected revenue demand. Figures for 2002-03 have not been adjusted, as the opening arrears for that year are not known.

**Table 25 -Adjusted Demand of Water Rent in Bhubaneswar City**

Demand as per PH Rent, Bhubaneswar <i>All numbers Rs. in Lakhs</i>	Demand including arrears					Current demand without arrears
	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07	Mar-07
Domestic- Govt	435	369	234	338	402	189
Domestic - Pvt	813	895	466	970	942	543
Institutional	522	456	518	528	599	308
Industrial	24	18	15	15	18	14
Commercial	33	45	40	45	49	19
ULB/ Standpost	78	39	50	77	78	1
<b>Total</b>	<b>1905</b>	<b>1822</b>	<b>1323</b>	<b>1974</b>	<b>2089</b>	<b>1074</b>

There seems to be a certain inconsistency in the data, as seen above (the database needs to be sanitised), as the revenue in 2004-05 and 2005-06 seems to be out of range as compared to 2003-04 or 2006-07. This obviously affects the analysis based on these numbers. The growth trend of the income is shown in the following table.

**Chart 2 -Revenue Growth Profile of Bhubaneswar**

	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Revenue from Water Charges	86%	84%	85%	85%	82%
Revenue from Sewerage Services	4%	4%	3%	3%	2%
Other Income	10%	12%	11%	12%	12%
Total	100%	100%	100%	100%	100%
Year-on-Year Growth in WS Charges		4%	7%	9%	7%

**Chart 3 –Average Revenue per Connection per Year**

Average Revenue for FY 06 and FY 07	
Revenue per Connection	Rs/ Conn/Year.
Domestic - Government	1126
Domestic - Private	2256
Institutional	44219
Industrial	19583
Commercial	8408
ULB & Standposts	5806
Total	2460

The average revenue per year from general public as per Domestic-Private (as shown above) connection is Rs. 2,256 or Rs. 188 per month. Based on a tariff of Rs. 2.80 / KL, this works out to 67,225 litres consumption per month (Rs. 188/2.80 per KL) or 2,240 litres per day. Assuming 10 members per household, this works out to 224 LPCD, which is close to the 233 LPCD, as assessed earlier.

Comparatively, the Government - Domestic consumer pays substantially less than the Private - Domestic consumer. This could represent an additional indirect subsidy to that category.

Sewage services represent a small contribution to the total business of PHEO. This may change once the coverage is significantly increased (with resultant increase in income) and the benefits are felt by the consumers.

### ***6.6. Profit and Loss Account***

Based on generally accepted accounting principles, the Profit and Loss account is prepared by segregating PHEO's accounts from that of Government's general Receipts and Payments and is shown in the following table.

There could still be certain errors in the P&L account below, as the consultants are not sure whether accrual accounting has been followed in all aspects. This would be another critical element to introduce in the new reform environment for PHEO, which would capture accurate data both for presentation of its financial position, as well as to justify tariff charges.

**Table 26 -Profit and Loss Account of PH Divisions in Bhubaneswar up to Mar-07**

<b>Profit &amp; Loss Account</b>					
Year Ending	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
<b>Income</b>					
Revenue from Water Charges	691.07	718.29	768.54	838.88	901.73
Revenue from Sewerage Services	29.95	30.69	30.00	29.55	20.77
Connection Charges					37.46
Other Income	80.83	101.82	102.39	113.67	136.30
Subsidy					
Total	801.85	850.80	900.93	982.10	1,096.26
<b>Expenditure</b>	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Treatment Costs					200.29
Electricity	1,714.99	1,021.58	1,040.06	1,325.33	1,311.58
Employee Expenses	537.35	453.14	433.76	473.67	536.49
Less: Expense Capitalised	(26.53)	(66.52)	(66.78)	(147.68)	(251.76)
Net Employee Expenses	510.82	386.63	366.98	325.99	284.73
Repairs & Maintenance	498.71	631.32	747.25	1,203.66	1,081.30
Less: Expense Capitalised	31.11	(167.97)	(104.22)	(118.95)	(184.27)
Net Repairs & Maintenance	529.82	463.34	643.03	1,084.71	897.03
Total O & M Expenditure	2,755.62	1,871.55	2,050.07	2,736.02	2,693.64
Management Contract Fees					
EDBITA	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)
Depreciation	-	-	-	-	-
EBIT	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)
Interest	-	-	-	-	-
PBT	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)
Tax	-	-	-	-	-
PAT	(1,953.77)	(1,020.75)	(1,149.13)	(1,753.93)	(1,597.38)

The 'Other Income' head includes income that is earned from carrying out deposit works for ULBs or other private layouts. PHEO collects 17% on the total expenditure from these works as its fees. Of this, 2% is remitted towards audit and pension charges. This 2% is not accounted for in the 'Other Income' head. PHEO collects certain insurance charges, instalments against housing loans, etc. for remittance to the Government or insurance agencies. These are not accounted as income.

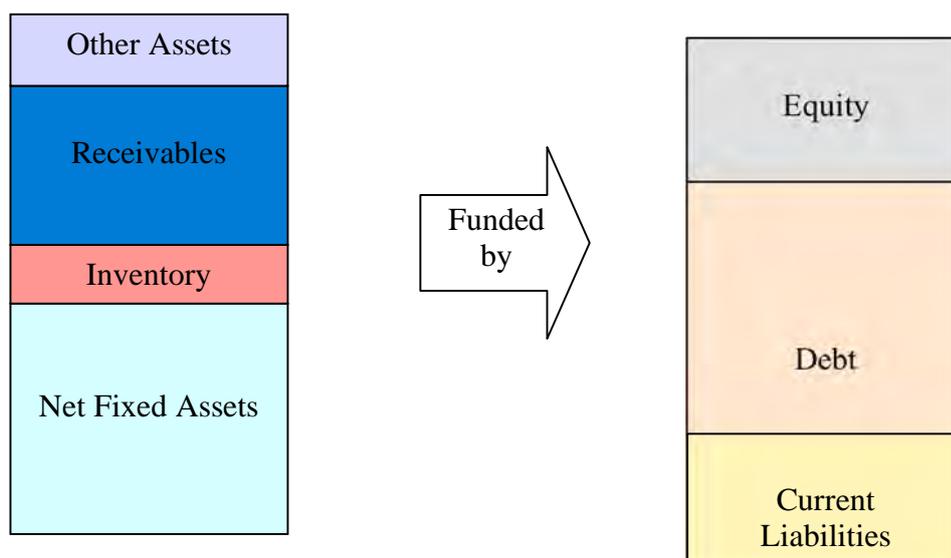
Another peculiar aspect is the way Government accounts for treatment of expenses for capitalisation. In generally accepted accounting practices, expenses that are reasonably directly or indirectly related to executing capital works are capitalised and amortised through depreciation. Such expenses are usually tracked diligently as they not only affect the current year's position, but also the value of the asset created.

However, the current Government system assumes a certain "percentage" of capital expenditure as expenses to be capitalised, and reduces the same from expenditure heads. Thus, in years of higher capital expenditure, more expenses would be capitalised, though such a direct relationship may not necessarily hold true.

## 7. Balance Sheet Construction for PHEO – Bhubaneswar

As per the current practice, no department of the State Government keeps a detailed record of the individual Fixed Assets created. Similarly, a formal financial statement of Assets and Liabilities is also not prepared. It is not clear as to how the PHEO assets have been financed and the cost of such funding.

**Figure 8 - Balance Sheet of a Company/Organisation**



The main advantages of formalising a Balance Sheet would be in understanding the value of assets, receivables and inventory so that the capital structure of the company in terms of the level of equity, debt and liabilities can be determined for exercising necessary financial control over the balance of assets and liabilities. The Balance Sheet would also provide a benchmark for valuation of the business so that the owner of the assets and the buyer can agree on the sale consideration for transfer of the business undertaking. However, in the present case, where the assets at present owned by GoO are to be transferred to the books of BMC, the value of assets as assessed and presented in the Balance sheet need not be the actual transfer price and GoO can take an appropriate view whether to transfer at the assessed price or through a nominal token cost of say Rs.100.

The other important use of the Balance Sheet is to understand the value of the business, for determining the economic cost of goods and services provided. Based on the correct costing, the user charges can be fixed individually or category wise, for the rate payers (rather than imposing the same on all tax payers through the incidence of taxes).

The terms for creating the capital structure (level of debt, terms and conditions for the servicing of debt, equity and its return) is completely the prerogative of the State Government. However, this report makes certain recommendations for GoO's consideration, taking into account the future projections of the business, the level of tariff increase, subsidy support, etc.

Towards creating this Financial Statement, forms were circulated for capturing asset category-wise details such as quantity, type, total numbers, approximate age of

construction, etc. Since the asset records are traditionally not maintained, the data acquired were very sketchy and required educated guesses to fill in.

PHEO assets have been created for more than six decades. It is very difficult to piece together such information. Hence till 1995, it was decided to gather information on a decadal basis. For the subsequent period, it was decided to gather information for every year, i.e., from 1996 to date (2007).

However, as land is allotted free of charge, the above assumptions have not been taken into consideration while preparing the asset values.

### ***7.1. Physical Details of Fixed Assets***

Details gathered/provided by various PHEO Divisions regarding their assets are as follows:

- Water treatment plants
  - Capacity year-wise for each Division is given
- Production tube wells
  - Total capacity in each Division
  - Only PH II & PH III provided yearwise break-up of the capacity
- Storage reservoirs
  - Similar to production tube wells; PH II & III provided break-up of capacity across years
- Hand tube wells
  - PH III provided additions across various periods
- Water mains
  - PH II & PH III provided additions over the years
- Other assets
  - Approximate financial details of office equipment, furniture, vehicles, etc.

Details as collected for WS and SS are summarized in Appendix D.

### ***7.2. Valuation Approach***

Valuation of assets, without adequate historical accounting data, is a challenge. Generally, in valuation exercises, historical cost is generally available and used for benchmarking and revaluation through different valuation methods such as Net Depreciated Replacement Cost Method or Indexing Method or Assessment of Economic Value Method. This is the generally accepted methodology used by Chartered Valuers.

The present task is doubly daunting when the asset quantity and creation details are also not available or accurate. In these circumstances, any approach is always open to subjective interpretations and corrections.

In the present situation, a hybrid approach has been taken to calculate the historical cost of assets. This is explained as below:

- Calculation of Net Depreciated Replacement Cost for each type of asset, using:
  - Current procurement costs for each category worked out by the respective Divisions (based on their standards of estimate). Where Division estimates vary, the estimates as provided by the individual Division have been considered.
- Using a deflationary multiplier (explained in the subsequent paragraphs), the historical asset is calculated:
  - Current Replacement Cost x deflationary multiplier = Gross Original Cost as on the year of construction.
- Depreciation is calculated from the approximate year of construction or the year in which the asset has been put in use.
- Depreciation rate is based on the rate at which 90% of the asset value is written off over the estimated useful life.
- Estimated useful life for each category is based on ‘Delphi Technique<sup>7</sup>’, cross referenced with industry norms.
- Accumulated depreciation is calculated as on March 2007 using the above principles.
- Net Value of Asset = Gross Value – Accumulated Depreciation.

### ***7.3. Deflationary Multiplier Calculation***

Inflation indices are usually used to calculate the current cost of a product, i.e., historical cost multiplied with inflation index would provide the current cost of a product. In reverse, given a current cost and deflationary multiplier, the original cost can be worked out.

The WPI indices have been accessed from the website <http://eaindustry.nic.in/> of the Office of the Economic Adviser to the Government of India, Ministry of Commerce and Industry.

As per discussions with experts in the sector, pipes and cement contribute significant costs in the creation of water and sewerage assets. While calculating the price indices for valuing the assets, 70% weightage for pipes and 30% for cement on the respective indices as per the WPI are taken into account and the combined weightage has been arrived at.

The deflationary multiplier for pipes and cement is calculated as detailed below:

- Select the WPI numbers as notified by the Central Government during the year 2006 which is 195 for pipes and 166 for cement.
- The WPI number was rebased by GoI to 100 twice during the year 1982 and further during the year 1994.
- GoI website suggests that each WPI number of the year 1982 need to be multiplied with a factor of 2.478 for obtaining the index number during

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<sup>7</sup> The **Delphi Technique** is a systematic interactive forecasting method for obtaining forecasts from a panel of independent experts. The carefully selected experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments. *Source: Wikipedia*

the year 2006. Thus the published index of 195 for pipes (during the year 2006) actually projects to 483 considering a base of 100 during the year 1982.

- Compounded Annual Growth Rate ('CAGR') of the WPI between 1994 and 2006 is calculated as 5.7%.
- Further to reverse calculate the index for the year 1960, an overall CAGR of 5% is assumed for the period between 1960 and 2006. With this the index number for pipes during the year 1960 is reverse calculated to 50.9, i.e., a base index number of 50.9 for pipes in 1960, growing at a CAGR of 5% would result in 483 in 2006. Similarly a base number of 43.4 for cement in the year 1960 would increase to 413 during the year 2006.
- Then the deflationary multiplier for a specific year is calculated by dividing the WPI number of that year with that of 2006

Details of indices and deflationary multipliers are presented in Appendix E.

Alternate valuation principles that could be considered are:

- Discounted Cash Flow ("DCF"):
  - As currently PHEO is not recovering its full cost of operations and is dependent on subsidy from GoO, the DCF method of valuation would not show the correct position, as the value of the business would be nothing but the present value of the subsidy that the GoO is willing to provide.
- Profit Capitalisation Method:
  - Again, as stated in the DCF method it would be merely capitalisation of GoO's subsidy at some valuation multiple. It is a commitment of a minimum level of subsidy and GoO would be receiving the present value of its own future outflows.

Hence these two methods of valuations have not been considered further.

Detailed category-wise asset grouping and their Net Depreciated Values are presented in Appendix F.

**Table 27 -Summary of Fixed Asset Valuation for WS and SS**

Category of Asset	Useful Life in Years	Total Capacity		Indexed Value Original Cost Rs.	Residual Value 10% Rs.	Depreciation per Annum Rs.	Accumulated Depreciation Mar-07 Rs.	Net Block as on Mar-07 Rs.
		Quantum	Unit					
<b>WATER SUPPLY</b>								
Treatment Plant	30	217.24	MLD	230,657,000	23,065,700	6,919,710	83,778,149	146,878,851
Production Tube Wells	20	217.24	MLD	230,657,000	23,065,700	6,919,710	83,778,149	146,878,851
Storage Tanks	60	63.9	MLD	221,054,000	22,105,400	3,315,810	45,289,067	175,764,933
Hand pump Tube Wells	15	1,856	KL	70,902	7,090	4,254	29,703	41,199
Transmission Mains	40	201.2	KM	703,403,000	70,340,300	15,826,568	152,786,102	550,616,898
Distribution Mains	40	583.9	KM	268,023,000	26,802,300	6,030,518	96,872,759	171,150,241
Stand Posts	10	415.0	Number	5,215,000	521,500	469,350	4,693,500	521,500
Office Equipments/ Furniture & Fixtures	10	-	-	2,200,000	220,000	198,000	1,980,000	220,000
Vehicles	10	-	-	2,200,000	220,000	198,000	1,980,000	220,000
Total for Water Supply				1,559,564,000	155,956,400	41,561,775	464,115,067	1,095,448,933
<b>SEWERAGE SERVICES</b>								
Sewerage Treatment Plant	30	1	Number	4,889,000	488,900	146,670	733,752	4,155,248
Sewerage Transmission	30	136.5	KM	57,014,687	5,701,469	1,710,441	20,539,346	36,475,341
Sewage Collection Mains	30	336.5	KM	34,440,029	3,444,003	1,033,201	12,406,902	22,033,126
Total for Sewerage				96,343,716	9,634,372	2,890,311	33,680,000	62,663,716
Grand Total - WS & SS				1,655,907,716	165,590,772	44,452,086	497,795,067	1,158,112,649

The net block of fixed assets as on end of March 2007 amounts to Rs.109.54 crore for water supply infrastructure and Rs.6.27crores for sewerage infrastructure totalling to 115.81Cr for the entire operating business.

#### 7.4. Other Assets – Valuation

The following assumptions have been made in terms of valuing other assets in the business based on discussions with PHEO and other experts in the sector. Accounts Receivables were based on the Closing Balance as per PH II Rent details adjusted for proposed write-off of Non-recoverable amounts.

**Table 28 - Assumptions for Other Assets**

Category	Multiplier	Assumptions
Inventory	0.25	1 month of Repairs & Maintenance
Receivables		Closing balance of PH II adjusted for w/off
Cash & Bank Balances	0.04	15 day of O&M Expenses
Advances	0.08	1 month of Employee Cost
O&M Payable	0.08	1 month of O&M Expenses
Other Refundable Deposits		Difference of 8443 Receipts & Payments
Receivables Write-off	157.2	Rs Lakhs

#### 7.5. Capital Structure for the new business undertaking

The assumptions for the capital structure of the business undertaking which is to be transferred to BMC from GoO are set out below.

**Table 29 - Assumptions for Capital Structure**

##### Proposed Capital Structure

Loan from Government	70%
Interest on Loan	8%
Loan Repayment Installments	10
Equity From Government	30%
Return on Equity	16%

Using current prudent financing norms of funding infrastructure projects and also using the projections of the growth of water and sewerage business, the capital structure of the business has been fixed at 70% debt (assumed to be funded by GoO at 8% rate and repayable in 10 years).

The balance is treated as equity, which can carry an assumed return of 16% per annum. This equity, or the nominal value of the business as decided by GoO, needs to be paid by BMC, as consideration to GoO for the transfer of the undertaking. BMC can discharge this consideration as shares issued from the share capital of CoE either in full or part or by other means.

For the purpose of initial valuation, the remaining value of the business (70%) is assumed to be transferred as loan carrying 8% interest. However GoO and BMC can mutually agree on the capital structure for the transfer of business. For example, the grants released by Government of Karnataka (GoK) to Bangalore Water Supply and Sewerage Board (BWSSB) are always treated as a Loan carrying interest but in practice BWSSB never pays back the Loan or interest and the state finance department occasionally writes off the debt.

#### **7.6. Provisional Valuation – Opening Balance Sheet as of March 31, 2007**

Based on the assumptions as detailed above, the Balance Sheet as of March 31, 2007 for the business of WS an SS in the city of Bhubaneswar is as follows.

**Chart 4 - Composition of Opening Balance Sheet**

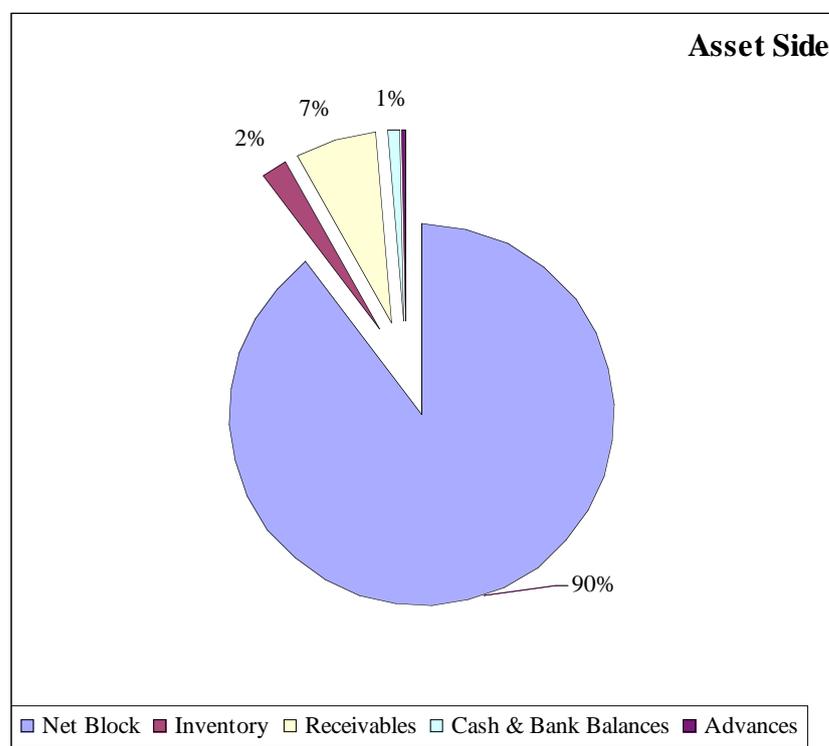


Table 30 -Construction of Opening Balance Sheet – Bhubaneswar City

<b>Balance Sheet</b>	Mar-07
	Rs. Lakhs
Gross Block	16,559.08
Less: Acc.Depreciation	(4,977.95)
<b>Net Block</b>	<b>11,581.13</b>
Capital Work in Progress	
Current Assets	
Inventory	270.33
Receivables	869.00
Cash & Bank Balances	130.40
Advances	44.71
<b>Total Current Assets</b>	<b>1,314.44</b>
Current Liabilities	
O&M Payable	260.81
Rep & Main Payable	113.81
Other Refundable Deposits	90.25
Addnl Cash from GoO	
<b>Total Current Liabilities</b>	<b>464.86</b>
Net Working Capital	849.58
<b>NET ASSETS</b>	<b>12,430.70</b>
Financed by	
Loan from Government	8,701.49
Grant	
Equity From Government	3,729.21
Reserves and Surplus	
<b>TOTAL</b>	<b>12,430.70</b>

## **8. Business Plan for COE Managed WS and SS Business for Bhubaneswar City**

The Business Plan for the new corporate operating entity (COE) is prepared for a period of eight years, i.e. from FY 2008 to FY 2015. Given the low current realisations, resistance to tariff hikes, and difficult in promoting sustainable efficiency growth, this long period of seven year plan has been considered.

Any business plan projection is as good as the quality of the base data used. Given the earlier discussions on the financials, these projections have been made on the current knowledge of the business and asset valuation. Should the quality of data change, in future, these projections would accordingly need to undergo a revision.

Two scenarios of Business Plan, have been developed, the first scenario being 'business as usual' (considering the present level of management efficiency) and the second scenario wherein 'corporatisation coupled with change management' would ensure gradual improvement of operating efficiencies.

### ***8.1. Assumptions***

The basic assumptions for both scenarios of the Business Plan are:

- No augmentation of water capacity – as per CDP document, the current capacity is adequate and would provide more than 150 LPCD, the normative standard.
- Water supply from Munduli works will be increased by ~45 MLD from the exiting level.
- Population growth would be as per CDP.
- Urban poor assumed to be 30% of the total population reducing to 23% by the year 2015 considering the percolation of economic growth. For this category, one connection is assumed for every 15 persons.
- For the rest of the domestic population, one connection is assumed for every 10 consumers.
- Current coverage of consumers is ~42%.
- Other Income as is being collected by the present PH Rent Division would increase at 2% CAGR. However, the income from deposit works at present charged by PHEO would be reduced as the ownership of assets is transferred to BMC
- It is expected that the capex identified in CDP is needed for improving the coverage of water services and the sewerage in the city
- PHEO or OWSSB, as the case may be, will have the capability to expend this capex in the projected time.
- CoE would enter into a performance based management contract with BMC at a management fee calculated at 15% of the annual O&M expenses (a generally followed industry norm).

#### **8.1.1. Efficiency Improvement**

The proposed new corporatised entity would plan to introduce time-tested change management principles for improving the productivity and efficiency of the organisation

to ensure improved service delivery. To this effect the following three critical areas of business performance would be emphasised for improving efficiencies:

- Improving collection efficiency: revenue collection efficiency has been low in the past. In view of the management contract envisaged for the CoE, it is expected that this would be one area that would see better performance. We project that revenue collection efficiency will increase to an acceptable level of 95% over an eight-year period
- Increase coverage: current coverage is about 42%; the COE will strive for a rapid increase in customer coverage to a level of 95%, since sufficient surplus water resource capacity exists in the City from the available infrastructure.
- Reducing losses: it has been assumed that the technical and non-technical loss (unaccounted water) would be addressed and would experience a declining trend during the forecast period. This is based on the discussions with the officials in PHEO, as well as experts in the sector. It is projected that the technical physical losses would decrease from 15% to 5% and the UFW level would decrease from 45% to 22%.
- Increase in tariff: in line with the State/BMC commitment to the reform agenda under JNNURM, full cost recovery is assumed at the end of eight years in order for the services to be self sustainable. To this effect, it is proposed to increase the tariff by an average 8% year-on-year coupled with improved service levels and customer service.
- Connection charges: connection charges, as is the current practice, are taken as revenue for the year in which they are realised. This is subjective, as the accounting treatment for this is not yet settled. In the electricity sector, connection charges were to be amortised over a period as income, whereas in the past State Electricity Boards have taken them to the Reserves and Surplus category, without passing the same as Income in the Profit and Loss Account. This is taken as revenue, since it is not refundable to the consumer and, further, would form part of Reserves and Surplus. The moot point is whether this can be done in one year or over say 30 years. Given the nominal flows, as well as the current thinking of further reductions in this charge, it may be a prudent practice to charge it to revenue in the same year itself.
- Subsidy from GoO: Subsidy is the amount required to cover the gap between the new corporatised entity's revenue and costs, so as to earn the minimum return on equity, as set out in the assumptions.

The above measures under a changed management scenario can also be introduced right away with the present PHEO management and the downstream benefits envisaged can be achieved although partially and less effectively. The main reasons for the less than optimum results is the fact that the PHEO is governed by state civil service and accounting rules where in there would not be functional autonomy possible for just one department among many and also due to the fact that there is no facility for rewarding performing employees by incentives and vice versa. Another significant element is the fact that the service in state department generally does not attract the best talent in the

areas of financial management, marketing and customer services which are crucial for effective utility management.

### 8.1.2. Projected Water Services Business

With the efficiency improvements listed in the previous section, growth of the water services business is projected for the years 2008-2015 as shown in the following table.

**Table 31 - Projected Water Services Business**

WATER SUPPLY	Unit	Mar-07	Mar-11	Mar-15
Total population (Lakhs)	Lakhs	8.83	9.92	10.91
Production Capacity	MLD	206.00	251.00	251.00
Service level	LPCD	233	253	<b>230</b>
Urban poor	%	30%	27%	23%
Service level for urban poor	LPCD	50	50	50
Population	Lakhs	2.65	2.68	2.51
Consumers per connection	Number	15	15	15
Urban poor connections	Number	17,668	17,856	16,724
Balance population	Lakhs	6.18	7.24	8.40
Consumers per connection	Number	10	10	10
Possible consumers	Number	61,838	72,416	83,985
Total consumers	Number	79,506	90,272	100,709
Conversion to COE consumers	%	42%	62.0%	95.0%
Domestic Paying Consumers	Number	33,581	55,969	95,674
Other consumers	Number	19,350	19,389	19,428
Grand total consumers	Number	52,931	75,357	115,101
Incremental consumers	Number		6,295	14,349
Ratio of possible to total consumers	%	67%	83%	114%
Average Revenue per consumer	Rs./Year	2,029	2,594	3,345
Total Revenue	Rs. Lakhs	1,073.74	1,954.91	3,850.33

The above table assumes that the volume of water production would be increased by about 45 MLD which shall be sufficient to service demand at tap for the expanded consumer base by the year 2015.

### 8.1.3. Projected Sewage Services Business

The sewage business is also projected in the similar procedure as in the case of water detailed in the previous section and the projections are shown in the following table. The assumptions specific to the sewage business are:

- Incremental coverage to increase by 10% post implementation of the sewerage scheme proposed in CDP.
- Average connection charges assumed at say Rs 1,500 per consumer.

**Table 32 - Projected Sewage Services Business**

Parameter	Unit	Mar-07	Mar-11	Mar-15
No of connections	Number	32,721		
Incremental connections	Number	272		
Population covered	%	35%		
Incremental coverage	%		10%	10%
Cumulative coverage			60%	100%
Population covered	Lakhs		5.95	10.91
Possible consumers	Number		90,272	100,709
Possible consumers	Number	79,506	90,272	100,709
Actual consumers	Number	32,721		
Coverage	%	41%		
% of inc conversion	%		8%	2%
% of Proj Coverage	%		61%	79%
Actual consumers	Number		55,206	79,717
Incremental consumers	Number		8,047	4,109
Year-on-year increase	%		10%	10%
Average revenue	Rs.Lakhs	63.48	84.68	123.98
Average Connection charges	Rs.Lakhs	1500	120.70	61.64
Total	Rs.Lakhs		205.38	185.62

#### 8.1.4. Other Income and Expenditure Heads

Based on past trends, as well as discussions with experts and PHEO, the following assumptions were made for projecting Other Income and the various expenditure heads.

**Table 33 – Assumptions for Other Income and Expenditure Heads**

Parameter	Mar-08	Mar-11	Mar-15
Other income	2%	2%	2%
Expenditure assumptions			
% increase			
Treatment costs	5%	5%	5%
Electricity	5%	5%	5%
Employee costs	5%	5%	5%
R & M	5%	5%	5%
Management contract fees	15%	15%	15%
Capitalisation			
Emp	15%	15%	15%
R&M	15%	15%	15%
Collection efficiency	55%	75%	95%

It can be seen above that the electricity costs are projected at only 5% annual growth rate on the base year of 2006-07 even though in reality the electricity costs would increase over 15% per year both due to increased demand and inflation. The lower rate of increase assumed is due to the possibility of significant savings in electricity costs by introducing energy audits and conservation measures.

The projected Receivables position over the period is as follows.

**Table 34 - Projected Receivables Position**

Receivables Rs. Lakhs	Mar-08	Mar-11	Mar-15
Opening Balance	1,026.20	795.46	378.97
Demand	1,296.98	2,039.60	3,974.31
Collection	1,277.75	2,126.29	4,135.62
Closing Balance	1,045.43	708.76	217.66

### 8.1.5. Capital Expenditure

Based on the discussions with PHEO and as per the CDP document, the capex required for WS and SS has been projected and presented in the following table.

**Table 35 - Projected Capital Expenditure – Phasing and Funding**

Category	Assumptions	Mar-08	Mar-09	Mar-10	Mar-11	Mar-15
CAPEX		Rs. Lakhs				
<b>Water supply</b>						
Grant - GoI	80%					
Grant - ULB	0%					
Grant - GoO	0%					
Balance as loan	20%					
Project cost	69,126					
Grant	55,301					
Loan	13,825					
Expenditure phasing		9,988	15,025	12,095	15,383	
Grant		7,990	12,020	9,676	12,306	
Loan		1,998	3,005	2,419	3,077	
<b>Sewage services</b>						
Grant - GoI	80%					
Grant - ULB	0%					
Grant - GoO	0%					
Balance as loan	20%					
Project cost	75,423					
Grant	64,447					
JBIC Loan	9,978					
Other Loan	998					
Expenditure phasing		17,776	16,208	21,921	19,517	
Grant		16,230	13,666	18,237	16,314	
Loan		1,547	2,542	3,684	3,203	

It is assumed that 80% of the Capital expenditure will be in the form of grant from the Government of India. It is assumed that the expenditure gap, if any, will be funded by financial institutions to be identified.

In the case of SS for the balance 20% of expenditure, 10% is assumed to be a loan from JBIC and the balance from other financial institutions (“FIs”) to be identified.

### 8.1.6. Loans

The current loan repayment schedule (as set out in the capital structure) is as follows.

**Table 36 - Loan Schedule – Opening Balance Sheet Loans**

		Mar-08	Mar-09	Mar-10	Mar-11	Mar-15
Opening Balance		8,701.49	7,831.34	6,961.19	6,091.04	2,610.45
Additions						
Repayment		(870.15)	(870.15)	(870.15)	(870.15)	(870.15)
Closing Balance		7,831.34	6,961.19	6,091.04	5,220.90	1,740.30
Interest	8%	661.31	591.70	522.09	452.48	174.03

The loan details for WS and SS capex are given below. Loans from FIs are currently assumed at 8% interest with 2-year moratorium in repayment of principal and an 8-year repayment schedule. Interest is payable from the date of disbursement of the loan.

As far as the JBIC loan is concerned, the interest rate is 0.75% (as per discussions with PHEO) with a 10-year moratorium on principal and 30-year repayment. Interest is payable from the date of disbursement of the loans.

**Table 37 - Capex Loan Schedule**

Category	Mar-08	Mar-09	Mar-11	Mar-15
CAPEX - Loan	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
<b>Water supply</b>				
Loan				
Opening Balance		1,997.60	7,421.60	10,337.75
Additions		3,005.00	3,076.60	
Repayment			(375.63)	(1,478.45)
Closing Balance	1,997.60	5,002.60	10,122.58	8,859.30
Interest	179.78	315.01	789.49	863.87
<b>Sewage services</b>				
Closing Balance	1,289.60	3,614.60	9,978.27	9,978.27
Interest	9.67	18.39	63.83	74.84
Loan Terms - Others				
Interest Rate				
Loan				
Opening Balance		257.20	729.38	780.82
Additions		216.58	268.44	-
Repayment			(21.66)	(74.06)
Closing Balance	257.20	473.78	976.16	706.76
Interest	23.15	32.89	76.75	66.94

### 8.1.7. Return on Equity

As per the prevalent practice in the infrastructure sector, a Return on Equity is proposed to be included in the tariff (or user charges) to ensure that the utility has adequate internal

resources to meet cash flows and seed future capex. However, given that the business is still dependent on the GoO for subsidy, the Return on Equity is frozen at 16% of Rs.3729.21lakhs of equity level from GoO as per the Opening Balance Sheet

## 8.2. Projected Financial Statements

Given the above assumptions, the Profit and Loss account of the new corporatised business managed by the CoE is as follows.

**Table 38 - Projected Profit and Loss Account – FY 2008 to FY 2015**

Year Ending	Mar-08	Mar-11	Mar-15
<b>Income</b>	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
Revenue from Water Charges	1,230.33	1,954.91	3,850.33
Revenue from Sewerage Services	66.65	84.68	123.98
Connection Charges	159.66	309.56	492.10
Other Income	139.03	147.54	159.70
Subsidy	3,749.48	4,111.96	3,119.95
Total	5,345.15	6,608.64	7,746.06
<b>Expenditure</b>			
Treatment Costs	210.31	243.45	295.92
Electricity	1,377.16	1,594.24	1,937.81
Employee Expenses	563.32	652.11	792.65
Less: Expense Capitalised	(84.50)	(97.82)	(118.90)
Net Employee Expenses	478.82	554.29	673.75
Repairs & Maintenance	1,135.37	1,314.33	1,597.58
Less: Expense Capitalised	(170.31)	(197.15)	(239.64)
Net Repairs & Maintenance	965.06	1,117.18	1,357.94
Total O & M Expenditure	3,031.35	3,509.17	4,265.42
Management Contract Fees	454.70	526.38	639.81
EDBITA	1,859.09	2,573.10	2,840.82
Depreciation	388.50	593.88	1,064.48
EBIT	1,470.59	1,979.22	1,776.35
Interest	873.92	1,382.55	1,179.68
PBT	596.67	596.67	596.67
Tax	-	-	-
PAT	596.67	596.67	596.67

**Table 39 - Projected Balance Sheet – FY 2008 to FY 2015**

<b>Balance Sheet</b>	Mar-08	Mar-11	Mar-15
Gross Block	16,559.08	23,999.46	41,360.37
Less: Acc.Depreciation	(5,366.45)	(7,049.50)	(10,547.90)
<b>Net Block</b>	<b>11,192.63</b>	<b>16,949.96</b>	<b>30,812.46</b>
Capital Work in Progress	3,544.40	14,033.90	-
<b>Current Assets</b>			
Inventory	283.84	328.58	399.39
Receivables	1,045.43	708.76	217.66
Cash & Bank Balances	47.09	855.04	130.40
Advances	46.94	54.34	66.05
<b>Total Current Assets</b>	<b>1,423.31</b>	<b>1,946.73</b>	<b>813.52</b>
<b>Current Liabilities</b>			
O&M Payable	273.85	317.01	385.33
Rep & Main Payable	94.61	109.53	133.13
Other Refundable Deposits	90.25	90.25	90.25
Addnl Cash from GoO	-	-	1,230.04
<b>Total Current Liabilities</b>	<b>458.71</b>	<b>516.79</b>	<b>1,838.75</b>
Net Working Capital	964.60	1,429.94	(1,025.24)
<b>NET ASSETS</b>	<b>15,701.63</b>	<b>32,413.81</b>	<b>29,787.23</b>
Financed by			
<b>Loan from Government</b>	<b>11,375.74</b>	<b>26,297.90</b>	<b>21,284.63</b>
Grant	-	-	-
<b>Equity From Government</b>	<b>3,729.21</b>	<b>3,729.21</b>	<b>3,729.21</b>
Reserves and Surplus	596.67	2,386.69	4,773.39
<b>TOTAL</b>	<b>15,701.63</b>	<b>32,413.81</b>	<b>29,787.23</b>

**Table 40 - Projected Cash Flow Statement – FY 2008 to FY 2015**

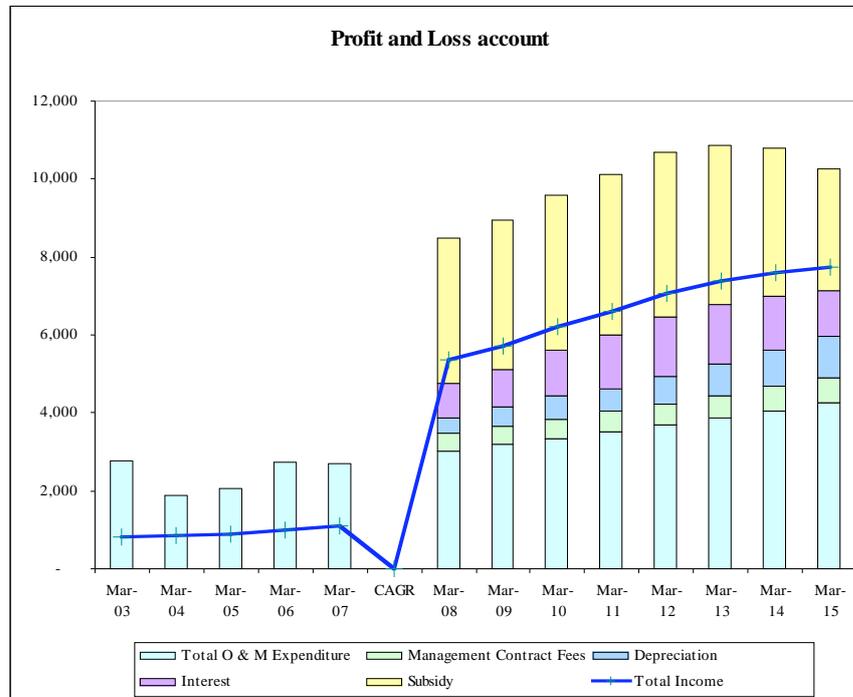
Parameter	Mar-08	Mar-11	Mar-15
Inflows	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
EBITDA - Tax	1,859.09	2,573.10	2,840.82
Loans - capex	3,544.40	6,280.03	-
Grant for Capex	24,220.09	28,620.17	-
<b>Total Inflows</b>	<b>29,623.58</b>	<b>37,473.30</b>	<b>2,840.82</b>
Outflows			
Capex	27,764.49	34,900.21	-
Debt Service			
Interest	873.92	1,382.55	1,179.68
Repayment	870.15	1,267.43	2,422.66
Changes in Net working capital	198.34	(88.78)	(761.51)
<b>Total Outflows</b>	<b>29,706.89</b>	<b>37,461.41</b>	<b>2,840.82</b>
Net Incremental cash flows	(83.31)	11.88	-
Opening Cash Balance	130.40	843.15	130.40
Closing Cash Balance	47.09	855.04	130.40

### 8.3. Financial Statements – Analysis

#### 8.3.1. Overview of Finances

The following chart analyses the projected P&L Account in terms of projections of costs and revenue.

Chart 5 - Profit and Loss Account



The sharp increase in revenue between the years 2007 and 2008 is due primarily to the increased pace of growth in consumers and the increase in tariffs.

#### 8.3.2. Net Cash Impact on Government

Table 41 - Projected Cash Flow Statement – FY 2008 to FY 2015

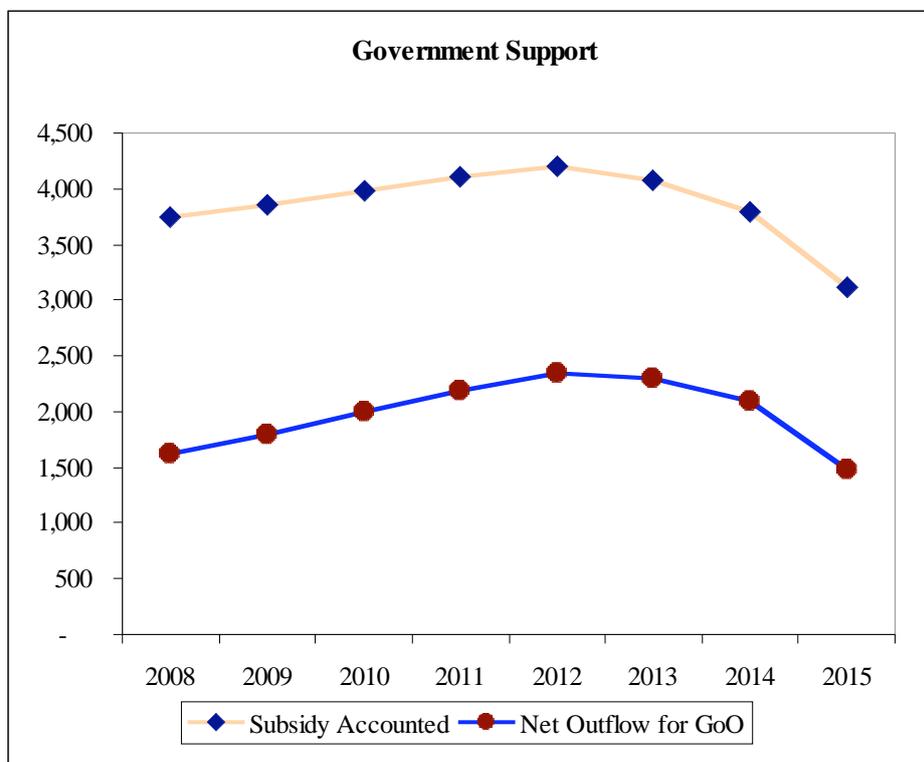
Cash outflow for GoO Rs. Lakhs

Parameter	Mar-08	Mar-11	Mar-15
Subsidy Accounted	3,749.48	4,111.96	3,119.95
Less: Return Earned	596.67	596.67	596.67
Less: Interest Earned	661.31	452.48	174.03
Less: Loan Repaid	870.15	870.15	870.15
Add: Cash support	-	-	-
Net Outflow for GoO	1,621.34	2,192.65	1,479.10

As per the projected improvement in COE's business, the above table shows the net impact on the Government in terms of inflows and outflows. It can be seen that as the efficiency improvements take hold and the cumulative impact of the tariff increases is felt, the Government net flow starts tapering off. It should be noted that the return

earned is shown as an inflow for GoO, although it strictly would be for BMC. However, to the extent that GoO support to BMC would be less, it has been set off accordingly.

**Table 42 - Projected Government Support– FY 2008 to FY 2015**



#### **8.4. Subsidy Analysis**

The subsidy commitments required from GoO are analysed below in two scenarios the first being Business as Usual where in PHEO continues to operate at the present level of efficiency and the second scenario being CoE with Changed Management operating at aggressive improvement as projected in the previous section.

##### **8.4.1. Scenario 1 – Business as Usual**

Growth of the business in the context of ‘business as usual’ is projected based on the following assumptions:

- Coverage continues to remain at the current level of 42% for the increased population.
- Number of consumers added per year is approximately 1,000 based on the past trend.
- Losses would continue at the present level even though it is likely that there would be further increases with continued deterioration of the assets.
- Collection efficiency would gradually increase considering the recent efforts by the management of the PH II Rent Division.
- Tariff increase at 5% year-on-year.

- Rate of growth of other consumers such as Commercial, Government - Domestic, Industrial, etc. is based on the past growth trend.

**Table 43 - Scenario I (Business as Usual) – Results**

**Scenario I**

Business as usual	Mar-08	Mar-11	Mar-15
No of consumers added is ~1000 per year and unaccounted losses at same level			
Revenue from Water Charges	1,140.61	1,391.62	1,797.86
Subsidy	3,937.32	4,844.25	5,568.38
Total Revenue	5,345.15	6,608.64	7,746.06
EBDITA	1,859.09	2,573.10	2,840.82
EBIT	1,470.59	1,979.22	1,776.35
PBT	596.67	596.67	596.67
PAT	596.67	596.67	596.67
DSCR	0.94	1.03	1.27
Outflow for GoO	1,809.18	2,924.95	3,927.52
Total outflow for GoO			24,069.42

**8.4.2. Scenario 2 – Efficiency Improvement by COE Management**

In the ‘aggressive’ scenario, growth in the business is projected based on the following assumptions:

- Coverage increases from 42% to 95% by the year 2015 for the increased population.
- Number of consumers added per year would be over 5,000 due to reforming the connection policies, streamlining and simplifying the procedures, and introducing aggressive connection campaigns.
- Losses would be reduced from the present level of 45% to 22% by the year 2015 by introducing improved operating practices for reduction of non-revenue water and introduction of active leakage control methods coupled with prudent asset management practices.
- Collection efficiency would gradually increase to 95% by introduction of incentives and streamlining of the billing and collection systems.
- Tariff increase at 8% year-on-year in line with the JNNURM reform agenda and also considering gradual improvement in service levels and customer services.

**Table 44 - Scenario II Improved efficiencies by COE Management**

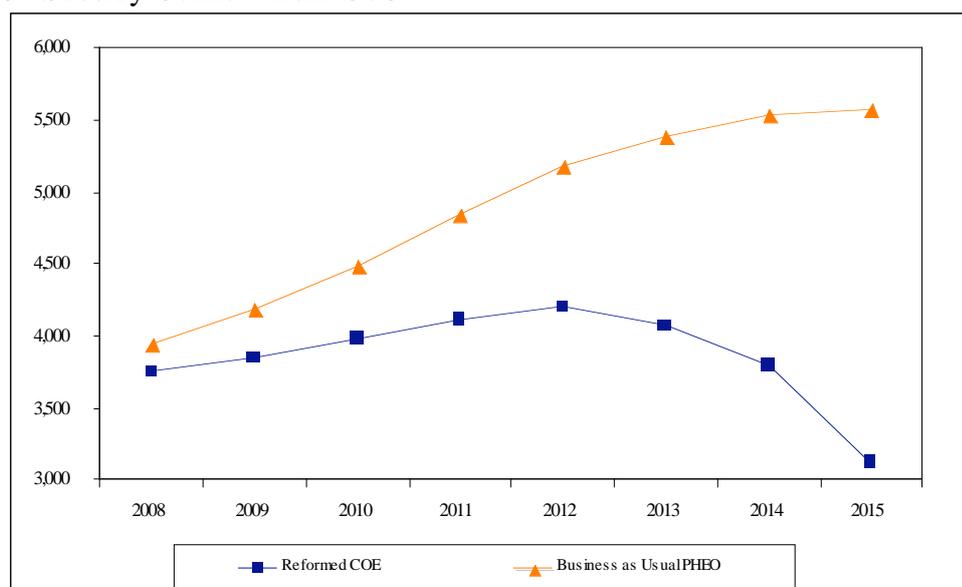
### Scenario 2 - CoE Changed Management

Parameter	Mar-08	Mar-11	Mar-15
Revenue from Water Charges	1,230.33	1,954.91	3,850.33
Subsidy	3,749.48	4,111.96	3,119.95
Total Revenue	5,345.15	6,608.64	7,746.06
EBDITA	1,859.09	2,573.10	2,840.82
EBIT	1,470.59	1,979.22	1,776.35
PBT	596.67	596.67	596.67
PAT	596.67	596.67	596.67
DSCR	0.94	1.03	1.27
Outflow for GoO	1,621.34	2,192.65	1,479.10
Total outflow for GoO			15,801.28

The following table and graph projects the impact on the GoO subsidy for the two scenarios.

**Table 45 - Subsidy Outflow Under the Two Scenarios**

**Chart 6 - Subsidy Outflow from GoO**



From the tables above and the chart, it can be seen that by introducing water sector reforms there would be a significant reduction in subsidy levels for GoO, which would amount to over Rs.90 crores in a span of eight years. These projected reductions in subsidy would continue into the future. The net gain of about Rs.30 crores annually can be reinvested in other social sector infrastructure such as housing, education and livelihoods for urban poor. While GoO gains in terms of freeing up precious financial resources, the customers would benefit from improved water services leading to improved public health. The PHEO employees would also gain from better management autonomy and an improved working environment coupled with incentives for higher performance.

## 9. Transfer of Business Undertaking to BMC

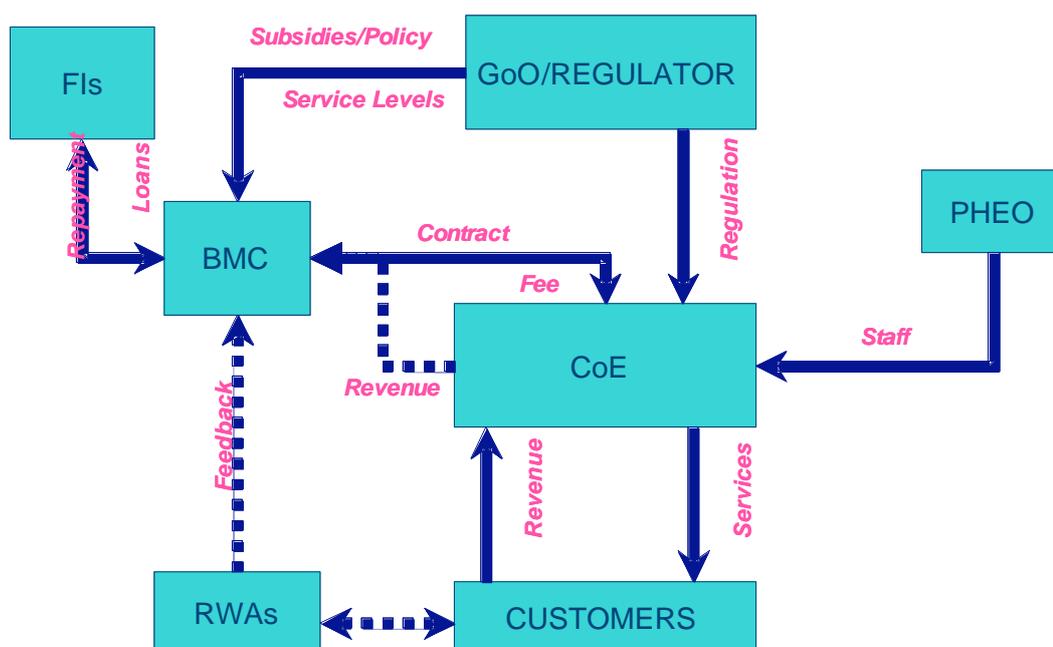
As per the agreed reform agenda under JNNURM, it is planned that the existing PHEO WS and SS undertaking (assets, liabilities, rights, claims, proceeding, etc.) would be transferred to BMC for a certain consideration as mutually agreed between GoO and BMC. To this effect BMC needs to equip themselves with the capability of improved financial and contract management skills.

As a preparatory requirement, GoO would initiate ring fencing of all accounts pertaining to water and sewerage services in Bhubaneswar city within PHEO. This measure in the short term would facilitate better financial control, monitoring and facilitates the improved availability of financial and operation information for the decision makers.

It is anticipated that GoO will initiate the steps necessary to set up the corporate operating entity (COE) to manage the business of WS and SS using the assets transferred to BMC. GoO can offer a stake in the COE to BMC, as appropriate. COE would be accountable to BMC in providing the services of WS and SS in the city of Bhubaneswar with appropriate service level standards and benchmarks agreed between two parties based on the initial baseline service levels.

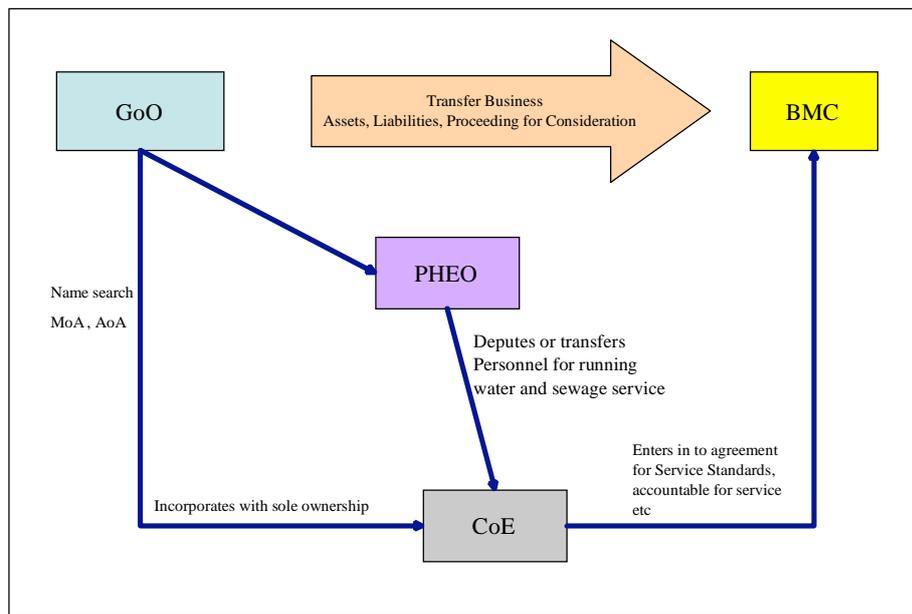
The COE would be given a performance based management contract in order to operate and maintain autonomy and be able to propose capital expenditures needed for the business. The capital expenditures would be on the books of BMC only. The reformed structure of water services shall be as depicted in the following figure.

**Figure 9 - Corporatised Water Services Business for Bhubaneswar City**



The process of transfer, creation and operationalisation is shown below.

**Figure 10 - Process for Transfer, Creation and Operationalisation of COE**



The implementation of the transfer and drawing up of the management contract is as follows:

- GoO transfers business undertaking to BMC (assets, rights, liabilities, claims, etc.).
- GoO would set up the COE under the Companies Act.
- GoO deposes or transfers the present personnel from PHEO to COE and also provides for hiring new management and the necessary financial skills from the market.
- COE to manage the WS and SS business for Bhubaneswar City.
- Delegated management contract drawn up for COE for setting service standards, operations cost, subsidy, etc.
- COE given time for verification and finalisation of base numbers, including:
  - Consumers, service levels, flows and losses
  - Identification and enumeration of assets and liabilities (fixed assets, inventory, receivables, advances, payables, claims, etc.).
  - Verification and finalisation of financial flows.
  - Identification of employees to be taken over or on deputation from PHEO.

### ***9.1. Step 1 – Transfer of WS and SS to BMC***

Usually de-mergers or mergers affect the rights and claims of creditors and require elaborate transfer mechanisms to ensure such rights and claims are not violated. In common jurisprudence, such schemes are usually taken through the court to ensure that creditors are given the chance to review the schemes and ensure their rights are suitably safeguarded.

Governments, while corporatising their activities, follow the powers vested in statutes (special or general acts) and place the schemes in public domain (including

the floor of assembly) to ensure that de-mergers are comprehensive in safeguarding the rights of all stakeholders.

GoO will prepare a transfer scheme, which transfers the business undertaking. The framework is as follows:

- (a) Preamble – purpose and objective of the scheme (in this case, following the mandates of the 74<sup>th</sup> Amendment of the Constitution of India and GoI's JNNURM).
- (b) Defining the undertaking – area of operations, nature of operations, statutes governing operation, any special covenants (say safeguards of employee rights).
- (c) Detailing of Balance Sheet line items – assets, liabilities, rights, claims, proceedings, etc. (details and numbers to be provided in separate schedules).
- (d) Consideration to be paid by BMC – defined under the Capital Structuring in the Balance Sheet
- (e) Provisional period - allows for verification and corrections, if any.

Some of the important issues to be addressed are:

- State Government to get a legal opinion as to under the provisions of which Act the transfer of the undertaking is to be done. This needs to be vetted by legal experts.
- Some of the covenants of transfer could be that CoE during the one-year provisional period:
  - prepares a detailed Asset Register with valuation from a Chartered Valuer; and
  - similarly enumerates, values, and verifies all other items of the Balance Sheet. State Government, at the end of the provisional period, notifies the final transfer values.

### ***9.2. Step 2 – Setting Up of COE***

Simultaneously, GoO can formalise and set up a corporate operating entity. The actions to be taken are:

- a. Define the objectives to be carried out by the new COE – generally this decides the nature of the entity and the form it would take (private or public limited, nature of capital needed, etc.).
- b. Develop the Memorandum and Articles of Association (once the objectives are defined, the rest can be taken from standard documents).
- c. Carry out name search.
- d. Identify the initial signatories to the documents (such as Secretary H&UD, Municipal Commissioner, etc.).
- e. Initial seeding of the company – authorised capital and issued capital necessary to form the shell (equity to be held by GoO with or without the participation of BMC).
- f. Registration of company (after the payment of necessary fees).

### ***9.3. Step 3 – Transfer Scheme Notification***

On successful completion of Step 1 and 2 above, the transfer scheme is notified and becomes effective. This also ensures that the business is carried on by the new entity from the appointed date.

COE draws up an action plan to carry out certain specific activities in verification and finalisation of the transferred Balance Sheet. As per our experience in similar situations, GoO should consider forming special focus committees to ensure that the verification and valuation is carried out within the designated time period.

#### ***9.4. Step 4 – Business Plan for COE-managed WS and SS for Bhubaneswar City***

Business Plan for the new WS and SS business transferred from GoO needs to be finalized. This would ensure that the new business functions in the way GoO expects at the same time defining the outer limit(s) on the subsidy. Of course, there could be adjustments for situations beyond the control of the appointed operator. These can be identified and adjustment functions defined ex-ante.

This activity would cover:

- Definition of business (2215 head with exclusion of 2509 or 2216 heads of activities).
- Assumptions for the business, including:
  - Consumer growth, performance standards;
  - Water accounting (intake, losses – technical, commercial, sale);
  - Operations – electricity, employees, repairs & maintenance;
  - Current assets & liabilities;
  - Loan liability; and
  - Capital expenditure – grants, loans, including JBIC terms & conditions.
- Exogenous tariff setting parameters.

Further, alternate scenarios to the business plan also need to be finalised. This would give an indication of the floor and the ceiling of critical parameters like subsidy or tariff setting, etc.

#### ***9.5. Step 5 – Staffing of COE***

GoO, in consultation with the CE, PH(U), deputed or transfers the required personnel from the PHEO. The CoE would independently hire the new management and required financial skills from the open market for carrying out the business of WS and SS services in the City of Bhubaneswar.

#### ***9.6. Step 6 – Management Contract for COE***

Based on the Business Plan and the agreed management fees, a detailed management contract needs to be drawn up for COE to ensure that it is able to work autonomously. This cannot be a simple MoU, but an elaborate contract setting out the terms and conditions along with:

- a. Definition of the right of use of assets.
- b. Service conditions to be fulfilled.

- c. Operational efficiencies to be improved.
- d. Monitoring documents to be submitted to BMC and GoO.
- e. Fee calculation and disbursement proceeds.
- f. Termination clauses.
- g. Arbitration and resolution of disputes.

## 10. Statute and Organisation Arrangements of the COE

### 10.1. Statute

The CoE will be governed by the Companies Act, 1956, as amended from time to time, which defines the type and form of the company, governance rules, method of maintaining accounts, financial responsibilities etc. This would, *inter alia*, include:

- Definition of the purpose of the Company (corporatised entity) in its Memorandum and Articles of Association.
- Limited liability of the Company's shareholders to the extent of the share capital contributed by them.
- Nature of the company – Government owned and a Public Sector Enterprise.
- Governance of the Company by a board of directors – usually includes a certain number of independent directors to ensure higher corporate governance standards.
- Roles and responsibilities of directors, as defined under various sections and precedents.
- Interactions with stakeholders like creditors, public, Government, etc.
- Transparency requirements in operations (arms length transactions).
- Reporting of transactions in which directors or shareholders involved.
- Accrual accounting.
- Financial reporting of its activities in the public domain.

#### 10.1.1. Organisational Structure

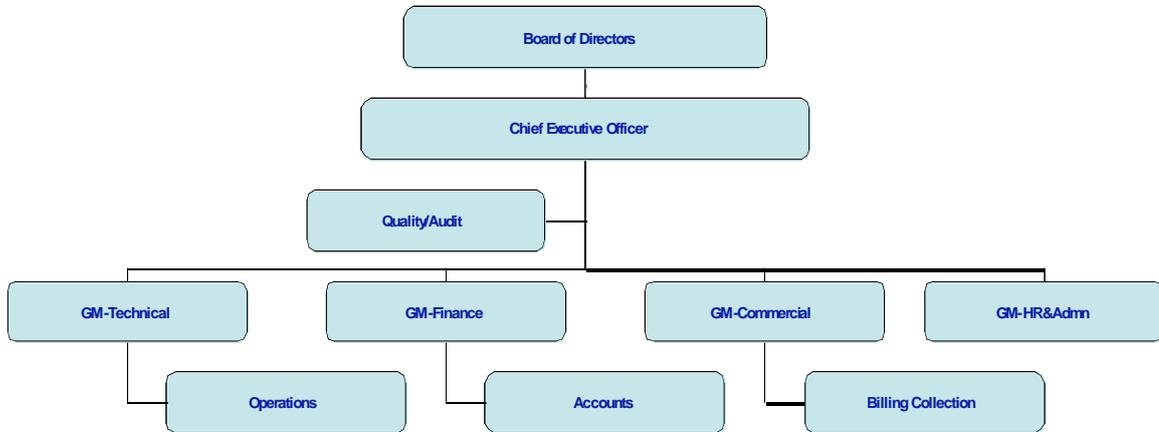
The current structure of PHEO's Head Office (Chief Engineer's Office), Divisions, Sections, etc. for the provision of services to consumers is very useful as a starting point. Similarly, PHEO's practice of having design separate from operations is also useful in achieving better efficiency.

Thus, no major re-organisation is required, except in a couple of functions. First, the Finance and Accounts function would require the appointment of a professional to head it at the corporate level, and similarly the Divisions would need to be strengthened with trained professionals.

Second, the Commercial function needs to explore improving the systems and procedures for metering, billing, collections, reduction of non-technical losses, tariff rationalisation, etc.

The following diagram set out the suggested structure at the corporate level.

**Figure 11 - Organisation Structure of COE**



The board of directors can be constituted with representation from GoO and BMC, with one or two independent directors to improve corporate governance. The board is assisted by a Chief Executive Officer (“CEO”) to run the operations on a day-to-day basis.

The CEO is assisted by General Managers, who look after the Technical, Commercial, Financial and Human Resources and Administration functions. The Divisions and Sections would be restructured with newly defined responsibilities, tasks, work programs and incentives.

### **10.1.2. Roles, Responsibilities and Accountability of COE**

COE will undertake to run the business of water supply and sewage services in the City of Bhubaneswar under a management contract with BMC to be regulated by GoO . This will include:

- Planning of services in consultation with and under the guidance of BMC.
- Co-ordination in capital projects execution with OWSSB.
- Executing other capital projects being executed by PHEO in the City of Bhubaneswar.
- Setting up of commercial systems and procedures for efficient operations covering – metering, billing, and collection, along with measures for reducing commercial losses such as verification of consumer connections, detecting illegal connections and their regularisation, etc.
- Setting up of accounting and financial systems to properly capture the transactions that reflect the true operations of the COE.
- Institute HR functions to look into the requirements of skills training and organisational learning to ensure that the entity operates in a commercially viable manner.
- Operations to be carried out in a fashion that ensures meeting of service standards agreed with BMC.
- Financial management to work within the budget agreed ex-ante with the GoO and as set out in the management contract.

## 11. Implementation Plan

All the activities highlighted above are listed in the following MS project plan, which shows that it requires approximately 601 days for implementation

Table 46 - Implementation Plan

D	T	D	S	F
1	M	P	0	0
2	F		0	0
3	D	M	5	0
4	1		0	0
5	1		2	0
6	4		0	0
7	T	h	0	0
8	1		0	0
9	2		0	1
0	3		0	0
1	2		0	0
2	1		0	0
3	0		0	0
4	1		0	0
5	1		0	0
6	1		0	0
7	3		0	0
8	3		2	0
9	3		2	0
0	3		0	0
2	D		0	0
2	4		0	0
2	1		2	0
2	1		3	0
2	1		0	0
2	4		0	0
2	1	6	0	0
2	4		0	0
2	1		0	0
0	4		0	0

Contd...

D	T	D	S	F
3	5	0	0	0
2	5	4	0	0
3	5	0	0	0
3	5	0	0	0
5	5	0	0	0
6	1	6	2	0
3	5	6	0	0
8	5	0	0	0
9	5	0	2	0
0	5	5	0	0
4	1	6	0	0
2	5	6	0	0
3	5	0	0	0
4	5	0	0	0
5	5	2	0	0
6	5 n	0	0	0
7	5	6	0	0
8	5	0	0	0
9	5	0	0	0
0	1	5	2	0
5	5	6	0	0
2	6	5	0	0
5	6	2	0	0
6	6	0	0	0
5	6	6	0	0
6	5	6	0	0
3	7	5	0	0
8	7	5	0	0
9	1	2	0	0
0	4	6	0	0

## **Appendix A            Terms of Reference to the Study**

### **USAID-Financial Institutions Reform and Expansion Project - Orissa State Water Reform**

#### **Terms of Reference for undertaking Institutional and Financial Due-Diligence and preparation of Corporate Business Plan for setting up a Corporatised Operating Entity for managing the water and sewerage Services in three cities of Orissa State.**

**Background:** Orissa State faces the combined challenge of relatively low household incomes, a large number of small towns and villages, very weak capacity at municipal level to provide water and sanitation services, and relative to most other Indian states, a low percentages of the population covered by water and sanitation services. Currently, financial operating losses of the water systems in the state are large. For example in Bhubaneswar, it is estimated that the cost of a cubic meter of water is approximately Rs.3.5, while the price charged is only Rs.1.5. The actual cash realized from customers would even be less than that, indicating a rather large operating loss, over Rs.70 crore (about \$15.2 million) per annum for the water sector.

Under the 74<sup>th</sup> Constitution Amendment, the state is required to decentralize local water and sanitation services to municipalities. The Government of Orissa has issued a reform notification consistent with the decentralization requirement and also in tune with the JNNURM reform agenda. Under this notification, state-owned water and sewerage assets have to be transferred to municipalities. The notification also envisions devolving revenues of municipal utilities to the municipalities, turning over investment responsibilities to local governments, and use of contracts to provide services.

The Government of Orissa has expressed an interest in carrying out a statewide reform of the urban water and sanitation sector. One reform objective is to improve the quality of water and sanitation services in the state. A second objective is to implement the policy of municipal service decentralization. USAID's FIRE D Project has been assisting the GoO in examining options for reform.

Decentralizing services to the municipal level presents a serious problem related to operation of water and sewerage assets. Presently, the Public Health Engineering Organization (PHEO), a state government department, provides services and manages most municipal water and sewerage systems. To decentralize, the state needs to decide the future role of PHEO, local governments and state financial support to cover the capital and operating subsidies to municipal water utilities. These decisions will be most effective if they are part of a well-designed reform initiative.

In addition, PHEO's ability to improve the performance of the water services as a state government department is limited unless some fundamental changes in organization, responsibilities and corporate governance are made. For example, PHEO has limited authority to eliminate illegal connections. Today, municipal utilities have low coverage, high levels of non-revenue water, and low bill collection rates. A large proportion of expenditure is to pay for electricity bills that now subsidized by the State. There is clearly a need to reform both at the level of the state's relationship with municipalities, and in the way municipalities manage water and sanitation services. In the entire service delivery regime, there is little accountability to the customer or the municipality.

Following discussion with USAID representatives under the FIRE D Project, the state has tentatively decided to continue a state water sector reform program. The tentative decision of the Government is to start with piloting in Bhubaneswar, Cuttack and Puri Municipal Corporations, which are committed to reform agenda under JNNURM. The rationale for starting with these

cities is that the level of technical competence would be high compared to other municipalities, and the ability of the public to pay for improved services is higher than in other areas of the state.

### ***Objectives***

The objectives of this activity include the following:

- Enable the state to implement decentralization of water and sanitation services;
- Set up incentive-based operating contracts between the state and a properly corporatized and commercialized division of PHEO. This will help PHEO transition from being a state department to a commercialized service provider.
- Improve the performance of the Bhubaneswar water and sewerage system through incentive based operating contracts. Over the long term, this will make the water system sustainable, and will free resources for development of sewerage collection and treatment.
- Based on the lessons learnt from the pilots, it will be replicated in other municipalities in Orissa.

The reform program would have six main elements. These include:

1. **Establish Orissa Water Utility Corporation (OWUC) under PHEO to provide operating services.** This would allow PHEO to formalize and commercialize its operating contract services, and would serve as a basis for signing a contract between OWUC and the pilot cities of Bhubaneswar, Cuttack and Puri Municipal Corporations.
2. The respective Municipal Corporations would **own the water and sewerage assets and would enter into a contract with the OWUC.**
3. **The OWUC would manage the water and sewerage services in the city of Bhubaneswar, Cuttack and Puri on say 5-year renewable performance based management contract between the Municipal C and GoO.**
4. **GoO would depute staff working in the PHEO on an initial basis and OWUC and staff could mutually develop a transfer framework.**
5. **The state would pay a declining operating subsidy to help the respective Municipal Corporations to cover the operating costs of water and sanitation services.** Currently the state pays a large portion of the operating and capital costs of municipal water and sanitation services. In the pilot cities, the state would offer a declining subsidy for operating costs over, for example a 7-year period. During this period, the operating contract would result in an improvement in performance of the utility, leading to increasing revenues that can cover operating costs.
6. A final element would be a program to **expand water and sanitation services into under-served slum areas of Bhubaneswar City.** The reform program would design a set of pilots that would extend services on a sustainable basis, using cost-reflective prices and service models designed specifically for the poor. The state could seek financial support for pilots from international donor and NGO agencies that are interested in pro-poor water and sanitation services.

### ***Specific Assistance from FIRE D Project:***

1. Assistance in preparing the reform plan, including the corporatization of the PHEO Water Utility, and development of pilots in Bhubaneswar, Cuttack and Puri.

2. Assistance in corporatizing the PHEO Water Utility, including preparation of business plan, corporatization plan and service model.
3. Assistance in designing and negotiating the operating contract between the Municipal Corporations and the Water Utility Corporation.
4. Assistance in the design of the state financial restructuring plan, including design of the declining operating cost support component.
5. Assistance in designing and executing one or two pilot services for the poor activities using sustainable and commercialized pricing and service delivery methods and identifying interested donors .

### ***Expected Results***

The activity will achieve the following results:

1. Corporatization and establishment of a state-owned Water Utility Corporation.
2. An operating contract between the OWUC and the respective Municipal Corporations.
3. Implementation of a financial restructuring plan that will phase out state subsidies for operating costs of local water and sanitation services.
4. The state intends to replicate this model with other municipalities once its viability is demonstrated.
5. Implementation of one or more pilot expansions of services for poor consumers.
6. The state intends to replicate this model with other municipalities once its viability is demonstrated.

### ***Financial Due-diligence study:***

As part of the assistance from FIRE Project, it is proposed to undertake a detailed financial and institutional due diligence of PHEO and OWSSB in particular to the water and sewerage services in the three cities of Bhubaneswar, Cuttack and Puri which have been included in JNNURM. This is to establish the base line of the financial and human resource status and to prepare a business plan duly estimating the capital funds, declining subsidies and transition arrangements required for enabling instituting a new Corporatised Operating Entity (COE) for managing the service provision in these three cities with appropriate contractual arrangements with the local city municipal corporations. The tasks envisaged under the study are:

### **Task –A**

#### **Baseline Report on PHEO**

- ❑ Undertake due diligence of the water and sewerage services in Bhubaneswar, Cuttack and Puri in Orissa to study the institutional structure, financial management and accountability in urban water and sewerage service provision.
- ❑ Brief details of existing water and sewerage facilities including list of assets in production, transmission, distribution, house service connections, public taps etc.
- ❑ Summary of institutional structure, staff existing (including qualification and experience levels) technical, engineering, operations, administration, accounting, meter reading, billing and collection of income
- ❑ Prepare a summary of key operating functions being undertaken by PHEO and OWSSB in the service provision in the three cities, which could be delineated to a new COE.

- ❑ Review the resources presently expended by PHEO and OWSSB to manage the water and sewerage services in the three cities which could be used to prepare an initial estimated operating resource plan and budget for the new COE.
- ❑ Study of the statutes under which PHEO and OWSSB have been set up, their prime responsibilities, governing rules, organizational structures, reporting protocols etc with reference to the service provision in the three cities.
- ❑ Details of number and cadre of staff, age profile, management structure,, method of recruitment, possibility of secondment to the new COE.
- ❑ Research the historical flow of funds from and State and other funding sources for capital and revenue accounts in the three cities..
- ❑ Identifying the cost centres such as Head Office, Circles and Divisions and mapping historical expenditure, which is attributable to the service, provision in the three cities.
- ❑ Profile of capital development expenditure at each cost centre and under each head of account to be allocated to the three cities.
- ❑ Revenue expenditure on Operations and Maintenance including power costs, chemicals, repairs, maintenance, asset management, and establishment costs, depreciation, contingencies etc attributable to the service provision in three cities.
- ❑ Income streams viz, revenue from water tariffs, charges, sewerage charges, connection charges, security deposits, pro-rata charges if any etc.
- ❑ Present systems of interaction and involvement with ULBs in the three cities.
- ❑ Summary of works under progress and summary of future augmentation and service improvement plans
- ❑ Summary of the present system of regulation by Government, interaction with local bodies, public representatives, community etc.

## **Task B**

### **Corporate and Business Plan**

- ❑ Preparation of institutional reform plan for corporatising the PHEO and setting up a new Corporatised Operating Entity for managing the service provision in the three cities of Bhubaneswar, Cuttack and Puri duly ensuring involvement of the Urban Local Bodies in the service delivery to the citizens.
- ❑ Detailing the statute, organisation structure, roles, responsibilities, and accountability arrangements of the new COE.
- ❑ Preparation of five year business plan including the funding and cost recovery plan for the COE to undertake management of water and sewerage services in the city

The study has to be a rapid assessment of the existing situation based on available data and in case of critical information, which is not available readily, the consultants could make their best estimates duly specifying the degree of reliability of such assumptions. The data re-validation and mid course correction could be undertaken as the assignment progresses.

### **Support by Government of Orissa**

The assignment shall be undertaken under the direct supervision of Fire (DIII) Project team. Full support from Government of Orissa including the urban development department, PHEO, OMWSSB and Municipal Corporations shall be ensured. GoO shall formulate a committee of all stakeholders and experts to review and guide the entire process. GoO shall constitute a project cell by nominating specific officers in each of the departments/agencies concerned as nodal officers for coordinating the study and facilitating supply of data, information documents.

## Appendix B Division Structure

### Division Structure

Division	Subdivision Name	No. of Sections under each Sub-division
PH-I Bhubaneswar	AE, Unit-III	4
	AE, Unit-IV	4
	AE, High Level Tank	4
	AE, Old Town	4
PH-II Bhubaneswar	AE, Palasuni	4
	AE, Sahidnagar	4
	AE, Unit-IX	4
	AE, Rent	4
PH-III Bhubaneswar	AE, Munduli	4
	AE, Ghatikia	5
	AE, CSpur	4
	AE, Khurda	4

Source – PH Divisional Office

### ULBs covered by PH Bhubaneswar Divisions

Division	No. of ULBs covered under the Division	Name of ULBs
PH-I, II & III Bhubaneswar	1	Bhubaneswar
PH-III Bhubaneswar	4	Balugaon
		Banapur
		Jatani
		Khurda

## Appendix C                      Monitoring of Water Quality and Flows

Two kinds of monitoring are done:

### i)            **Water Quality Monitoring:**

Water Quality Monitoring is done by mobile kits available at section office and also at labs. With mobile kits only the amount of chlorine is checked while in labs turbidity and other things are also tested. The monitoring is done to ensure the correct amount of chlorine available at the consumer end. Less than normal amount would be insufficient for disinfection purpose while higher amount would give bad taste to water among other things.

While surface water quality in Bhubaneswar is found satisfactory, the ground water contains high iron content (0.03 to 5.0ppm) and low Ph (4.5 to 8.0) at many locations. The following are some of the present practices being undertaken with regard to water quality surveillance monitoring system:

- Daily testing of water samples from treatment plants and consumer points by PH Laboratory
- Random sampling and testing of water samples by analyst in PH Laboratory
- Testing of FRC, PH & Turbidity at Sub-divisions (test kit is being provided to each Sub-division for the same)
- Testing is also done in a full fledged laboratory with Spectrophotometers facility (helps in testing PH, Turbidity, FRC, Trace metals, BOD and COD)
- Documentation of test results on regular basis
- Installation of gas chlorinator

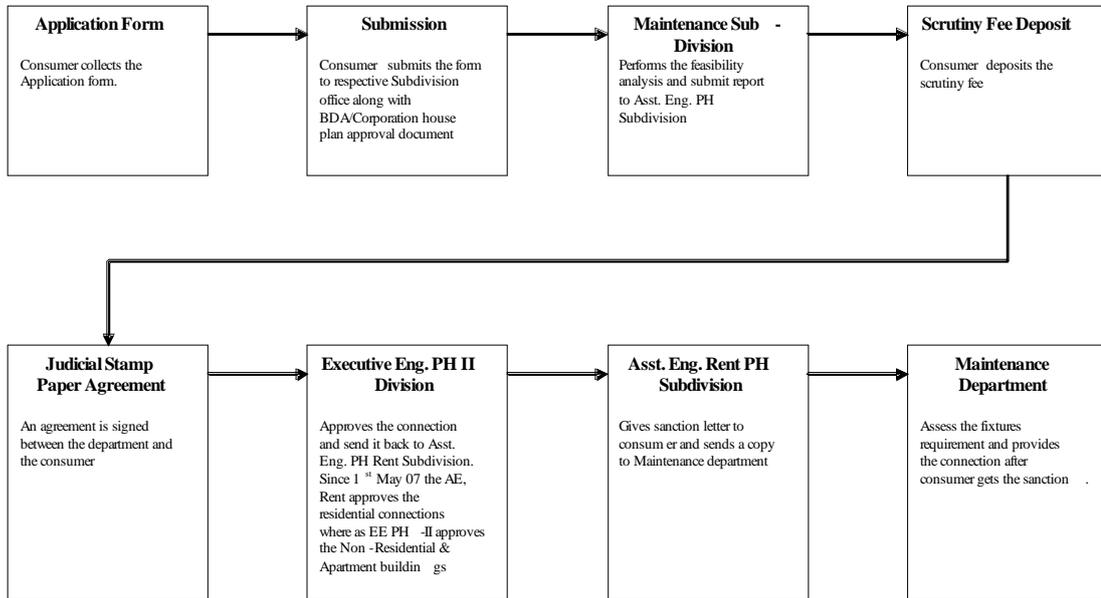
### ii)            **Flow Monitoring:**

Flow monitoring is done with the help of pressure gauges installed on the pipeline. Less than normal pressure would result in people not getting water who are at the end of pipeline. Higher pressure is always preferable to an extent above which there is a chance of leakages in the pipeline due to formation of cracks.

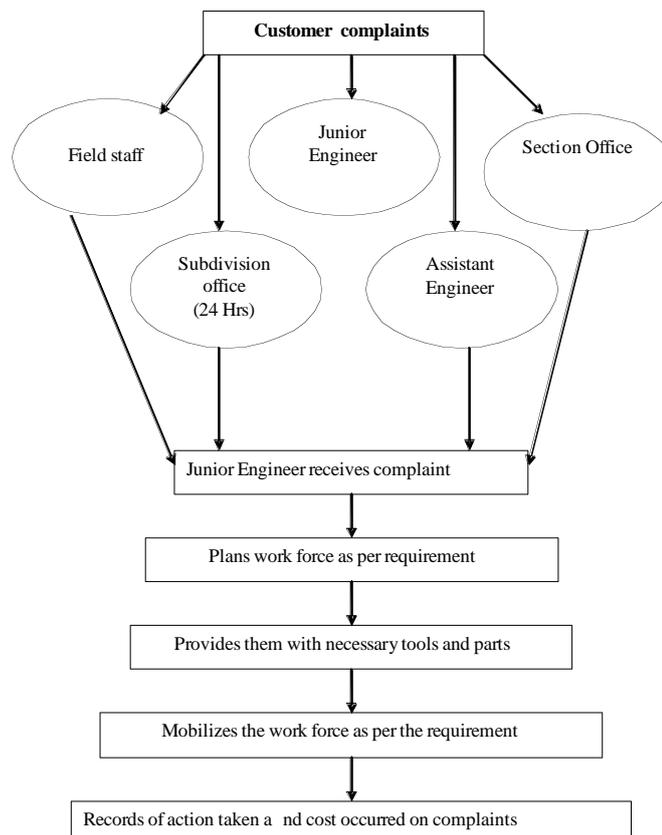
## Appendix D Redressal

## New Connection Process, Consumer Complaint

### Process for New Connections



### Process Flow for Consumer Complaint



## Complaint Types & Redressal Times

### Complaint Redressal Times

Sl. No.	Nature Of Complaints	Redressal Time(In Days)	
		Minimum Days	Maximum Days
<b>Water Supply</b>			
1	No Water at all	1	2
2	Low Water Pressure	2	4
3	Polluted Water Supply	1	2
4	Water Leakage	1	2
5	Erratic Timing of Water Supply	2	3
6	Change of Category of Water Supply	7	15
7	Illegal Usage of Motor	1	2
<b>Sewerage</b>			
8	Sewerage overflow on the Road/ conservancy lane	1	2
9	Replacement of Missing Manhole cover	2	7
<b>Meter &amp; Billing</b>			
10	Excess bill and verification	7	10
11	Non-receipt Of Water Bill	2	7

# Appendix E Divisions

# Data on Water Supply and Sewage Assets from

## WATER SUPPLY PH I

### WS Asset Data from PH I

Existing Infrastructure - Assessment of Age																					
Division Name:																					
Physical Quantity		Upto 1960	1961-1970	1971-1980	1981-1990	1991-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007			
Description	Unit																				
Population (per census years)																					
1 Water Treatment	Capacity - MLD	29.51	908		2043																
2 Major Tubewells	Capacity - KLD	60407			15%	40%	35%												10%		
3 Storage Tanks	Capacity - GLN	5,595,000		10%	15%	40%	25%												10%		
4 Hand pump tube wells	Numbers	195																			
5 Water mains	Mtrs			10%	15%	40%	25%												10%		
	120mm																				
	400mm																				
	350mm																				
	300mm	18,050																			
	250mm	27,800																			
	200mm	26,220																			
	150mm	137,158																			
	100/80mm	276,229																			
	90mm																				
	80mm																				
6 Service connections	Mtrs/Numbers																				
	Domestic																				
	Commercial																				
	Institutional																				
	Industrial																				

Note: No Cumulation of Units Source: Yellow boxes represent filling up data based on "Delphi system"

## PH II

### WS Asset Data from PH II

Existing Infrastructure - Assessment of Age																					
Division Name:																					
Physical Quantity		Upto 1960	1961-1970	1971-1980	1981-1990	1991-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007			
Description	Unit																				
Population (per census years)																					
1 Water Treatment	Capacity - MLD	109.08	2043		41	47.65															
2 Major Tubewells	Capacity - KLD	15860			0.02995	0.668979	0.208	0.063											0.03		
3 Storage Tanks	Capacity - GLN	3,650,000		3%	11%	65%													3%		
4 Hand pump tube wells	Numbers								4%	11%											
5 Water mains	Mtrs																				
	900 mm	3,500			3,500																
	600 mm	6,600			6,600																
	500 mm	7,200			7,200																
	450 mm	8,000			8,000																
	400 mm	8,000			8,000																
	350 mm	5,250			5,250																
	300 mm	24,500		200	21465		1585														
	250 mm	2,975		410	800		1765														
	200 mm	7,790		1840	934		3380												660		
	150 mm	30,500		8039	10663		8015						976						2500		
	100 mm	59,500		15891	14575		25173						1255		605				1283		
6 Service connections	Mtrs/Numbers																		2001		
	Domestic																				
	Commercial																				
	Institutional																				
	Industrial																				

Note: No Cumulation of Units Source:

## PH III (Bhubaneswar related)

## WS Asset Data from PH III – for Bhubaneswar City

Physical Quantity	Unit	Upto																			
		1960	1961-1970	1971-1980	1981-1990	1991-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007			
<b>Population (per census years)</b>																					
1 Water Treatment	Capacity - MLD	115	0							115											
2 Major Tubewells	Capacity - KLD	530			0.1019	0.7509434			0.0377358				0.04906	0.06							
3 Storage Tanks	Capacity - GLN	4957182						23%	59%				2%						13%		
4 Hand pump tube wells	Numbers	1856						13%	11%	8%	6%	11%	11%	9%	8%	10%	5%	3%	5%		
5 Water mains	Mtrs																				
	1200 mm	200570											20570								
	1000mm	300											300								
	900mm	1500											1500								
	800mm	5300											5300								
	700mm	5570											5570								
GH	450 mm	560											560								
	400 mm	3780											1500	1000		1280					
	350 mm	1951												931					500	520	
	300 mm	4276												1776				1000	1500		
	250 mm	4549														869				3680	
	200 mm	6927				2500			1000				500	1200		1077				650	
	150 mm	36225				15000			15000					4000		725				600	
	100 mm	44249				20000			12000					5000		1849		2000		300	
	90 mm																			3100	
	80 mm																				
6 Service connections	Mtrs/Numbers																				
	Domestic																				
	Commercial																				
	Institutional																				
	Industrial																				

Note: No Cumulation of Units Source:

## SWEAGE SERVICE

### PH I

## SS Asset Data from PH I

Existing Infrastructure - Assessment of Age																					
Division Name:		Upto																			
Physical Quantity	Unit	1960	1961-1970	1971-1980	1981-1990	1991-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007			
		1 Sewer Treatment	Capacity - MLD																		
2 Sewer mains	Mtrs																				
	750 mm	2000																			
	600 mm	1000																			
	500 mm	3000																			
	450 mm	700																			
	400 mm																				
	350 mm																				
	300 mm	22689																			
	250 mm	14029																			
	200 mm	25769																			
	150 mm	142865																			
	100 mm	19534																			
	90 mm																				
	80 mm																				
3 Service connections	Mtrs/ Numbers																				
	Domestic																				
	Commercial																				
	Institutional																				
	Industrial																				

Note: No Cumulation of Units Source:



## Appendix F      WPI Indices and Deflationary Multipliers

WPI Indices Used and Deflationary Multiplier used for Asset Valuation

70% weight				30% weight					
Pipes & Tupes	0.7			Cement	0.3				
		reversor	2.478						
Mar-60	0.11		50.9		0.11		43.4		0.11
Mar-61	0.11		52.5		0.11		45.1		0.11
Mar-62	0.11		54.1		0.11		46.8		0.11
Mar-63	0.12		55.8		0.12		48.6		0.12
Mar-64	0.12		57.6		0.12		50.5		0.12
Mar-65	0.12		59.4		0.13		52.5		0.12
Mar-66	0.13		61.2		0.13		54.5		0.13
Mar-67	0.13		63.1		0.14		56.6		0.13
Mar-68	0.13		65.1		0.14		58.8		0.1369
Mar-69	0.14		67.1		0.15		61.1		0.14
Mar-70	0.14		69.2		0.15		63.4		0.15
Mar-71	0.15		71.4		0.16		65.9		0.15
Mar-72	0.15		73.6		0.17		68.4		0.16
Mar-73	0.16		75.9		0.17		71.1		0.16
Mar-74	0.16		78.2		0.18		73.8		0.17
Mar-75	0.17		80.7		0.19		76.7		0.17
Mar-76	0.17		83.2		0.19		79.6		0.18
Mar-77	0.18		85.8		0.20		82.7		0.18
Mar-78	0.18		88.5		0.21		85.9		0.19
Mar-79	0.19		91.2		0.22		89.2		0.20
Mar-80	0.19		94.0		0.22		92.7		0.20
Mar-81	0.20		97.0		0.23		96.3		0.21
Mar-82	0.21		100.0	3%	0.24		100.0	4%	0.22
Mar-83	0.22		107.5	^---assume cagr betw	0.26		108.7		0.23
Mar-84	0.24		115.6		0.29		118.2		0.25
Mar-85	0.26		124.2		0.31		128.5		0.27
Mar-86	0.28		133.6		0.34		139.7		0.29
Mar-87	0.30		143.6		0.37		151.8		0.32
Mar-88	0.32		154.3		0.40		165.0		0.34
Mar-89	0.34		165.9		0.43		179.4		0.37
Mar-90	0.37		178.4		0.47		195.0		0.40
Mar-91	0.40		191.8		0.51		212.0		0.43
Mar-92	0.43		206.1		0.56		230.5		0.47
Mar-93	0.46		221.6		0.61		250.6		0.50
Mar-94	0.49		238.2		0.66		272.4		0.54
Mar-95	0.53		256.1		0.72		296.1		0.59
Mar-96	0.57	111.1	275.3	7.50%	0.78	129.9	321.9	8.71%	0.63
Mar-97	0.59	114.5	283.7	^---cagr between 82 to	0.80	133.5	330.8		0.65
Mar-98	0.61	120	297.4		0.77	128.9	319.4		0.66
Mar-99	0.62	121.4	300.8		0.79	130.9	324.4		0.67
Mar-00	0.63	122.3	303.1		0.77	128.4	318.2		0.67
Mar-01	0.68	132.2	327.6		0.82	136.6	338.5		0.72
Mar-02	0.67	130.7	323.9		0.89	148.7	368.5		0.74
Mar-03	0.67	131.5	325.9		0.87	145.3	360.1		0.73
Mar-04	0.83	161.5	400.2		0.88	147.1	364.5		0.84
Mar-05	0.97	188.9	468.1		0.92	152.8	378.6		0.95
Mar-06	1.00	195.2	483.7	6.79%	1.00	166.7	413.1	6.09%	1.00
				5.02%				5.02%	
				<---cagr between 82 to 06 number)					
				<---cagr between 60 to 06 number)					

## Appendix G Detailed Category-wise Asset Valuations (WS and SS)

### Treatment Plant Asset Values

Category	life	Total	Current Cost	Index	Indexed Value -	Depreciation	Depreciation	Accumulated	Net Block as on
	Capacity		per MLD	numb	Original Cost in	90%	Per Annum	Depreciation	March 2007
					Rs	over	in Rs	upto Mar 07	
<b>WATER SUPPLY</b>									
<b>Treatment Plant</b>									
		30 MLD						Mar-07	
PH I	Mar-54	6.8	2,616,062	0.10	1,779,000		53,370	1,601,100	177,900
	Mar-68	6.8	2,616,062	0.14	2,435,000		73,050	2,191,500	243,500
	Mar-75	6.8	2,616,062	0.17	3,068,000		92,040	2,761,200	306,800
PH II	Mar-60	13.6	1,356,733	0.11	1,942,000		58,260	1,747,800	194,200
	Mar-74	27.24	1,356,733	0.17	6,166,000		184,980	5,549,400	616,600
	Mar-87	41	1,356,733	0.32	17,691,000		530,730	10,621,870	7,069,130
PH III	Mar-97	115	2,639,683	0.65	197,576,000		5,927,280	59,305,278	138,270,722
<b>Total</b>		<b>217.24</b>			<b>230,657,000</b>		<b>6,919,710</b>	<b>83,778,149</b>	<b>146,878,851</b>

### Production Tube Wells Asset Values

Category	life	Total	Current Cost	Index	Indexed Value -	Depreciation	Depreciation	Accumulated	Net Block as on
	Capacity		per MLD	numb	Original Cost in	90%	Per Annum	Depreciation	March 2007
					Rs	over	in Rs	upto Mar 07	
<b>WATER SUPPLY</b>									
<b>Production Tube Wells</b>									
		20 MLD						Mar-07	
PH I	Mar-75	9.1	480,000	0.17	750,000	4.5%	33,750	675,000	75,000
	Mar-85	24.2	480,000	0.27	3,167,000	4.5%	142,515	2,850,300	316,700
	Mar-93	21.1	480,000	0.50	5,101,000	4.5%	229,545	3,215,517	1,885,483
	Mar-00	6.0	480,000	0.67	1,942,000	4.5%	87,390	611,969	1,330,031
PH II	Mar-75	0.5	710,000	0.17	58,000	4.5%	2,610	52,200	5,800
	Mar-85	10.6	710,000	0.27	2,057,000	4.5%	92,565	1,851,300	205,700
	Mar-93	3.3	710,000	0.50	1,178,000	4.5%	53,010	742,576	435,424
	Mar-96	1.0	710,000	0.63	449,000	4.5%	20,205	222,366	226,634
	Mar-04	0.5	710,000	0.84	285,000	4.5%	12,825	38,475	246,525
PH III	Mar-85	0.05	640,000	0.27	9,000	4.5%	405	8,100	900
	Mar-93	0.40	640,000	0.50	128,000	4.5%	5,760	80,687	47,313
	Mar-97	0.02	640,000	0.65	8,000	4.5%	360	3,602	4,398
	Mar-00	0.03	640,000	0.67	11,000	4.5%	495	3,466	7,534
	Mar-04	0.03	640,000	0.84	17,000	4.5%	765	2,295	14,705
<b>Total</b>		<b>76.8</b>			<b>15,160,000</b>		<b>682,200</b>	<b>10,357,853</b>	<b>4,802,147</b>

### Storage Tank Asset Values

Category	Al life	Total	Current Cost	Index	Indexed Value -	Depreciation	Depreciation	Accumulated	Net Block as on
	life	Capacity	per MLD	numb	Original Cost in	90%	Per Annum	Depreciation	March 2007
					Rs	over	in Rs	upto Mar 07	
								Mar-07	
<b>WATER SUPPLY</b>									
<b>Storage Tanks</b>									
		60 ML							
PH I	Mar-65	2.54	7,612,134	0.12	2,398,000	1.5%	35,970	1,511,725	886,275
	Mar-75	3.81	7,612,134	0.17	5,001,000	1.5%	75,015	2,402,124	2,598,876
	Mar-85	10.16	7,612,134	0.27	21,122,000	1.5%	316,830	6,974,600	14,147,400
	Mar-93	6.35	7,612,134	0.50	24,298,000	1.5%	364,470	5,105,576	19,192,424
	Mar-00	2.54	7,612,134	0.67	12,948,000	1.5%	194,220	1,360,072	11,587,928
PH II	Mar-65	0.45	7,996,017	0.12	450,000	1.5%	6,750	283,685	166,315
	Mar-75	1.82	7,996,017	0.17	2,504,000	1.5%	37,560	1,202,743	1,301,257
	Mar-85	10.78	7,996,017	0.27	23,545,000	1.5%	353,175	7,774,688	15,770,312
	Mar-97	0.68	7,996,017	0.65	3,544,000	1.5%	53,160	531,891	3,012,109
	Mar-98	1.82	7,996,017	0.66	9,617,000	1.5%	144,255	1,299,085	8,317,915
	Mar-02	0.45	7,996,017	0.74	2,673,000	1.5%	40,095	200,585	2,472,415
PH III	Mar-93	5.11	7,996,017	0.50	20,535,000	1.5%	308,025	4,314,882	16,220,118
	Mar-96	0.62	7,996,017	0.63	3,154,000	1.5%	47,310	520,669	2,633,331
	Mar-97	13.29	7,996,017	0.65	69,149,000	1.5%	1,037,235	10,378,033	58,770,967
	Mar-98	0.56	7,996,017	0.66	2,944,000	1.5%	44,160	397,682	2,546,318
	Mar-03	2.93	7,996,017	0.73	17,172,000	1.5%	257,580	1,031,026	16,140,974
<b>Total</b>		<b>63.9</b>			<b>221,054,000</b>		<b>3,315,810</b>	<b>45,289,067</b>	<b>175,764,933</b>

### Hand Pump Tube Wells Asset Values

Category	Al life	Total	Current Cost	Index	Indexed Value -	Depreciation	Depreciation	Accumulated	Net Block as on
	life	Capacity	per MLD	numb	Original Cost in	90%	Per Annum	Depreciation	March 2007
					Rs	over	in Rs	upto Mar 07	
								Mar-07	
<b>WATER SUPPLY</b>									
<b>Hand pump Tube Wells</b>									
		15 Numbers							
PH III	Mar-93	233	55,000	0.50	6,442,000	6.0%	386,520	5,414,457	1,027,543
	Mar-96	200	55,000	0.63	6,954,000	6.0%	417,240	4,591,926	2,362,074
	Mar-97	150	55,000	0.65	5,370,000	6.0%	322,200	3,223,765	2,146,235
	Mar-98	120	55,000	0.66	4,371,000	6.0%	262,260	2,361,777	2,009,223
	Mar-99	205	55,000	0.67	7,565,000	6.0%	453,900	3,633,687	3,931,313
	Mar-00	200	55,000	0.67	7,366,000	6.0%	441,960	3,094,931	4,271,069
	Mar-01	160	55,000	0.72	6,335,000	6.0%	380,100	2,281,641	4,053,359
	Mar-02	150	55,000	0.74	6,075,000	6.0%	364,500	1,823,499	4,251,501
	Mar-03	180	55,000	0.73	7,257,000	6.0%	435,420	1,742,873	5,514,127
	Mar-04	102	55,000	0.84	4,734,000	6.0%	284,040	852,120	3,881,880
	Mar-05	56	55,000	0.95	2,933,000	6.0%	175,980	351,960	2,581,040
	Mar-06	100	55,000	1.00	5,500,000	6.0%	330,000	330,000	5,170,000
<b>Total</b>		<b>1,856</b>			<b>70,902,000</b>		<b>4,254,120</b>	<b>29,702,637</b>	<b>41,199,363</b>

### Water Mains -Transmission Asset Values

Category	life	Total Capacity	Current Cost per MLD	Index numb	Indexed Value - Original Cost in Rs	Depreciation 90% over	Depreciation Per Annum in Rs	Accumulated Depreciation upto Mar 07	Net Block as on March 2007
<b>WATER SUPPLY</b>									
<b>Water Mains - Transmiss</b>		40 KMs							
PH I	Mar-65	7.2	2,904,745	0.12	2,596,000	2.3%	58,410	2,336,400	259,600
	Mar-75	10.8	2,904,745	0.17	5,415,000	2.3%	121,838	3,901,470	1,513,530
	Mar-85	28.8	2,904,745	0.27	22,868,000	2.3%	514,530	11,326,708	11,541,292
	Mar-93	18.0	2,904,745	0.50	26,307,000	2.3%	591,908	8,291,570	18,015,430
	Mar-02	7.2	2,904,745	0.74	15,414,000	2.3%	346,815	1,735,025	13,678,975
PH II	Mar-65	2.5	6,368,586	0.12	1,935,000	2.3%	43,538	1,741,500	193,500
	Mar-75	61.7	6,368,586	0.17	67,814,000	2.3%	1,525,815	48,859,523	18,954,477
	Mar-85	6.7	6,368,586	0.27	11,705,000	2.3%	263,363	5,797,583	5,907,417
	Mar-02	1.0	6,368,586	0.74	4,577,000	2.3%	102,983	515,195	4,061,805
	Mar-03	0.0	6,368,586	0.73	-	2.3%	-	-	-
	Mar-05	1.3	6,368,586	0.95	7,582,000	2.3%	170,595	341,190	7,240,810
	Mar-07	0.7	6,368,586	1.00	4,203,000	2.3%	94,568	-	4,203,000
PH III	Mar-85	2.5	13,598,373	0.27	9,284,000	2.3%	208,890	4,598,442	4,685,558
	Mar-97	1.0	13,598,373	0.65	8,851,000	2.3%	199,148	1,992,566	6,858,434
	Mar-99	0.5	13,598,373	0.67	4,562,000	2.3%	102,645	821,722	3,740,278
	Mar-00	35.3	13,598,373	0.67	321,447,000	2.3%	7,232,558	50,647,718	270,799,282
	Mar-01	2.1	13,598,373	0.72	20,862,000	2.3%	469,395	2,817,656	18,044,344
	Mar-02	2.8	13,598,373	0.74	27,795,000	2.3%	625,388	3,128,651	24,666,349
	Mar-03	1.9	13,598,373	0.73	19,398,000	2.3%	436,455	1,747,016	17,650,984
	Mar-04	1.3	13,598,373	0.84	14,688,000	2.3%	330,480	991,440	13,696,560
	Mar-05	1.0	13,598,373	0.95	12,951,000	2.3%	291,398	582,795	12,368,205
	Mar-06	2.0	13,598,373	1.00	27,197,000	2.3%	611,933	611,933	26,585,068
	Mar-07	4.9	13,598,373	1.00	65,952,000	2.3%	1,483,920	-	65,952,000
<b>Total</b>		<b>201.2</b>			<b>703,403,000</b>		<b>15,826,568</b>	<b>152,786,102</b>	<b>550,616,898</b>

### Water Mains - Distribution Asset Values

Category	Useful life	Total Capacity	Current Cost per MLD	Index number	Indexed Value - Original Cost in Rs	Depreciation 90% over	Depreciation Per Annum in Rs	Accumulated Depreciation upto Mar 07	Net Block as on March 2007
<b>WATER SUPPLY</b>									
<b>Water Mains - Distribut</b>		40 KMs							
PH I	Mar-65	41.3	1,332,485	0.12	6,832,000	2.3%	153,720	6,148,800	683,200
	Mar-75	62.0	1,332,485	0.17	14,248,000	2.3%	320,580	10,265,586	3,982,414
	Mar-85	165.4	1,332,485	0.27	60,170,000	2.3%	1,353,825	29,802,696	30,367,304
	Mar-93	103.3	1,332,485	0.50	69,220,000	2.3%	1,557,450	21,817,101	47,402,899
	Mar-02	41.3	1,332,485	0.74	40,558,000	2.3%	912,555	4,565,275	35,992,725
PH II	Mar-65	23.9	1,153,582	0.12	3,424,000	2.3%	77,040	3,081,600	342,400
	Mar-75	25.2	1,153,582	0.17	5,021,000	2.3%	112,973	3,617,596	1,403,404
	Mar-85	33.2	1,153,582	0.27	10,455,000	2.3%	235,238	5,178,447	5,276,553
	Mar-02	3.8	1,153,582	0.74	3,189,000	2.3%	71,753	358,959	2,830,041
	Mar-03	0.6	1,153,582	0.73	512,000	2.3%	11,520	46,112	465,888
	Mar-05	0.0	1,153,582	0.95	-	2.3%	-	-	-
	Mar-07	3.3	1,153,582	1.00	3,788,000	2.3%	85,230	-	3,788,000
PH III	Mar-85	35	1,209,222	0.27	11,558,000	2.3%	260,055	5,724,772	5,833,228
	Mar-97	27.0	1,209,222	0.65	21,250,000	2.3%	478,125	4,783,870	16,466,130
	Mar-99	0.0	1,209,222	0.67	-	2.3%	-	-	-
	Mar-00	9.0	1,209,222	0.67	7,288,000	2.3%	163,980	1,148,309	6,139,691
	Mar-01	0.0	1,209,222	0.72	-	2.3%	-	-	-
	Mar-02	0.0	1,209,222	0.74	-	2.3%	-	-	-
	Mar-03	2.6	1,209,222	0.73	2,282,000	2.3%	51,345	205,521	2,076,479
	Mar-04	0.0	1,209,222	0.84	-	2.3%	-	-	-
	Mar-05	2.0	1,209,222	0.95	2,303,000	2.3%	51,818	103,635	2,199,365
	Mar-06	0.9	1,209,222	1.00	1,088,000	2.3%	24,480	24,480	1,063,520
	Mar-07	4.0	1,209,222	1.00	4,837,000	2.3%	108,833	-	4,837,000
<b>Total</b>		<b>583.9</b>			<b>268,023,000</b>		<b>6,030,518</b>	<b>96,872,759</b>	<b>171,150,241</b>

#### Other WS Asset Values

Category	Useful life	Total Capacity	Current Cost per MLD	Index number	Indexed Value - Original Cost in Rs	Depreciation 90% over	Depreciation Per Annum in Rs	Accumulated Depreciation upto Mar 07	Net Block as on March 2007
<b>WATER SUPPLY</b>									
<b>Stand Posts</b>		10 Numbers							
PH I	Mar-93	195	25,000	0.50	2,450,000	9.0%	220,500	2,205,000	245,000
PH II	Mar-93	220	25,000	0.50	2,765,000	9.0%	248,850	2,488,500	276,500
<b>Total</b>		<b>415.0</b>			<b>5,215,000</b>		<b>469,350</b>	<b>4,693,500</b>	<b>521,500</b>
<b>Office Equipments/ Furni</b>		10							
PH I	Mar-93				1,000,000	9.0%	90,000	900,000	100,000
PH II	Mar-93				700,000	9.0%	63,000	630,000	70,000
PH III	Mar-93				500,000	9.0%	45,000	450,000	50,000
<b>Total</b>		-			<b>2,200,000</b>		<b>198,000</b>	<b>1,980,000</b>	<b>220,000</b>
<b>Vehicles</b>		10							
PH I	Mar-93				15,950,000	9.0%	1,435,500	14,355,000	1,595,000
PH II	Mar-93				6,200,000	9.0%	558,000	5,580,000	620,000
PH III	Mar-93				20,800,000	9.0%	1,872,000	18,720,000	2,080,000
<b>Total</b>		-			<b>42,950,000</b>		<b>3,865,500</b>	<b>38,655,000</b>	<b>4,295,000</b>

#### Sewage Service Asset Values

Category	Useful life	Total Capacity	Current Cost per MLD	Index number	Indexed Value - Original Cost in Rs	Depreciation 90% over	Depreciation Per Annum in Rs	Accumulated Depreciation upto Mar 07	Net Block as on March 2007
<b>SEWERAGE SERVICES</b>									
<b>Sewerage Treatment Plant</b>	30	MLD							
<b>Total</b>	<b>1</b>		<b>6,640,000</b>		<b>4,889,000</b>		<b>146,670</b>	<b>733,752</b>	<b>4,155,248</b>
<b>Sewer Mains - Transmission</b>	30	KMs							
<b>Total</b>		<b>136.5</b>			<b>57,014,687</b>		<b>1,710,441</b>	<b>20,539,346</b>	<b>36,475,341</b>
<b>Sewer Mains - Distribution</b>	30								
<b>Total</b>		<b>336.5</b>			<b>34,440,029</b>		<b>1,033,201</b>	<b>12,406,902</b>	<b>22,033,126</b>
<b>TOTAL OF SEWERAGE</b>									
<b>GRAND TOTAL - SS</b>					<b>96,343,716</b>		<b>2,890,311</b>	<b>33,680,000</b>	<b>62,663,716</b>