FINANCIAL INSTITUTIONS REFORM AND EXPANSION PROJECT

Debt Market / Infrastructure Component

PRE-FEASIBILITY ANALYSIS AND
REPORT FORMATS
Volume 1 : Stage I - Financial Analysis

(Draft)

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CONTENTS

Volume I : Pre-Feasibility Analysis and Report Formats for Stage I

	Executive Summary	i
I	Introduction	1
II	Financial Analysis for Stage I	3
III	Pre-Feasibility Report Format for Stage I	8
Annex 1	Financial Analysis for UEIPs - Model FIREFAM	16
Annex 2	Formats for Quantitative Information to be Sent to Financial Institutions for Stage I	35

Volume II : Pre-Feasibility Analysis and Report Formats for Stage II

	Executive Summary	i
I	Introduction	1
II	Institutional Arrangements	4
III	Risk Assessment	11
IV	Financial Analysis	13
V.	Pre-Feasibility Report Formsts - Stage II	19
Annex 1	Agency Assessment	29
Annex 2	Project Risk Assessment	34
Annex 3	Rapid Market Assessment for Pre-feasibility Stage	39
Annex 4	Formats for Quantitative Information to be Sent to Financial Institutions for Stage II	50

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EXECUTIVE SUMMARY

Traditionally urban environmental infrastructure services like water, sewerage and solid waste management have been considered as public services to be provided by the local governments and related state or metro level statutory authorities Financing of these services has largely been through budgetary allocations. With the recently initiated financial reforms in India, there is tremendous scope for enhancing the investments in this sector by tapping the rapidly expanding capital markets, especially for debt funds This, however, would require considerable efforts as the market perception of high risk and low returns from investments in this sector needs to be changed by successfully developing and implementing commercially viable projects for urban environmental infrastructure In this perspective, *commercially viable projects would essentially be those which would be able to raise resources from the capital markets largely on the basis of revenue streams from specific service linked user charges and other dedicated sources*. They would, therefore, need to address three important concerns, namely, a market rate of return on investments, an acceptable institutional arrangement for raising market resources and service delivery and a clear risk assessment and mitigation framework

This report suggests the nature of analysis essential for pre-feasibility phase of project development. It focuses on aspects which are critical for commercial viability Thus, technology choices and service standards are not discussed here The proposed analysis is for two different stages of initial project development. It must be realized that project development in a commercial format is a very resource intensive exercise. It is thus essential to assess whether a given project suggests adequate potential for devoting such resources for commercial structuring. The first stage of pre-feasibility suggests basic financial analysis of the given project and overall service system. If the basic fundamentals seem strong enough and necessary tariff revisions feasible in view of the past pricing practices, local political opinion, quick sensitivity analysis and a rapid market assessment, it would be advisable to pursue the project development further. This volume I gives details of the first stage analysis and report formats for the first stage. Based on the stage-I pre-feasibility report, the service authority may approach a financial intermediary or the state government for permission to borrow.

The stage I analysis focuses on financial performance of the given service/sector in light of new investments. It is important to realize that in most cases investments in environmental infrastructure augment the capacities or coverage of the existing system It is therefore, necessary to review the returns on investments in relation to the entire sector/system, rather than limiting to the given project only. For example, an investment maybe made to augment water capacity and increase the distribution network. However, it may neither be possible nor appropriate to delineate the returns as a separate stream Thus, even while determining the returns on this new investment, it would be essential to assess the net returns on the total

system. Definition of this system will depend on the institutional arrangement which is being envisaged for the specific environmental service For example, for water and sewerage, the system may refer to a separate department within a municipal authority, a separate state level board or an independent project company set up to supply bulk water to other authorities or user groups A clear delineation of this system and its rationale need to be set out in the beginning

The volume I report focuses on financial analysis necessary at the pre-feasibility stage Volume II details the institutional analysis and risk assessment. A financial analysis model (FIRE-FAM) has been developed to assist in the analysis of financial performance for different tariff alternatives (refer Annex 1). The basic principles suggested for the pre-feasibility analysis and report formats may be used for any urban environmental infrastructure including water supply, sewerage and sanitation, solid waste management and area development projects. However, some of the detailed analysis has been worked out for water supply at this stage Further development for sewerage, solid waste management and area development is underway The approach to financial analysis suggested in this report includes the following steps Further details are given in next section.

1. Estimation of New Investments Required
2. Consumption Forecasts
3. System Annual Costs
4. Initial Average Tariff Analysis
5. Detailed Tariff Analysis and Additional Revenue Measures
6. Sensitivity Analysis

It is necessary to present the analysis in the context of city and performance of the given service and agency. For this, the following report format is suggested. Further details are given in section III.

1. Introduction
2. Existing Situation Analysis
    - Demographic and Economic Growth Patterns
    - Service Conditions and Coverage
    - Financial Analysis of Service
3. Institutional Arrangements
    - Existing Institutions
    - Proposed Changes
4. Estimation of New Investments Required
    - Project Concept
    - Proposed Service Standards and Coverage
    - Main Project Components
    - Total Project Costs

5. Financial Analysis

- Consumption Forecasts
- System Annual Costs
- Initial Average Tariff Analysis
- Detailed Tariff Analysis and Additional Revenue Measures
- Sensitivity Analysis

The analysis framework and report formats suggested in this paper may be used by interested service agencies like municipal and urban development authorities, state and metro water and sewerage boards, industrial development corporations, new independent companies proposed for specific projects, etc. It is likely that the state government initiative in supporting the development of such projects will be required in the initial stages

I. INTRODUCTION

Traditionally urban environmental infrastructure services like water, sewerage and solid waste management have been considered as public services to be provided by the local governments and related state or metro level statutory authorities Financing of these services has largely been through budgetary allocations This method has limited the scope for investments in this sector and has often produced inefficiencies and a lack of commitment to introduce appropriate user charges for these services With the recently initiated financial reforms in India, there is tremendous scope for enhancing the investments in this sector by tapping the rapidly expanding capital markets, especially for debt funds This, however, would require considerable efforts as the market perception of high risk and low returns from investments in this sector needs to be changed by successfully developing and implementing commercially viable projects for urban environmental infrastructure

In this perspective, commercially viable projects would essentially be those which would be able to raise resources from the capital markets largely on the basis of revenue streams from specific service linked user charges and other dedicated sources. They would, therefore, need to address three important concerns, namely, a market rate of return on investments, an acceptable institutional arrangement for raising market resources and service delivery and a clear risk assessment and mitigation framework

In India, initial project development in a commercial format has taken place in other infrastructure sectors like power, surface transport and airports. These experiences have created an interest among many state and local governments to explore the possibility of developing urban environmental infrastructure projects in a commercial format Some of the states like Andhra Pradesh have taken a cabinet level decision to privatize urban environmental services which have so far been treated as "social services".

There is thus an urgent need to develop suitable project proposals along commercial lines. This report suggests the nature of analysis essential for pre-feasibility phase of project development. It may be used by interested service agencies like municipal and urban development authorities, state and metro water and sewerage boards, industrial development corporations, new independent companies proposed for specific projects (as described later in volume II), etc It is likely that the state government initiative in supporting the development of such projects will be required in the initial stages

The proposed analysis is for two different stages of initial project development. It must be realized that project development in a commercial format is a very resource intensive exercise. It is thus essential to assess whether a given project suggests adequate potential for devoting such resources for commercial structuring. The ***Stage I*** of pre-feasibility suggests basic financial analysis of the given project and overall service system. The first step in this process will be to delineate the project/service jurisdictions in relation to the institutional structure envisaged Within this, if the basic fundamentals seem strong enough and necessary tariff revisions feasible in view

of the past pricing practices, local political opinion, quick sensitivity analysis and a rapid market assessment, it would be advisable to pursue the project development further It is envisaged that the authority will be able to manage this analysis itself with external technical support as necessary.

Based on the stage-I pre-feasibility report, the service authority may approach a financial intermediary or the state government for permission to borrow. The ***Stage II*** pre-feasibility analysis suggests a more comprehensive project development incorporating proposals for institutional arrangements and initial ideas regarding a risk mitigation and allocation strategy The financial viability is then reassessed in view of these proposals The stage II analysis and project development may occur with support from financial intermediary, state government or financial advisors who may facilitate this process. This is available in Pre-feasibility Analysis and Report Formats - Volume II

The concept of developing urban environmental infrastructure projects in a commercial format is totally new for Indian cities. It is thus essential to devote considerable efforts for developing appropriate methods to incorporate critical concerns related to tariff revisions required in relation to market rates of return, identifying suitable institutional arrangements, risk assessment, mitigation and allocation, etc. However, all these will require initial commitment from the service authorities to ensure the necessary tariff revisions and introduce the necessary institutional changes.

It is hoped that this report would prove useful for service authorities and agencies to assess the potential of specific urban environmental infrastructure projects to be developed in a commercial format. This would help to enhance their access to capital markets and improve service quality for urban areas.

Report Format : The next section describes the financial analysis required for stage I of pre-feasibility analysis. The suggested report structure for this stage is discussed in the third section. Annex 1 describes the Financial Analysis Model (FIREFAM)[1] which has been developed to assist in assessing the financial performance of the project in relation to different tariff proposal alternatives. Annex 2 presents the formats for quantitative information on projects for stage I which are necessary for project appraisal.

The basic principles suggested for the pre-feasibility analysis and report formats may be used for any urban environmental infrastructure including water supply, sewerage and sanitation, solid waste management and area development projects. However, some of the detailed analysis has been worked out for water supply at this stage. Further development for sewerage, solid waste management and area development is underway.

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1 This model has been developed on a standard spreadsheet software and is available to interested users by writing to the authors.

II. FINANCIAL ANALYSIS FOR PRE-FEASIBILITY REPORT - STAGE I

Major concerns in accessing capital market for investments in urban environmental infrastructure relate to the prevalent market perception of inadequate returns, high risks in timely debt servicing and inappropriate tariff structures In order to create a market acceptance of this sector, it is first necessary to demonstrate that an acceptable financial performance of the given sector/system is possible, that the tariff revisions necessary to achieve commercial returns on investments are feasible and that the projected financial performance remains viable even after incorporating the typical risks which are associated with this sector through a preliminary sensitivity analysis

System Assessment: It is important to realize that in most cases investments in environmental infrastructure augment the capacities or coverage of the existing system It is therefore, necessary to review the returns on investments in relation to the entire sector/system, rather than limiting to the given project only. For example, an investment maybe made to augment water capacity and increase the distribution network However, it may neither be possible nor appropriate to delineate the returns as a separate stream Thus, even while determining the returns on this new investment, it would be essential to assess the net returns on the total system. Definition of this system will depend on the institutional arrangement which is being envisaged for the specific environmental service. For example, for water and sewerage, the system may refer to a separate department within a municipal authority, a separate state level board or an independent project company set up to supply bulk water to other authorities or user groups. A clear delineation of this system and its rationale need to be set out in the beginning

APPROACH TO FINANCIAL ANALYSIS:

The analysis for Stage I focuses essentially on financial performance of the system in relation to the new investments, reliable estimates of the system annual costs, and revenues based on alternative tariff proposals. The emphasis on tariffs in the six step analysis suggested below, arises from the existing practice in most Indian cities, where the tariff levels are very low and generally do not cover even the operation and maintenance costs.

1. Estimation of New Investments Required:

The first step in this analysis would be to estimate the new investments required for a specific infrastructure sector based on existing situation, service levels and coverage, and user preferences. It would be useful to assess the user preferences for the service and develop the project concept on the basis of these. The next would be to develop a preliminary financing plan consisting of type of finance (equity or debt), sources of funds, and their terms and conditions reflecting the market trends. Once this is done the following parameters need to be determined to estimate the total project costs.

- Base costs for different components of project for the design year
- Phasing of project
- Physical contingencies
- Price escalation till expected date of commencement and during construction
- Design and supervision charges
- Interest during construction

2. Consumption Forecasts:

Consumption forecasts of the specific service are essential for estimating the variable portion of operation and maintenance expenditure and revenues from service linked user charges This exercise is iterative in nature as both the number of connections and supply levels/standards need to be adjusted (either upwards or downwards) based on the total planned source capacity

The first step in consumption forecasts is to identify user groups[2] and estimation of connections across these. The number of connections is influenced by capacity availability (both source capacity and distribution network) and demand for connections. It would be useful to estimate the connections separately for the existing developed areas (based on the density and likely growth patterns) and where new distribution network is being provided.

The second step is to set the likely supply level per unit (in liters per connection per day) across different user groups. This needs to be set based on existing level of supply, likely demand patterns and the need for ensuring life line rates for low income consumers. Moreover, the supply level per unit needs to be adjusted either upwards (if there is additional demand) and downwards (to increase the coverage) based on source capacity.[3]

System Leakages and Total production Requirements: Both the connections and supply level per unit help in estimation of total consumption. However, for estimating total production over time, it is necessary to account for system inefficiencies such as leakages. Reliable estimate of leakages is often difficult and efforts should be made to assess it carefully. Any temporal changes in these due to specific administrative measures need to be also taken into account.

3. System Annual Costs:

The third aspect of analysis relates to estimation of annual costs of the entire system which corresponds to both existing system as well as additional system created through new investment. For example, if the project is to augment the water supply, it will be necessary to

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2 The user groups would vary for different services See Table A1 for an illustrative list of user categories for different infrastructure services

3 Ideally, this needs to be adjusted iteratively to reflect price elasticity of demand in relation to the proposed tariff changes These concerns need to be included for more detailed analysis in stage II

consider the entire system consisting of the existing water supply system and the new (project) system while doing financial analysis of the project.[4] The system annual costs consist of the following,

i. Operation and Maintenance Costs · These need to be estimated separately for the existing and new systems and calculated on the basis of existing costs and expected price increases This needs to be linked to the likely consumption/production over time

ii. Debt servicing of outstanding loans for existing system · This needs to be worked out based on the outstanding loans for existing system, terms and conditions.

iii Debt servicing requirements for the project · This depends the proposed financing plan for the project It is also influenced by the institutional arrangements (for example, in case of independent project entity, servicing of equity is an important requirement)

iv. Other Requirements : It is also necessary to make a provision for the anticipated requirements for major repairs and replacements with the expected price increases In case of an independent project company, tax provisions will also need to be accounted for.

v. Depreciation : It is necessary to provide for depreciation of existing assets as well as new assets created as a part of the project. For calculating depreciation of new assets, the equity part of the project should be considered, since the debt servicing already includes a capital recovery portion as a part of the principal repayment or debt redemption fund.

4. Initial Average Tariff Analysis:

Given the estimates of project and system costs and a preliminary financing plan, key aspect of analysis revolves around the required/proposed changes in tariff levels to ensure a specified level of financial performance. The required financial performance depends upon the market trends in cost of funds, and the general market image of risks associated with financing this investment. The most important indicators in this regard would be the internal rate of return (IRR), return on equity (ROE) and debt service coverage ratio (DSCR). In the initial analysis, it would be useful to work with average unit tariffs. Two approaches are suggested in this regard[5]. It would be necessary to assess whether the required revisions in average tariff levels are likely to be feasible in the specific context.

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4 In case of an independent project arrangement, the existing system may not be present or may refer to the assets and liabilities which may have been transferred.

5 The FIRE-FAM model which has been developed to assist in this analysis, enables an easy application of these approaches. Refer Annex 1 for details

a) In the first approach, it would be useful to assess the extent of revision necessary in average unit tariffs in the first year to ensure full cost recovery over the analysis period A fixed annual revision in tariffs to account for price escalation may be assumed from the second year

b) In the second approach, a feasible revision plan in average tariffs over the life of investments needs to be developed On the basis of this and the initial financing plan, financial performance can be assessed in terms of the following three indicators

i Rate of return on investments This indicator provides an estimate of overall financial rate of return possible, based on project and system costs and revenue profiles. Generally referred to as Internal Rate of Return (IRR), it provides an estimate of the discount rate at which the present value of costs and benefits (revenues) is equal Ideally the IRR needs to be compared with the prevailing costs of capital in the market for investments with a similar risk profile In case, no returns are expected on equity, IRR on total investments can be somewhat lower than the market rate and still ensure commercial viability. In current market situation in India, an IRR on total investments which is higher than 16 to 18 percent may be considered acceptable for preliminary project development or appraisal[6] It is likely that initial projects will require higher returns on investments due to the prevalent market perception of high credit (especially for delays) risks Over time, as the market image of the sector improves, the required default spread will reduce and the relative cost of funds will also reduce.

ii Rate of Return on Equity: This indicator provides an estimate of returns on equity which will be possible after meeting all the operating and maintenance costs, depreciation provisions and debt servicing costs (based on the preliminary financing plan). It is likely that for public sector agencies or local authorities returns on equity is not an important consideration. However, in case, private sector funds are being sought (possibly through an Independent Project Entity arrangement as described later), return on equity becomes an important concern. In this case, it will need to match the market rate of return on such equity contributions in other sectors with a similar risk profile. In the initial period, as the perceived risks of such infrastructure projects are likely to be high, required returns will also be high. It is also likely that for infrastructure investments, capital appreciation will take a longer time which would force up the required rate of return.

iii. Debt Service Coverage Ratio: This indicator provides an estimate of the extent to which operating profits/surpluses (i.e. operating income minus operation and maintenance expenditure) will be adequate to meet the debt servicing requirements over the project life It enables an assessment of the likely credit risk associated with project lending, a ratio lower than 1 indicates considerable credit risk and vice versa. Generally a coverage of 1 25 to 1.5 has been used in other infrastructure sectors like power. It is, however, likely that initial projects may require a

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6 It is essential to review the market conditions and likely trends at the time of project development and appraisal to determine an acceptable rate of return from a commercial perspective

slightly higher ratio, given the low market image of the sector.

5. Detailed Tariff Analysis and Additional Revenue Measures :

Project development in a commercial format is acceptable when financial performance indicators are acceptable at feasible tariff levels and revisions If after the initial average tariff analysis, this is not achieved, it will be useful to do more detailed tariff analysis (in relation to a rapid market assessment), identify new innovative revenue sources and explore the possibility of including the revenue from *other dedicated sources*

Detailed tariff analysis would be based on dual considerations of 'what the market will bear' for non-poor user groups and affordable life line rates for the poor user groups It would be also necessary to forecast the likely changes in consumption in relation to these tariff proposals (refer Annex 1 for details) In addition it would be useful to explore the possibility of using other measures such as sale of land from project area, advanced registration charges or land exactions (Refer Table A2 for illustrations of such measures). It would also be possible to explore the possibility of committing a part of the revenue from general sources such as octroi and property tax to system revenues. This would, however, need to be done in relation to the overall municipal finance projections and city priorities across other sectors. Once these additional revenue streams are identified, the financial performance may be reassessed

6. Sensitivity Analysis:

One of the main constraints in accessing capital markets for urban environmental infrastructure projects is the market perception of high risks While these will need to be tackled through an appropriate contractual framework at a later stage, it would be useful to assess the sensitivity of financial performance to risks associated with project costs, project delays and revenue projections based on the proposed tariff structures. For stage I analysis, the following criteria may be used for the sensitivity analysis, and, based on these variables, it is necessary to reassess the project financial viability.[7]

- Increase in project costs
- Delay in project implementation
- Decrease in project revenues

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7 The FIRE-FAM model in Annex 1 permits an easy sensitivity analysis for different scenarios based on the risk parameters.

III. REPORT STRUCTURE FOR PRE-FEASIBILITY ANALYSIS STAGE I

The financial analysis suggested in the previous section needs to be presented in relation to the city context and overall agency/system details. As preliminary project development is expected to have been done, the overall results and analysis need to be presented in a structured manner. The following paragraphs suggest a broad report structure for Stage I of pre-feasibility analysis. The first three sections provide details of the existing situation and institutional arrangements. The next two sections are based on the financial analysis suggested in the previous section

Report Structure for Stage I

Executive Summary

1. Introduction

Project description
- Overview of existing system
- Overview of the project
- Financial viability highlights

- Report structure

2. Existing Situation Analysis

a. <u>Demographic and Economic Patterns</u>

- Population and household growth and forecasts
  Give demographic details such as population, households over last three decades together with the growth rates over time. Clearly indicate the basis for assumptions and method used for the projections of population for planning period.
- Economic activities, past trends of growth and forecasts
  Brief description of economic activities in City/Region. If possible, give number of industrial and commercial establishments for past five years, expected growth and projections.

b. <u>Existing Service Conditions</u>

- Service standards across different user groups
  Describe existing sources, transmission, treatment, service reservoirs and distribution network with the help of location map. Indicate existing service levels across different user groups indicating the service levels for

low income groups (or in slums and squatter settlements).

c Financial Analysis of Service

. Past Tariffs and revisions
Give details of the past trends in tariffs, proposed and approved revisions by general body/state government across different tariff categories for past five years
. Revenue and expenditure trends for the service
Give details of revenue from tariffs/charges, other sources and expenditure of the service on establishment, operation and maintenance and debt for last five years

3. Institutional Arrangements

. Description of existing service agencies.
Describe roles of existing agencies in service delivery, management, monitoring and regulation Assess potentials and constraints of each of these agencies.
Proposed institutional arrangements
Describe proposed institutional arrangements with rationale for selection Clearly indicate advantages of this arrangement.

4. Estimation of New Investments Required

. Service standards, coverage and estimation of requirements
Give details of targeted supply levels and coverage across different user groups/tariff categories and requirements for the planning period. Results of rapid market assessment including consumer preferences and likely consumption patterns.
. Project description for selected alternative
Describe and indicate the magnitude of various project components with the help of a location map. Brief details of environmental costs and benefits* which will result from the project
. Coverage of below median income households *
Give details of extent of proposed service levels and extent of coverage of below median income groups
. Preliminary financing plan in terms of equity and debt components as well as their terms and conditions
. Estimation of total project costs
Work out the project costs consisting of base costs, physical contingencies, price

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* Specific requirements for the HG funding under FIRE program

escalation during construction, design and supervision charges and interest during construction. Also, indicate the unit costs adopted for estimating base costs of project. Give details of phasing.

5. Project Financial Viability

a. Consumption Forecasts and System Costs

Consumption Forecasts
Estimate the consumption forecasts both interms of connections and production requirements (as explained in section II, step 2)
System Annual Costs
Estimate the likely costs of system. These costs may consist of operation and maintenance costs of new and existing system, the debt service requirements of outstanding loans for existing system, debt servicing requirements for new system as well as any other requirements such debt service reserve and provision for major replacements (as explained in section II, step 3)

b Tariff and Revenue Analysis

. Initial Average Tariff Analysis
Set initial average tariffs based on average costs and feasible average revisions in existing tariffs. Also estimate (as explained in section II, step 4)

. Detailed Tariff Analysis and Additional Revenue Measures
In case, average tariff analysis does not result in acceptable financial performance, explore the possibility of revisions across different user groups as well as other revenue measures. With these options reassess the financial viability (as explained in section II, step 5)

c. Sensitivity Analysis

Sensitivity Analysis for Financial Performance
After identifying the crucial variables that influence project, assess the impact the changes in these variables on project financial viability as explained in step 6 of section II.

Table A1
Illustrative user Categories for Urban Environmental Services

Water Supply	Sewerage/Effluent Disposal	Solid Waste
. **Domestic** Plotted Housing Mulitstoried Apartments Slum/Low Income Settlements	.**Domestic** Housing Colonies Individual Plotted Houses Slum/Low Income Settlements	. **Domestic** Housing Colonies Individual Plotted Houses Slum/Low Income Settlements
. **Industrial** Bulk Users Bulk Users with Low Quality Requirements Other Industrial	. **Industrial** Units with highly polluted wastes - Type 1 Type 2 Industrial Estates	. **Industrial** Units with Hazardous Wastes Industrial Estates Other Industrial
. **Commercial** Hotels Major Market Centres Other Bulk Users Other Commercial Establishments	. **Commercial** Hotels Other Bulk Users Other Commercial Establishments	. **Commercial** Hotels and Restaurants Major Vegetable & Fruit Markets Other Markets Local Business Complexes Other Commercial Establishments
. **Institutional** Colleges and Universities Large Govt Office Complexes Other Institutions	. **Institutional** Hospitals Colleges and Universities Large Govt Office Complexes Other Institutions	. **Institutional** Hospitals Colleges and Universities Large Govt Office Complexes Other Institutions

Table A2
Additional Revenue Measures for Urban Infrastructure

A. DIRECT RECOVERY OF CAPITAL COSTS	
1 **Valorization Charges**	Public charges to recover the capital cost of infrastructure, levied on the immediate beneficiaries of the project In Columbia, where these have been practiced extensively, the charges are based on plot area, frontage, shape, topography and use of land These would be particularly useful for local level infrastructure like streets, water supply and sewerage network, etc One advantage in this measure is that the users are able to relate the charges directly with service improvements which they receive and, therefore, cost recovery can be better In new areas, such costs may be capitalized in land price (as done effectively by CIDCO, Bombay) or through a special charge
2 **Special Assessment Districts (SADs)**	Special Assessment Districts are created to allocate specific infrastructure costs to property owners within the district The method is similar to valorization charges, but is based on a statutory jurisdiction created for allocating the costs It is essential to identify the boundaries of the given service in a manner that the influence zone includes all the important beneficiaries SADs have been used extensively in the USA
3. **Capacity Allocations**	It may be possible, in case of a service with relatively high demand, to require the future consumers (especially the large bulk consumers) to make payments for up-front capital contributions, in lieu of a promised capacity allocation This would be especially applicable for large bulk consumers like some industrial, commercial or institutional users or residential zones/areas which may want to purchase a service in bulk These payments will help to meet a part of the cost of construction for a new facility like water source, sewage treatment plant or solid waste disposal plant/site The payments need to be determined in relation to the actual capacity costs Capacity allocations can further be backed up by purchase agreements ('take or pay contracts') for these services.

4. **Development Charges**	Development charges are also levied to recover capital costs of infrastructure provision These are commonly used in many Indian cities. Often there are state level provisions for development charges However, in most Indian cities, these are not determined in relation to actual costs They are generally mandatory in nature, but as they are levied at the time of granting building permission, the actual revenue mobilization depends on the timing of development.
5 **Advanced Registration\ Connection Charges**	These are similar to capacity allocations in that an advanced payment ensures possible access to a service connection later However, the main difference is that the former are voluntary in nature, whereas these charges, as practiced in.many Indian cities, are mandatory in nature These also, however, should be linked to the actual costs.
6 **Development Impact Fees**	Development impact fees are meant to compensate the local or development authority *for the financial burden of the new development on the existing/planned off-site infrastructure*. In USA, where these have been commonly used, *the charges are assessed for each individual component of the total system.. Each impact is isolated and monetized so that the beneficiaries can bear the cost of development*. This requires the authority to develop a standardized mathematical model which can regularly be updated to reflect the replacement or debt servicing costs of infrastructure and its division across user groups The fees are typically based on parameters like plot size, frontage, use, size and type of construction, location, etc., which influence the extent and nature of impact. Use of this measure in Indian cities, however, is likely to be limited by its need for a fairly sophisticated analysis of costs of infrastructure and impacts of each specific development and the related extensive data base.

B. LAND BASED MEASURES	
1. **Land Readjustment**	Land readjustment is a method of financing infrastructure within a defined, typically undeveloped area, by redrawing parcel boundaries, aligning on-site infrastructure, donating certain valuable parcels for public sale and using the proceeds to finance up-front costs of infrastructure In this method, the value added to each parcel as a result of the infrastructure compensates existing land owners for lose of land area. Increased value for reduced size is the essential motivation for land readjustment This can also be a voluntary partnership between a public agency and a group of land owners who agree to participate in a land readjustment project. In India, some of the states like Gujarat and Maharashtra practice Town Planning Schemes which are a form of land readjustment Under this, up to 30 percent of area is taken for roads and public facilities, including commercial facilities which can be sold at market rates Compensation for land which is taken away is largely adjusted against betterment levies on land owners, which helps to considerably reduce any direct payments
2 **Betterment Levy**	Betterment levies capture the increased capitalization of land due to public infrastructure. Despite their theoretical appeal, they have been more difficult to implement in practice The basic difficulty arises in the assessment of the "betterment" that goes into a piece of land through infrastructure development In a few states of India, where betterment levies are used, assessment of land values increases are quite arbitrary and generally much lower than the prevailing market values, making it difficult to meet the costs of infrastructure
3 **Excess Appropriation**	This is an indirect financing method which involves taking of private land for public infrastructure or upgrading neighborhoods The excess expropriation mechanism provides project funding by acquiring private land for resale or development after it has increased in value due to project's primary activity. This measure would be especially appropriate for development of roads, where user charges are difficult, but substantial land value increases are common The use of this tool depends critically on the extent of land price increases and proper timing of development

C. PRIVATE - COMMUNITY RESOURCES	
1 **Development Exactions**	Development exactions or sub-division regulations, require a developer to provide on-site infrastructure as a pre-condition to development approval by a public agency The costs are passed through to home buyers who bear the ultimate cost of infrastructure Such development exactions are defined in the local town planning legislation or building code under sub-division regulations The existing regulations in most cities require developers to provide on-site infrastructure, including roads, drainage, water and sanitation, and provide land for public facilities like school, parks, etc. The major problems, however, relate to ineffective implementation due to poor monitoring systems.
2 **Linkage**	Cities have a variety of developmental needs, some of these are likely to be very profitable in nature, where as others are more social goods with lower returns on investments The concept of Linkage uses this aspect of city development to require a developer to develop the low return public facilities in return for the permission to undertake the more profitable developments like commercial or luxury housing in prime locations. This requires a good assessment of indirect costs and benefits as well as proper monitoring of compliance. Examples of this are where the developers are required to provide a specified proportion of low income housing for developing a site In India, attempts are being made to evolve these through the models like Guided Land Development in Tamilnadu, Licensing of private developers in Haryana and the partnerships by Lucknow Development Authority. Efforts to provide an incentive FSI for slum redevelopment in Bombay is also a form of linkage.

Annex 1
Financial Analysis Model for UEIPs (FIREFAM)

For assessing commercial viability of urban environmental infrastructure projects, a key aspect is the feasibility of commercial rate of return for the investment. This requires a proper financial analysis of project/sector/system costs and revenues FIREFAM, a financial analysis model, has been developed to assist in this task It can be used by both service agencies for project development at a pre-feasibility stage and by potential lenders or financial intermediaries to do a rapid appraisal of the project. While overall structure of the model remains the same for stages I and II of pre-feasibility studies (or rapid appraisal), sensitivity analysis for stage I is more indicative. For stage II, it can be based on more detailed risk assessment.

FIREFAM has been developed on a standard spreadsheet package The minimum hardware equipment requirements for its use are a AT 286 personal commuter, a printer and Lotus 123 software (version 2.2 and above). However, if the personal computer is of 486 family, it would be advisable to have Micro Soft Excel version 5 0 spreadsheet software as it provides better presentation tools than Lotus 2.2

The current development of FIREFAM is more suited to water and sanitation projects/sectors. Further development for solid waste management and area development projects is underway The basic structure of the model is illustrated in Figure 1 It can be used for any of the three alternatives for tariff analysis. Using this model, the required aggregate tariff revisions can be assessed in relation to the cost of funds in the market and past tariff levels. It helps to assess the feasibility of tariff revisions which may be required and the need for exploring new cost recovery mechanisms or repackaging. Impact of more detailed tariff revisions enables the user to assess project viability in relation to exploring new tariff or cost recovery measures.

Table 1.1 presents the estimates of new investments required and preliminary financing Table 1.2 gives past connection and consumption patterns as well as expected growth patterns of connections. Table 1.3 presents consumption and connection forecasts where as Table 1 4 gives system annual costs. Table 1.5 gives initial tariff analysis where as Table 1.6 and 1.7 give detailed tariff analysis. Table 1.8 present sensitivity analysis The detailed reports and outputs in these tables are described in following paragraphs.

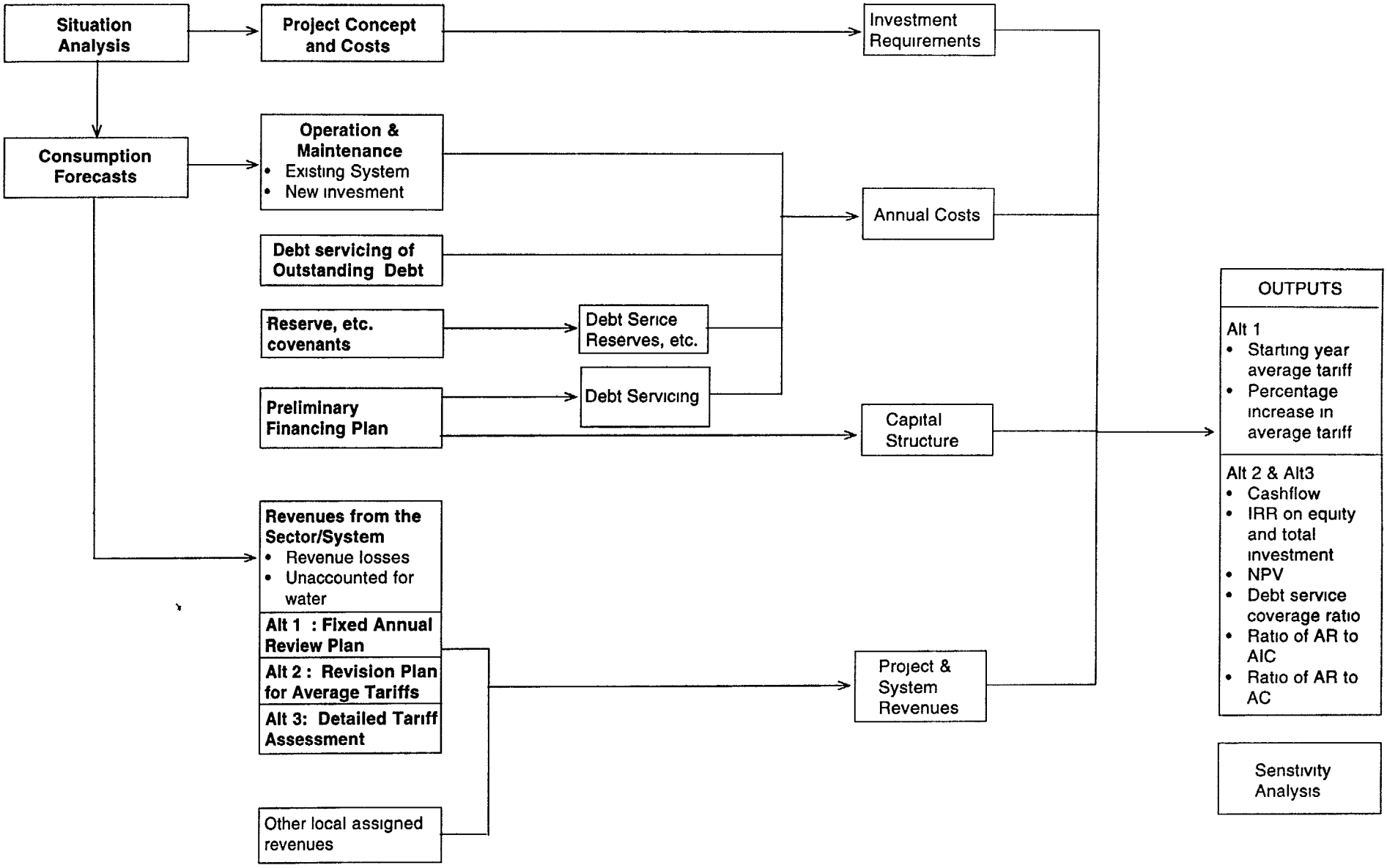
TABLE 1.1 : ESTIMATION OF NEW INVESTMENTS

Inputs·

1. Project Costs : The main inputs related to project costs are,
   1 Year of Base Costs : The year corresponding to prices used for base costs

Figure 1

FINANCIAL MODEL FOR WATER PROJECT VIABILITY ANALYSIS



ii. Base Costs · Base costs need to be given for different components of the project These components may include source development, transmission, treatment and distribution network. This analysis also facilitates bundling/packaging of different services such as water supply and sanitation and water supply and land development

iii. Unit Costs : Unit costs for different components (that are specified in the model) need to be given along with label for unit.

iv. Price escalation to starting year · This is the percentage per annum for escalating the base costs to the starting year of project implementation

v. Physical Contingency : This needs to be given as a percentage of base cost.

vi. Price escalation during Construction Period : This needs to be presented as a percentage per annum. It corresponds to starting year base costs and physical contingencies

vii. Design, Engineering and Supervision Charges · It needs to be given as a percentage of the escalated cost

viii. Interest During Construction : This needs to be given as a percentage per annum and applicable on the total of above mentioned costs It is capitalised in the project costs.

2. Starting Year of Project : This is the starting year of project implementation or analysis

3. Phasing : This is the phasing of the project over time The values are in percentage distribution of project work over time.

4. Preliminary Financing Plan : This indicates the likely financing plan envisaged. The main inputs of this plan are,

i. Equity as a % of Project Cost : The equity amount as a percentage of total project costs needs to be indicated. This can come from either the agency's own funds or stakeholders in the case of Independent Project Entity.

ii. Expected Returns on Equity : This needs to be provided as the expected return on equity per year in percentage.

ii. Debt: Provision is made for two types of debt. These may be from financial institutions, government and/or direct borrowing from the capital market. The user needs to indicate debt as a percentage of project cost, rate of interest, repayment period and starting year for repayment for each of debt. The debt servicing requirements are calculated on a equated annual payment basis. Even in case of instruments maturing after a longer period, the capital recovery portion is assumed to be kept in a special reserve as per the usual practices related to sinking funds.

5 Discount Rate : This is used to discount the future stream of costs and revenues. This may be based on either opportunity cost of capital or average cost of debt which is in this table.

Outputs:

6 Total Project Costs . This is calculated on the basis of inputs related to starting year base costs, physical contingencies, price escalation, design, engineering and supervision charges, interest rates during construction and phasing of the project.

7. Debt-Equity Ratio : This is based on financing plan indicates the ratio of debt to equity.

8. Average Cost of Debt : This is the average cost of debt and may be used for deciding the discount rate

TABLE 1.2 : PAST CONNECTION AND CONSUMPTION PATTERNS AND EXPECTED GROWTH OF CONNECTIONS

Inputs

1 Past Connections across User Groups : This indicates the connections during last five years across user groups. The user groups are divided into three broad categories. First category corresponds to unmetered or user groups based on flat rates (item number 1 i to 1.iv in Table 1 2 are of this category). Second category corresponds to metered supply or user groups based on consumption rates (item number 1.v to 1.x in Table 1 2 are of this category). Third category corresponds to free supply (item number 1.xi to 1.xii in Table 1.2). Sub-tariff categories presented in this Table are indicative and it is advised not to change these roads categories.

2. Past Service Levels across User Groups : This indicates the supply levels in litres per day per connection for different user groups during last five years.

3. Unaccounted for Water (Past) : This must be given as a percentage of total production This may include water leakages in transmission, treatment, distribution and supply to public uses as well as free connections.

4. Expected Growth Rates of Connections : This indicates the likely growth rates of connections across user groups in percentage per annum. This growth rate is an average for five year interval and consists of six such intervals. These growth rates need to be set based on the past growth trends across user groups, availability of distribution network, administrative capability of implementing agency and total planned capacity. This exercise is iterative in nature in a sense both the number of connections and future supply levels (presented in Table 1.3) need to be adjusted (either upwards or downwards) based on the total planned source capacity.

Outputs :

5. Past Consumption and Production : This consumption in million litres per day is worked out based on past connections and quantity supplied (in litres per day per connection) across user groups. The past production is worked based on consumption and unaccounted for water

6. Past Growth Rates of Connections : This indicates an average growth rate of connections across user groups during past five years This can be used to determine the expected growth rate of connections in the future

TABLE 1.3 : CONSUMPTION FORECASTS

Inputs

1. Future Service Levels/Consumption across User Groups : This indicates the likely supply levels in litres per day per connection for different user groups. This needs to be based on existing supply levels and availability of capacity/water
2. Unaccounted for Water (Future) : This must be given as a percentage of total production This may include water leakages in transmission, treatment, distribution and supply to public uses as well as free connections.
3. Capacity of Existing System : This needs to be given in Million Litres per Day.
4. Total Capacity Including Project : This needs to be given in Million Litres per Day. This includes the capacity utilization of existing system and planned capacity of project Moreover, this item is used for cross checking the total production requirements arising as a result of connection forecasts, expected supply levels and unaccounted for water In case total capacity is lessthan production demand, analyst needs to adjust downward either the growth of connections or supply levels.

Outputs

5. Future Connections across User Groups : This indicates the likely connections in the future across user groups This is estimated based on the expected growth rates across user groups for five year intervals.
6. Total Consumption and Production Forecasts : Total consumption is estimated based on number of connections and supply/service levels across user groups. Total production requirements are worked based on total consumption and unaccounted for water. Total production requirements need to be cross checked with total planned capacity. In case, total production requirement is morethan total planned capacity, analyst needs to adjust downward either the growth of connections or supply levels.
7. Total Capacity Utilization : This indicates extent of capacity utilization (i e, total production requirements divided by total planned capacity - both project and existing system) and expressed as a percentage of total planned capacity If this value is less than 100, it indicates under utilization of planned capacity. In case this value is more than 100, it indicates over utilization and production requirements need be adjusted downwards either by reducing the number of connections or supply levels across user groups
8. Non-Domestic Supply as a % of Production : This indicates the percentage of non-domestic supply (industrial, commercial and institutional) in total production.

9. Domestic Supply as a % of Production : This indicates the percentage of total domestic supply in total production.

10 Public and Free Supply as a % of Production This indicates the percentage of total public and free supply (through public taps and free connections) in total production

TABLE 1.4 : SYSTEM ANNUAL COSTS

Inputs

1 Operation and Maintenance Costs : Units costs of operation and maintenance at starting year prices need to be given separately for the existing service system and for the new system. This needs to be given in Rupees lakhs per MLD per annum.

2. Price Escalation for Operation and Maintenance : Price escalation of operation and maintenance in percentage per annum need to be given separately for the existing service system and for the new system.

3. Debt Servicing of Outstanding Loans for Existing System : This is the debt servicing requirements of the existing service system

4. Depreciation : This is the depreciation of existing assets as well as new assets created as a part of the project. For calculating depreciation of new assets, the equity part of the project should be considered, since the debt servicing already includes a capital recovery portion as a part of the principal repayment. Depreciation should also represent the replacement of equipment which is cyclic in nature.

5 Debt Service Reserve : This line item indicates the provision for debt service reserve where part of operating revenues are kept aside for meeting debt service obligations in case of revenue shortfalls. The amount of this reserve requirement should be based on the risk and credit assessment. It is a one time requirement with the facility of replenishment in the case of withdrawal. For example, in the case of a BOT project for water in Indonesia, the debt service reserve amount is kept equal to 6 months' of debt servicing obligations.

6. Other Requirements : This may include provision for tax (corporate income tax) liabilities in the case of independent project entity as well as specific reserves to meet other contingencies such as wage revisions, etc.

Outputs :

7. Total Consumption Forecasts : This indicates the billable supply in million litres per day and is worked out separately for existing and new system based on Table 1.3

8 Total Production Forecasts : This indicates the total production requirements in million litres per day and is worked out separately for existing and new system (this disaggregation is to work out the operation and maintenance expenditure in case these two systems use different supply options such as gravity versus pumping)

9. Operation and Maintenance Expenditure This is worked out based on the future

production, unit cost of operation and maintenance and price escalation of operation and maintenance expenditure. This is done separately for existing and new system

10 Total Operating Expenditure : This indicates the operating expenditure of sector which includes operation and maintenance expenditure, debt servicing on outstanding loans for existing system, servicing of equity and debt, debt service reserve and other requirements

TABLE 1.5 : INITIAL TARIFF ANALYSIS

Inputs

1 Past Revenue · This is the revenue from the water sector during last five years. It is used to estimate the average revenue per kilo litre from the water sector during the last five years

2 Past Revenue Losses : This needs to be given as a percentage of total revenue demand during last five years

3 Past Expenditure : This is the total expenditure on water sector during last five years and is used for evaluating the past performance of water sector.

4 Expected Revenue Losses (Future) : This indicates the likely revenue losses in the future It needs to given as a percentage of total revenue demand for each year of the analysis period

5. Initial Tariff Analysis : There are two alternatives for this analysis.

Alternative 1 : **Fixed Annual Revision in Average Tariff**

i. Annual Fixed Revision : The starting year tariff setting is based on the average cost of the service system during the analysis period (costs includes project and O&M costs, debt servicing requirements) and a fixed annual revision of the average price. The input is fixed price revision in percentage per annum.

ii. Other Dedicated Revenue : This indicates the revenue from other sources which is dedicated to water sector. This also includes the revenue from water tax component of property tax. The quantum of this source depends on the agency's willingness and ability to put aside part of revenues from general sources to water sector

Alternative 2 : **Revision Plan for Average Tariffs**

iii. Aggregate Tariff Revision Plan : Based on average revenue in the past and a *aggregate tariff revision plan* over time. Input is percentage revision per annum for each year of the plan period

iv Other Dedicated Revenue : This indicates the revenue from other sources which is dedicated to water sector. This also includes the revenue from water tax

component of property tax. The quantum of this source depends on the agency's willingness and ability to put aside part of revenues from general sources to water sector.

Outputs ·

6. Effective Charge/Revenue during Previous Year : This is worked based on the previous years revenue and consumption (billable supply) and used for estimating the price revision required during starting year for tariff analysis alternative I. This is expressed in Rupees per Kilo Litre.
7. Cost during Previous Year : This is calculated based on previous year's expenditure and consumption and may be used for evaluating the water sector performance (surplus/deficit). This is expressed in Rupees per Kilo Litre.
8. Average Annual Revision (Past) : This reflects the average revision that was undertaken during last five years. It is expressed as a percentage per annum.
9. Average Incremental Cost (Rs/KL) This is also known as marginal cost which is the cost of producing an additional unit of service It represents average cost of the *new* service system during the analysis period. It is the ratio of the present value of total costs of the *new* service system and the present value of consumption based on *new* service system.
10. Initial Tariff Analysis :

Alternative 1 : **Fixed Annual Revision in Average Tariff**

i. Starting Year Average Tariff : This indicates the required starting year tariff in Rs per Kilo Litre to meet the required rate of return on debt and equity
ii. Percentage Increase in Tariff Required : This is the increase in the average tariff required during starting year as compared to the previous year's tariff. This needs to be compared with the annual average increase in the tariff (above mentioned output item no.3) that has been carried out during the last five years
iii. Charges Over Time : This indicates the proposed charges over time in Rs per Kilo Litre based on above mentioned starting year tariff and fixed annual price revision.
iv. Ratio of Average Revenue to Average Costs : This indicates level of cost recovery for these tariffs. The overall financial self-sufficiency can be measured by comparing long run average revenue as implied by the proposed tariffs and the long run average costs. The ratio of 1 is essential to recover the costs fully

11. Initial Tariff Analysis

Alternative 2 · **Revision Plan for Average Tariffs**

i. Charges Over Time : This indicates the proposed charges in Rs per Kilo Litre over as per the aggregate tariff revision plan.

ii. Ratio of Average Revenue to Average Costs : This indicates level of cost recovery for these tariffs. The overall financial self-sufficiency can be measured by comparing long run average revenue as implied by the proposed tariffs and the long run average costs The ratio of 1 is essential to recover the costs fully

iii. Ratio of Average Revenue to Average Incremental Cost for Service: This indicates ratio of average revenue from these tariffs and average incremental cost of the service This is a measure of efficiency of price structure.

iv. Internal Rate of Return on Total Investments : This is a important indicator in rate of return analysis. The rate of return corresponds to total investments and to time frame of project analysis. It indicates the overall returns of the project during the project period for the tariffs in alternative 2.

v. Internal Rate of Return on Equity : This indicates the likely returns on equity after meeting operating and maintenance costs, debt servicing requirements, debt service reserve, depreciation and other requirements. The revenue from service system is based on tariffs in alternative 2.

vi. Debt Service Coverage Ratio : Indicates the debt coverage capability of the project. It is the ratio of the present value of the net cash flow before servicing debt to the present value of debt servicing requirements. The discount rate specified in inputs is used for the present value analysis.

vii. Net Present Value: This is the present value of net system cash flow (cash flow after meeting the operating and maintenance costs, debt service requirements, debt service reserve, depreciation and other requirements).

TABLE 1.6 : DETAILED TARIFF ANALYSIS - I

Inputs ·

1. Detailed Tariff Setting · This alternative facilitates setting charges for different user groups. The inputs of this alternative are,

   i Tariffs across User Groups : The inputs are tariffs across different categories over analysis period. The tariff categories divided as similar to that of user categories as in Table 1.2. The tariff categories are broadly divided into three categories. The first categories corresponds to user groups based on annual flat rates (item numbers 1 i to 1.iv and 1.xi of Table 1 6). The second category corresponds to user groups based on consumption charges which are expressed in Rs per KL (item numbers 1.v to 1.x of Table 1 6) The third category corresponds to connection charges (item numbers 1 xii to 1 xv of Table 1 6) Sub-tariff categories presented in this Table are indicative and it is advised not to change these roads categories.

Outputs .

2. Quantities : Annual quantities for different tariff categories over time are worked out based on user categories in table 1.2. In case of flat rates category, the total number of connections are worked out from user category based on flat rate in Table 1 2 (item 1 i to 1 iv of Table 1 2). Similarly, in case of consumption rates, the quantity of water supplied is worked out based on supply level and number of connections. In the case of connection charges across user groups, the corresponding number of new connections are worked out. The quantities correspond to the tariff categories presented in this table.

TABLE 1.7 : DETAILED TARIFF ANALYSIS - II

Inputs :

1. Other Dedicated Revenue : This indicates the revenue from other sources which is dedicated to water sector. This also includes the revenue from water tax component of property tax. The quantum of this source depends on the agency's willingness and ability to put aside part of revenues from general sources to water sector.

Outputs :

2. Revenues . The revenue from tariffs estimated based on detailed tariffs and consumption forecasts. Expected revenue losses are also incorporated while forecasting these revenues.
3. Performance Indicators: The performance indicators are,

   i. Ratio of Average Revenue to Average Costs : This indicates level of cost recovery for these tariffs. The overall financial self-sufficiency can be measured by comparing long run average revenue as implied by the proposed tariffs and the long run average costs. The ratio of 1 is essential to recover the costs fully.
   ii. Ratio of Average Revenue to Average Incremental Cost for Service: This indicates ratio of average revenue from these tariffs and average incremental cost of the service. This is a measure of efficiency of price structure.
   iii. Internal Rate of Return on Total Investments This is a an important indicator in rate of return analysis. The rate of return corresponds to total investments and to the time frame of project analysis. This indicates the overall returns of the project during project period for the tariffs in alternative 3.
   iv. Internal Rate of Return on Equity : This indicates the likely returns on equity after meeting operating and maintenance costs, debt servicing requirements, debt service reserve, depreciation and other requirements. The revenue from the service system is based on tariffs in alternative 3.
   v. Debt Service Coverage Ratio : Indicates the debt coverage capability of project. It is the ratio of the present value of net cash flow before servicing debt to the

present value of debt servicing requirements. The discount rate specified in inputs is used for the present value analysis.

vi. Net Present Value· This is the present value of net system cash flow (cash flow after meeting the operating and maintenance costs, debt service requirements, debt service reserve, depreciation and other requirements).

TABLE 1.8 : SENSITIVITY ANALYSIS

The sensitivity analysis table consists of comparative performance of project for different situations such as changes in project costs (compared to base cost) and project revenues. The key variables which could be used to judge the project across these situations are presented in this table.

FIREFAM: Financial Analysis Model - Inputs and Output Analysis

(All monetary values are in Rs Lakhs)

TABLE 1 1 · ESTIMATION OF NEW INVESTMENTS

1	**Project Costs**						
a.	Base Costs *1993* Prices						
	Main Components	Costs	Cost per Unit	Unit	Total Quantity	Unit	
	Source	*1856*	*12 54*	*Rs Lakhs per MLD*	*0 00*	*MLD*	
	Transmission	*3545*	*64 45*	*Rs Lakhs per KM*	*0 00*	*KM*	
	Treatment	*1263*	*6 82*	*Rs Lakhs per MLD*	*0 00*	*MLD*	
	Distribution	*3216*	*18 92*	*Rs Lakhs per KM*	*0 00*	*KM*	
	Component 5	*0*	*0 00*	*Rs Lakhs per ____*	*0 00*	_____	
	Component 6	*0*	*0 00*	*Rs Lakhs per ____*	*0 00*	_____	
	Component 7	*0*	*0 00*	*Rs Lakhs per ____*	*0 00*	_____	
	Component 8	*0*	*0 00*	*Rs Lakhs per ____*	*0 00*	_____	
	Total	9879					
b	Price Escalation to Starting Year	*10 00*	% per annum	2075			
c	Physical Contingency	*8 00*	% of base cost	956			
d.	Price Escalation during construction	*6 00*	% per annum	1938			
e	Design, Engineering and Supervision	*10 00*	% of escalated cost	1485			
f	Interest during Construction	*16 00*	% per annum	2613			
	Total Project Costs			18946	*128 02*	*Rs Lakhs per MLD*	

	Item	*1995*	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2	**Phasing**															
a	Phasing - % distribution of Costs	*10 0*	*20 0*	*20 0*	*25 0*	*25 0*	*0 0*	*0 0*	*0 0*	*0 0*	*0 0*	*0 0*	*0 0*	*0 0*	*0 0*	*0 0*
b	Base Costs over time	1195	2391	2391	2989	2989	0	0	0	0	0	0	0	0	0	0
c	Physical Contingencies	96	191	191	239	239	0	0	0	0	0	0	0	0	0	0
d.	Price Escalation during Construction	0	155	319	617	847	0	0	0	0	0	0	0	0	0	0
e	Design, Engineering and Supervision	129	274	290	384	407	0	0	0	0	0	0	0	0	0	0
f	Interest during Construction	227	482	511	677	717	0	0	0	0	0	0	0	0	0	0
	Total Capital Cost	1647	3492	3702	4905	5199	0	0	0	0	0	0	0	0	0	0

3	**Preliminary Financing Plan**	Amount as a % of cost	Amount	Expected Return		
a.	Equity	*33 30*	6309	*18 00*		
b	Debt Component		Amount	Interest Rate	Repayment Period	Starting Year for Repayment
i	Debt 1	*33 30*	6309	*18.00*	*12*	*2000*
ii	Debt 2	*33 40*	6328	*16 00*	*30*	*2000*
	Total	100 00	18946			
					Debt-Equity Ratio	2 00
4	Discount Rate for Present Value Analysis in %			*15 00*	Average Cost of Debt	17 00

TABLE 1 2 PAST CONSUMPTION AND CONNECTION PATTERNS AND GROWTH FORECASTS

			Number of Connections					Quantity of Supply in Litres per Connection per day				
1	**Connections**											
	User Category		1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
i	Domestic Unmetered	*1/2 Inch Dia*	*88946*	*90761*	*92613*	*94503*	*96432*	*690*	*640*	*590*	*550*	*520*
ii	Domestic Unmetered	*3/4 Inch Dia*	*11118*	*11345*	*11577*	*11813*	*12054*	*1250*	*1250*	*1250*	*1250*	*1250*
iii	Domestic Unmetered	*1 Inch Dia*	*7783*	*7942*	*8104*	*8269*	*8438*	*1500*	*1500*	*1500*	*1500*	*1500*
iv	Domestic Unmetered	*Morethan 1 Inch*	*3335*	*3404*	*3473*	*3544*	*3616*	*1750*	*1750*	*1750*	*1750*	*1750*
v	Domestic Metered	*Block 1*	*765*	*788*	*813*	*838*	*864*	*500*	*500*	*500*	*500*	*500*
vi	Domestic Metered	*Block 2*	*510*	*526*	*542*	*559*	*576*	*750*	*750*	*750*	*750*	*750*
vii	Industrial	*Bulk Users*	*10*	*12*	*14*	*15*	*15*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*
viii	Industrial	*Others*	*210*	*215*	*221*	*229*	*238*	*100000*	*100000*	*100000*	*100000*	*100000*
ix	Commercial		*7290*	*7515*	*7747*	*7987*	*8234*	*200*	*200*	*200*	*200*	*200*
x	Institutional		*300*	*307*	*313*	*320*	*327*	*12000*	*12000*	*12000*	*12000*	*12000*
xi	Public Taps		*225*	*240*	*253*	*265*	*273*	*1000*	*1000*	*1000*	*1000*	*1000*
xii	Free Connections		*102*	*114*	*123*	*132*	*146*	*200*	*200*	*200*	*200*	*200*
	Total Connections		120594	123168	125793	128474	131213					
	Total Supply in MLD							130	130	130	130	130
	Unaccounted for Water as a % to total production							*25 00*	*25 00*	*25 00*	*25 00*	*25 00*
	Total Production in MLD							173	173	173	173	173

			During Past Five Years	Project Analysis Period - Projections (Based on Connections in Previous Page)					
2	**Expected Growth Rates in % per annum**								
	User Category		1994 to 1990	1995 to 1999	2000 to 2004	2005 to 2009	2010 to 2014	2015 to 2019	2020 to 2024
i	Domestic Unmetered	1/2 Inch Dia	1 68	*1 25*	*2 00*	*1 50*	*1 50*	*1 50*	*1 50*
ii	Domestic Unmetered	3/4 Inch Dia	1 68	*1 25*	*2 00*	*1 50*	*1 50*	*1 50*	*1 50*
iii	Domestic Unmetered	1 Inch Dia	1 68	*1 25*	*2 00*	*1 50*	*1 50*	*1 50*	*1 50*
iv	Domestic Unmetered	Morethan 1 Inch	1 68	*1.25*	*2 00*	*1 50*	*1 50*	*1 50*	*1 50*
v	Domestic Metered	Block 1	2 59	*1 25*	*3 00*	*2 00*	*2 00*	*2.00*	*2 00*
vi	Domestic Metered	Block 2	2 59	*1 25*	*3 00*	*2 00*	*2 00*	*2 00*	*2 00*
vii	Industrial	Bulk Users	10 00	*1 50*	*3 00*	*1 50*	*1 50*	*1 50*	*1 50*
viii	Industrial	Others	2 67	*1 50*	*3 00*	*1 50*	*1 50*	*1 50*	*1 50*
ix	Commercial		2 59	*2 50*	*3 00*	*1 50*	*1 50*	*1 50*	*1 50*
x	Institutional		1 80	*1 50*	*2 00*	*1 50*	*1 50*	*1 50*	*1 50*
xi	Public Taps		4 27	*2 00*	*4 00*	*1 50*	*1 50*	*1 50*	*1 50*
xii	Free Connections		8 63	*2 00*	*4 00*	*1 50*	*1 50*	*1 50*	*1 50*

TABLE 1.3 CONSUMPTION FORECASTS (CONNECTIONS AND PRODUCTION)

1	**Connection Forecasts**		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
i	Domestic Unmetered	1/2 Inch Dia	97637	98858	100094	101345	102612	104664	106757	108892	111070	113291	114991	116716	118466	120243	122047
ii	Domestic Unmetered	3/4 Inch Dia	12205	12357	12512	12668	12826	13083	13345	13612	13884	14161	14374	14589	14808	15030	15256
iii	Domestic Unmetered	1 Inch Dia	8543	8650	8758	8868	8979	9158	9341	9528	9719	9913	10062	10213	10366	10521	10679
iv	Domestic Unmetered	Morethan 1 Inch	3661	3707	3754	3800	3848	3925	4003	4083	4165	4248	4312	4377	4442	4509	4577
v	Domestic Metered	Block 1	875	886	897	908	919	947	975	1005	1035	1066	1087	1109	1131	1154	1177
vi	Domestic Metered	Block 2	583	590	598	605	613	631	650	670	690	711	725	739	754	769	784
vii	Industrial	Bulk Users	15	15	16	16	16	17	17	18	18	19	19	19	20	20	20
viii	Industrial	Others	241	245	248	252	256	263	271	279	288	296	301	305	310	315	319
ix	Commercial		8337	8545	8759	8978	9202	9478	9763	10056	10357	10668	10828	10991	11155	11323	11493
x	Institutional		331	336	341	346	351	358	366	373	380	388	394	400	406	412	418
xi	Public Taps		276	282	288	293	299	311	324	337	350	364	369	375	381	386	392
xii	Free Connections		148	151	154	157	160	166	173	180	187	195	198	201	204	207	210
	Total Connections		132853	134623	136417	138237	140082	143003	145985	149032	152143	155321	157659	160033	162443	164889	167372
2.	**Consumption Forecasts (In Litres per Connection per Day)**																
i	Domestic Unmetered	1/2 Inch Dia	*500*	*500*	*500*	*500*	*800*	*800*	*800*	*800*	*800*	*800*	*800*	*800*	*800*	*800*	*800*
ii	Domestic Unmetered	3/4 Inch Dia	*1250*	*1200*	*1145*	*1000*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*
iii	Domestic Unmetered	1 Inch Dia	*1500*	*1400*	*1400*	*1400*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*
iv	Domestic Unmetered	Morethan 1 Inch	*1750*	*1750*	*1500*	*1500*	*1750*	*1750*	*1750*	*1750*	*1750*	*1750*	*1750*	*1750*	*1750*	*1750*	*1750*
v	Domestic Metered	Block 1	*500*	*500*	*500*	*500*	*750*	*750*	*750*	*750*	*750*	*750*	*750*	*750*	*750*	*750*	*750*
vi	Domestic Metered	Block 2	*750*	*750*	*750*	*750*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*
vii	Industrial	Bulk Users	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*	*1000000*
viii	Industrial	Others	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*	*100000*
ix	Commercial		*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*	*200*
x	Institutional		*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*	*12000*
xi	Public Taps		*1000*	*1000*	*1000*	*1000*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*	*1500*
xii	Free Connections		*200*	*200*	*200*	*200*	*300*	*300*	*300*	*300*	*300*	*300*	*300*	*300*	*300*	*300*	*300*
	Total Supply in MLD		129	130	130	130	168	172	176	180	184	188	191	194	196	199	202
	Unaccounted for Water in %		*25 00*	*25 00*	*25 00*	*25 00*	*25 00*	*20 00*	*20 00*	*20 00*	*20 00*	*20 00*	*20 00*	*20 00*	*20 00*	*20 00*	*20 00*
	Total Production in MLD		173	173	173	173	224	215	219	224	230	235	238	242	246	249	253
	Capacity of Existing System in MLD		*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*	*173*
	Total Capacity in MLD (incl project)		*173*	*173*	*173*	*173*	*282*	*282*	*282*	*282*	*282*	*282*	*282*	*282*	*282*	*282*	*282*
	Total Capacity Utilization in %		100	100	100	100	79	76	78	80	81	83	85	86	87	88	90
	Non-Domestic Supply in Production (%)		26 04	26 38	26 76	27 19	21 33	22 90	23 04	23 18	23 33	23 47	23 47	23 47	23 47	23 47	23 47
	Domestic Supply in Production (%)		48 78	48 44	48 05	47 62	53 44	56 86	56 71	56 57	56 42	56 27	56 27	56 27	56 27	56 27	56 27
	Public and Free Supply in Production (%)		0 18	0 18	0 18	0 19	0 22	0 24	0 24	0 25	0 25	0 26	0 26	0 26	0 26	0 26	0 26

TABLE 1 4 SYSTEM ANNUAL COSTS

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	**Total Consumption in MLD**															
a.	Existing System	129	129	129	129	129	138	138	138	138	138	138	138	138	138	138
b	New System	0	0	0	0	38	33	37	41	45	49	52	55	58	61	64
c	*Total Billable Supply*	129	129	129	129	167	171	175	179	183	187	190	193	196	199	202
2	**Unaccounted for Water (%)**	25 00	25 00	25 00	25 00	25 00	20 00	20 00	20 00	20 00	20 00	20 00	20 00	20 00	20 00	20 00
3	**Total Production in MLD**															
a.	Existing System	173	173	173	173	173	173	173	173	173	173	173	173	173	173	173
b	New System	0	0	0	0	51	42	46	51	57	62	65	69	73	76	80
c	*Total Production*	173	173	173	173	224	215	219	224	230	235	238	242	246	249	253
	System Annual Costs															
4	**Operation and Maintenance Costs** in Rs Lakhs/MLD per Year (Starting Year Prices)					a For Existing System		*2 50*		b For New System		*10 00*				
5	Price Escalation for O&M in % per annum															
a	For Existing System	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*
b	For New System	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*	*6 00*
6	Operation and Maintenance Expenditure															
a.	on Existing System	433	458	486	515	546	579	614	650	689	731	775	821	870	922	978
b	on New System	0	0	0	0	642	557	660	774	902	1045	1171	1309	1461	1627	1810
c	*Total O&M*	433	458	486	515	1188	1136	1273	1425	1592	1776	1945	2130	2331	2550	2788
7	Debt Servicing of Outstanding Loans for Existing System	*450*	*360*	*288*	*230*	*184*	*147*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
8	Depreciation	*150*	*150*	*150*	*150*	*150*	*250*	*265*	*281*	*298*	*316*	*335*	*355*	*376*	*398*	*422*
9	Servicing of Equity and Debt															
a	Equity	0	0	0	0	0	1136	1136	1136	1136	1136	1136	1136	1136	1136	1136
b	Debt 1	0	0	0	0	0	1316	1316	1316	1316	1316	1316	1316	1316	1316	1316
c.	Debt 2	0	0	0	0	0	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024
10	Debt Service Reserve	*0*	*0*	*0*	*0*	*0*	*400*	*770*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
11	Other Requirements	*0*	*0*	*0*	*0*	*0*	*100*	*107*	*114*	*123*	*131*	*140*	*150*	*161*	*172*	*184*
	Total System Annual Costs	1033	968	924	896	1522	5509	5891	5296	5488	5699	5897	6111	6344	6597	6870

TABLE 1 5 INITIAL TARIFF ANALYSIS

1	Past Performance	1990	1991	1992	1993	1994			g	Effective Charge/Revenue during Previous Year (Rs/KL)						2.13
a.	Past Production (MLD)	173	173	173	173	173			h	Cost during Previous Year in Rs/KL						2.86
b	Past Unaccounted for Water (%)	25 00	25 00	25 00	25 00	25 00			16	Average Annual Revision in % per annum (Based on last five years)						7.53
c.	Past revenue	*758*	*849*	*951*	*980*	*1009*										
d.	Past Revenue Losses (in %)	*30 00*	*30 00*	*30 00*	*30 00*	*30 00*										
e	Past Expenditure	*1016*	*1138*	*1275*	*1313*	*1353*										
2	**Average Incremental Cost of Project in Rs/KL**			12 54	with an annual revision equal to price escalation during construction											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
3	Expected Revenue Losses (Future in %)	*30 00*	*29 50*	*29 00*	*28 50*	*28 00*	*27 50*	*27 00*	*26 50*	*26 00*	*25 50*	*25 00*	*24 50*	*24 00*	*23 50*	*23 00*
4	**INITIAL TARIFF ANALYSIS**	**Alternative 1 · Fixed Annual Revisions in Average Tariffs**														
a.	Annual Revision of Tariff in Percentage per Annum			*7.00*												
b	Starting Year Tariff Required in Rs/KL	1995		3 13		Percentage increase required over previous year				46 92						
c	Other Dedicated Revenues for this sector	*100*	*110*	*121*	*133*	*146*	*161*	*177*	*195*	*214*	*236*	*259*	*285*	*314*	*345*	*380*
d.	Estimated Charges Over Time (Rs/KL)	3 13	3 35	3 59	3 84	4 10	4 39	4 70	5 03	5 38	5 76	6 16	6 59	7 05	7 55	8 08
e	Ratio of Average Revenue to Average Cost			1 00		Average Revenue in Rs/KL			5 74		Average Cost in Rs/KL			5 73		
5	**INITIAL TARIFF ANALYSIS**	**Alternative 2 : Revision Plan for Average Tariffs**														
a.	Tariff Revision Plan (in % per annum over previous year charge)	*25 00*	*25 00*	*30 00*	*30 00*	*30 00*	*0 00*	*15 00*	*0 00*	*15 00*	*0 00*	*15 00*	*0 00*	*15 00*	*0 00*	*15.00*
b	Estimated Charges over Time (Rs/KL)	2 66	3 33	4 33	5 63	7 32	7 32	8 41	8 41	9 68	9 68	11 13	11 13	12.80	12.80	14 72
c	Other Dedicated Revenues for this sector	*100*	*110*	*121*	*133*	*146*	*161*	*177*	*195*	*214*	*236*	*259*	*285*	*314*	*345*	*380*
6	**Performance Indicators**															
i	Internal Rate of Return on Total Investments			26 09												
ii	Internal Rate of Return on Equity			18 23		Required Rate on Equity			18 00 %							
iii	Debt Service Coverage Ratio			3 36		At Discount Rate of			15 00 %							
iv	Net Present Value of Net Project Cash Flow			4276		At Discount Rate of			15 00 %							
v	Ratio of Average Revenue (AR) to Average Incremental Cost (AIC)			0 71		Average Revenue in Rs/KL			8 95		Average Incremental Cost in Rs/KL			12.54		
vi	Ratio of Average Revenue to Average Cost			1 56		Average Revenue in Rs/KL			8 95		Average Cost in Rs/KL			5 73		

TABLE 1 6 : DETAILED TARIFF ANALYSIS - I

	Item		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	**Tariff Category**	Unit		**Charges**	(For unmetered connections, charge is in Rs per connection per annum, For metered supply, charge is in Rs per Kilo Litre))												
i	D Unmtd. 1/2 inch	Rs/Conn/Year	300	321	343	368	393	421	450	482	515	552	590	631	676	723	774
ii	D Unmtd. 3/4 inch	Rs/Conn/Year	1000	1070	1145	1225	1311	1403	1501	1606	1718	1838	1967	2105	2252	2410	2579
iii	D Unmtd. 1 inch	Rs/Conn/Year	1500	1605	1717	1838	1966	2104	2251	2409	2577	2758	2951	3157	3378	3615	3868
iv	D Unmtd morethn 1"	Rs/Conn/Year	2000	2140	2290	2450	2622	2805	3001	3212	3436	3677	3934	4210	4504	4820	5157
v	D Mtd Block 1	Rs/KL	2.0	2 1	2 3	2 5	2 6	2 8	3 0	3 2	3 4	3 7	3 9	4 2	4 5	4 8	5.2
vi	D Mtd Block 2	Rs/KL	4 0	4 3	4 6	4 9	5 2	5 6	6 0	6 4	6 9	7 4	7 9	8 4	9 0	9 6	10 3
vii	Indstrl - Bulk Users	Rs/KL	17 0	18 2	19 5	20 8	22 3	23 8	25 5	27 3	29 2	31 3	33 4	35 8	38 3	41 0	43 8
viii	Indstrl - Others	Rs/KL	8 5	9 1	9 7	10 4	11 1	11 9	12 8	13 6	14 6	15 6	16 7	17 9	19 1	20 5	21 9
ix	Commercial	Rs/KL	6 0	6 4	6 9	7 4	7 9	8 4	9.0	9 6	10 3	11 0	11 8	12.6	13 5	14 5	15.5
x	Institutional	Rs/KL	4 0	4 3	4.6	4 9	5 2	5 6	6 0	6 4	6 9	7 4	7 9	8 4	9 0	9 6	10 3
xi	Public Taps	Rs/Conn/Year	150	161	172	184	197	210	225	241	258	276	295	316	338	361	387
xii	C Charge - Domestic	Rs/New Conn	1000	1070	1145	1225	1311	1403	1501	1606	1718	1838	1967	2105	2252	2410	2579
xiii	C Charge - Industrial	Rs/New Conn	5000	5350	5725	6125	6554	7013	7504	8029	8591	9192	9836	10524	11261	12049	12893
xiv	C Charge - Commercial	Rs/New Conn	3000	3210	3435	3675	3932	4208	4502	4817	5155	5515	5901	6315	6757	7230	7736
xv	C Charge - Institutional	Rs/New Conn	2000	2140	2290	2450	2622	2805	3001	3212	3436	3677	3934	4210	4504	4820	5157
2	**Quantities**	Unit	**Quantities**														
i	D Unmtd 1/2 inch	Total Connections	97637	98858	100094	101345	102612	104664	106757	108892	111070	113291	114991	116716	118466	120243	122047
ii	D Unmtd 3/4 inch	Total Connections	12205	12357	12512	12668	12826	13083	13345	13612	13884	14161	14374	14589	14808	15030	15256
iii	D Unmtd 1 inch	Total Connections	8543	8650	8758	8868	8979	9158	9341	9528	9719	9913	10062	10213	10366	10521	10679
iv	D Unmtd morethn 1"	Total Connections	3661	3707	3754	3800	3848	3925	4003	4083	4165	4248	4312	4377	4442	4509	4577
v	D Mtd Block 1	KL/Annum	159651	161647	163667	165713	251677	259227	267004	275014	283264	291762	297598	303549	309620	315813	322129
vi	D Mtd Block 2	KL/Annum	159651	161647	163667	165713	223713	230424	237337	244457	251791	259344	264531	269822	275218	280723	286337
vii	Indstrl - Bulk Users	KL/Annum	5543438	5626589	5710988	5796653	5883603	6060111	6241914	6429171	6622046	6820708	6923018	7026864	7132267	7239251	7347839
viii	Indstrl - Others	KL/Annum	8795588	8927521	9061434	9197356	9335316	9615375	9903837	10200952	10506980	10822190	10984523	11149290	11316530	11486278	11658572
ix	Commercial	KL/Annum	608596	623810	639406	655391	671776	691929	712687	734067	756089	778772	790454	802310	814345	826560	838959
x	Institutional	KL/Annum	1450163	1471916	1493994	1516404	1539150	1569933	1601332	1633359	1666026	1699346	1724837	1750709	1776970	1803624	1830679
xi	Public Taps	Total Connections	276	282	288	293	299	311	324	337	350	364	369	375	381	386	392
xii	C Charge - Domestic	New Connections	1525	1544	1563	1583	1602	2611	2664	2718	2773	2828	2160	2192	2225	2259	2293
xiii	C Charge - Industrial	New Connections	3	4	4	4	4	8	8	9	9	9	5	5	5	5	5
xiv	C Charge - Commercial	New Connections	103	208	214	219	224	276	284	293	302	311	160	162	165	167	170
xv	C Charge - Institutional	New Connections	4	5	5	5	5	7	7	7	7	8	6	6	6	6	6

TABLE 1 7 DETAILED TARIFF ANALYSIS - II

	Item	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
3	**Revenues**	**Revenues (In Rupees Lakhs)**														
i	Other Dedicated Revenues for this sector	*100*	*110*	*121*	*133*	*146*	*161*	*177*	*195*	*214*	*236*	*259*	*285*	*314*	*345*	*380*
	Revenue from Tariffs															
i	Current Demand	2429	2641	2866	3112	3383	3734	4104	4511	4958	5450	5895	6403	6954	7552	8202
ii	Revenue Losses (%)	30 00	29 50	29 00	28 50	28 00	27 50	27 00	26 50	26 00	25 50	25 00	24 50	24 00	23 50	23 00
iii	Arrears	729	994	1120	1206	1285	1380	1481	1588	1702	1824	1930	2041	2159	2282	2411
iv	Total Revenues for Water Sector (Inclusive of Other Dedicated Revenue)	1801	2485	2862	3158	3450	3800	4181	4599	5058	5564	6048	6576	7150	7774	8453
4	**CASH FLOW ANALYSIS**															
i	Net Cash Flows (before Servicing Debt)	-879	-1975	-1764	-2642	-3271	2267	2643	2893	3169	3473	3769	4091	4443	4826	5243
ii	Debt Service Coverage Ratio	0 00	0 00	0 00	0 00	0 00	0 97	1 13	1 24	1 35	1 48	1 61	1 75	1 90	2 06	2.24
iii	Net System Cash Flow	-879	-1975	-1764	-2642	-3271	-574	-575	438	706	1001	1288	1601	1942	2313	2718

5	**Performance Indicators**					
i	Internal Rate of Return on Total Investments	24 29				
ii	Internal Rate of Return on Equity	15 42	Required Rate on Equity	18 00 %		
iii	Debt Servicing Coverage Ratio	2 34	At Discount Rate of	15 00 %		
iv	Net Present Value of Net Project Cash Flow	427	At Discount Rate of	15 00 %		
v	Ratio of Average Revenue (AR) to Average Incremental Cost (AIC)	0 66	Average Revenue in Rs/KL	8 34	Average Incremental Cost in Rs/KL	12.54
vi	Ratio of Average Revenue to Average Cost	1 45	Average Revenue in Rs/KL	8 34	Average Cost in Rs/KL	5 73

TABLE 1 8 · SENSITIVITY ANALYSIS

Summary Table

(All monetary values are in Rs Lakhs)

Sensitivity Analysis for Project Variables for Tariff Analysis Alternative III at debt equity ratio of *1 2*

	Alternatives for Project Variables/ Risks	Total Project Cost	Financing Plan			Performance Indicators				Ratio of AR to AIC	Ratio of AR to AC
			Equity	Debt 1	Debt 2	IRR on Total Invest-ments in %	IRR on Equity in %	Debt Service Coverage Ratio at Discount Rate of 15 %	NPV at Discount Rate of 15 %		
1	Base Case	18946	6309	6309	6328	24 29	15 42	2 34	427	0 66	1 45
2.	Scenario 1 Project Costs (Increase by 25%)	23683	7886	7886	7910	17 55	9 77	1 65	-6624	0 55	1 19
3	Scenario 2 Project Costs (Decrease by 25%)	15157	5047	5047	5062	34 77	23 33	3 20	6067	0 80	1 77
4	Scenario 3 Project Revenues (Increase by 25%)	18946	6309	6309	6328	37 12	25 02	3 20	8540	0 83	1 82
5	Scenario 4 Project Revenues (Decrease by 25%)	18946	6309	6309	6328	16 88	9 15	1 65	-6064	0 53	1 16

Annex 2 : FORMATS FOR QUANTITATIVE INFORMATION TO BE SENT TO FINANCIAL INSTITUTIONS FOR STAGE I

Table A2.1 : Formats for Quantitative Information on Projects from Agencies for Stage I

(All monetary values are in Rs Lakhs)

1 **Project Costs**

a Base Costs at _____ Prices

Main Components	Costs
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Total	_____

b Price Escalation to Starting Year _____ % per annum

c Physical Contingency _____ % of base cost

d Price Escalation during construction _____ % per annum

e Design, Engineering and Supervision _____ % of escalated cost

f Interest during Construction _____ % per annum

2 **Preliminary Financing Plan**

		Amount as a % of cost	Expected Return		
a	Equity	_____	_____		
b	Debt Component		Interest Rate	Repayment Period	Starting Ye for Repaym
i	Debt 1	_____	_____	_____	_____
ii	Debt 2	_____	_____	_____	_____
c	Discount Rate in %		_____		

	Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8							Year 29	Year 30
3	Phasing - % distribution of costs																
4	Operation and Maintenance Unit Costs (at Starting Years Prices) in Rs Lakhs per MLD								For Existing System			_____		For New System			_____
5	Price Escalation of Operation and Maintenance Expenditure in % per annum																
a	For Existing System																
b	For New System																
6	Debt Servicing of Outstanding Loans for Existing System																
8	Depreciation																
9	Other Requirements																
10	Expected Revenue Losses in % (as a % of total revenue demand)																
11	Other Dedicated Revenue for this sector																

Table A2 1 Continued

Future Connections and Consumption

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8							Year 29	Year 30
12	Connections across user category																
	User Category																
i																	
ii																	
iii																	
iv																	
v																	
vi																	
vii																	
viii																	
ix																	
x																	
xi																	
xii																	
13	Consumption Forecasts (in Litres per day per connection) across user category)																
i																	
ii																	
iii																	
iv																	
v																	
vi																	
vii																	
viii																	
ix																	
x																	
xi																	
xii																	
14	Unaccounted for Water (as a % of production)																
15	Capacity of Existing System in MLD																

Table A2.1 Continued ....

16 **Past Connections**

	User Category	Year 1	Year 2	Year 3	Year 4	Year 5
i						
ii						
iii						
iv						
v						
vi						
vii						
viii						
ix						
x						
xi						
xii						

17	Past Unaccounted for Water in %					

19 **Past Revenue and Expenditure Details**

a	Past Revenue					
b	Past Revenue Losses in %					
c	Past Expenditure					

18 **Past Connections and Tariffs (Give Annual Rates)**

	Tariff Category	Unit for Rate	Year 1	Year 2	Year 3	Year 4	Year 5
i							
ii							
iii							
iv							
v							
vi							
vii							
viii							
ix							
x							
xi							
xii							
xiii							
xiv							
xv							

Table A2.1 Continued

19 **Tariff Categories and Charges Over Time (Give Annual Charges)**

	Tariff Category	Unit for Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8							Year 29	Year 30
i																		
ii																		
iii																		
iv																		
v																		
vi																		
vii																		
viii																		
ix																		
x																		
xi																		
xii																		
xiii																		
xiv																		
xv																		

20 **Tariff Category** — **Quantities (Give annual quantities)**

	Tariff Category	Unit for Quantity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8							Year 29	Year 30
i																		
ii																		
iii																		
iv																		
v																		
vi																		
vii																		
viii																		
ix																		
x																		
xi																		
xii																		
xiii																		
xiv																		
xv																		