



# Preparation of Medium Term Investment Plan (MTIP) and Pre-Feasibility Studies (PFS) for an Integrated Water Supply Distribution System in Greater Visakhapatnam, India

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Executive Summary



1. The objective of the study was to prepare a Medium Term Investment Plan (MTIP) for an Integrated Water Supply Distribution System for the Greater Visakhapatnam area, identify the priority projects, and subsequently perform a Pre-Feasibility Study (PFS) of the prioritised projects. This project is supported by Cities Development Initiative for Asia (CDIA).
2. The study was divided into two phases. The first phase identified the issues and proposed the possible interventions in the form of Medium Term Investment Plan (MTIP). This was taken forward in the second phase as Pre-Feasibility Study, which included in-depth investigation and analysis of the proposed options to evaluate their feasibility based on 4 important factors viz. technical, environmental, social and financial. Overall the study includes identification of key issues currently faced by the water supply system in the Visakhapatnam area and envisaged threats to future sustainability of urban water of the study region.
3. MTIP included identification of primary issues faced by water supply system in Visakhapatnam. The identification of issues was done based on the extensive consultation carried out with relevant stakeholders and GVMC officials, collection and analysis of data. The issues were identified on the basis of technical, environmental, social and financial implications. The identified issues were limited availability of raw water, insufficient maintenance of the sources, lack of infrastructure for monitoring water quality, loss of water due to NRW, lack of skilled staff, lack of information management system and few more. Based on the identified issues, relevant recommendations were provided in the MTIP. MTIP with an objective to ensure long-term sustainability of water resources suggests that the focus of water management needs to shift from a traditional supply side management to demand side management, which has traditionally been neglected. Though augmentation of supplies would be required to meet the growing demand in urban centres, the future however lies in effectively controlling the demand for water resources and efficiently managing and using the available resources. The suggestion of the MTIP is to develop an integrated water demand management strategy, which would aim at reducing the losses in the system (non-revenue water - NRW), improving operational efficiencies, promoting rational use of water resources, equitable distribution of the resource and exploring alternative sources such as recycling of wastewater for non-potable uses. Thus based on this approach following options were proposed to be taken up for Pre-Feasibility Study for Integrated Water Supply Distribution System for the Greater Visakhapatnam area:
  4. NRW reduction and source sustainability projects like desalination, de-silting, rainwater harvesting, wastewater recycling
    - 4.1. Integrated information management system including asset management
    - 4.2. Energy audit
    - 4.3. Water quality management
    - 4.4. Training and capacity building of GVMC staff
5. These options were further evaluated in the Phase 2 of the project. The methodology adopted for this process was based on the extensive stakeholder consultation including consultation with GVMC officials and data and information collection and analysis. These evaluated options were then developed as PFS package which included detail of all these identified and selected interventions. Further these options were prioritized and based on this an implementation strategy was proposed. Implementation strategy also includes involvement of stakeholders for successful implementation of PFS options. All these options are then financially evaluated for different tariff scenarios. Suggested PFS options will help address the water demand supply gap in GVMC including accessibility to all the consumers, particularly urban poor.

## NRW reduction and source sustainability projects

6. NRW reduction and source sustainability project has been identified as the most important strategy for reducing NRW losses and bridging the water demand supply gap. NRW reduction mainly includes components such as metering, installation of pressure reducing valves (PRVs), water audit, conversion of open channels to close conduit and replacement of old pipelines. These measures are important to curb NRW losses which are reported by GVMC to be around 40%. Other source augmentation and water conservation projects that form part of this strategy include de-silting of major reservoirs, desalination, wastewater recycling and re-use for non-potable purpose and rain water harvesting at a pilot scale. Of these mentioned options, only converting open channels to closed conduits and replacing old pipelines are long term investment plan while the rest are short/medium term investment plan (2-5 years). The main departments responsible for taking up these interventions are Water Supply Department and Engineering Department. The estimated cost for this particular option of NRW reduction and source sustainability projects is approximately Rs. 2781 crores.

## Integrated information management system

7. Maintaining and managing huge volumes of data is a concern for any growing urban local bodies such as Visakhapatnam. It is critical for the urban authorities to maintain and manage the data in a systematic manner at all times in order to operate in an efficient way. One of the PFS interventions envisaged during the Phase I of this study was incorporation of an integrated information management system for the water supply and distribution system of GVMC. This intervention is a low-cost immediate action which will help the Water Supply and Distribution (WSD) Department of GVMC to better manage their data and improve their service delivery. The proposed interventions in managing the information within the Water Supply and Distribution (WSD) Department of GVMC are aimed at achieving the following objectives.

- 7.1. Storage, maintenance and management of useful data in a systematic fashion
- 7.2. Improved services to customers
- 7.3. Achieving the targeted service level benchmarks (SLB)
- 7.4. Enhanced asset life
- 7.5. Monitoring of resources

8. A thorough analysis of existing information management systems within the WSD Department of GVMC was undertaken in order to assess the gaps and required improvements needed. GVMC has a management information system (MIS) in place, but there is no exclusive MIS for WSD Department as the existing MIS caters to all departments within GVMC. Based on the analysis following improvements and additions to the existing system were recommended and PFS was undertaken.

- 8.1. Asset management plan including computerized maintenance management system (CMMS)
- 8.2. Billing and financial management system
- 8.3. GIS and hydraulic modelling
- 8.4. Supervisory Control and Data Acquisition (SCADA)
- 8.5. Public disclosure platform
- 8.6. Emergency management system

9. It has been suggested that all information management systems should be linked and integrated. As mentioned earlier this is short-term investment plan (2-5 years). The

estimated cost for implementing integrated information management system is Rs. 24 .02 crores (3875000 USD).

### **Energy audits**

10. In 2004, GVMC spent Rs. 4.8 crores annually on energy<sup>1</sup>. In 2013 the annual energy bill has increased to approximately Rs. 21.5 crores, documenting more than a four-fold increase in energy expenses for the GVMC in the last nine years<sup>2</sup>. Thus, curtailing spiralling energy costs should become a priority for GVMC's financial sustainability and conducting regular energy audits is a crucial step towards that goal. Hence, energy audits have been included as one of the options under the Pre-Feasibility Studies. A comprehensive energy audit will study and evaluate energy consumption at various points in the water distribution network of GVMC starting from its pump stations, and covering its distribution networks. An energy audit can be considered to be the beginning of an on-going systematic strategy for monitoring and controlling energy consumption, which ushers in tangible benefits of substantial cost savings, as well as the intangible benefits to the environment and society of consuming less energy.

11. The proposed plan of action envisaged in the PFS includes having 3rd party energy audit to start with, followed by training of GVMC zonal engineers to conduct energy audits and establishment of energy efficiency task force. Also, there should be an annual energy audit. This is a short-term, low-cost immediate action intervention. The total estimated cost of this intervention is Rs. 0.352 crores (56774 USD).

### **Water quality management**

12. Based on the analysis conducted during study, lack of regular water quality testing and monitoring was observed. Therefore, setting up water quality laboratories for efficient and regular water quality monitoring of raw water, treated water and distribution water at household level was recommended and taken as an option for PFS. One central water laboratory and zonal water laboratories in all zones was recommended. These laboratories would be capable of testing physic-chemical parameters, heavy metals and microbial parameters. Costing analysis was performed based on various resources such man power, infrastructure, instruments and chemicals and cost was estimated. The total capital cost for establishing water quality laboratories was estimated to be Rs. 1.60 crores (258,741 USD).

### **Institutional analysis and training and capacity building**

13. This section details out possible institutional arrangement that can be adopted in the form of PP mode. In PPP mode also there exist different arrangements from low to high private party involvement. A successful model of Nagpur Municipal Corporation has also been discussed. It is important to achieve the service delivery goals and for this efficient staff is needed. Based on the consultation with GMC officials and as per the other suggested PFS options relevant training subjects have been identified. A detailed training plan which includes theme of training, potential institutes and expected cost has been provided. The total cost for this training and capacity building plan has been estimated to be Rs. 0.4995 crores (80566 USD).

<sup>1</sup> TERI, 'Municipal Energy Efficiency Outreach Programme for Visakhapatnam City', 2004

<sup>2</sup> TERI calculation based on energy bill data provided by GVMC for 2012-13.

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## Environmental Analysis

14. Environment analysis is carried out to understand and assess the environmental impacts of identified interventions on the city of Visakhapatnam. Among the identified interventions, land is required only for desalination project. The GVMC has already identified a land where a pilot desalination plant will be planned in the future. Implementation of any of the projects will not involve land acquisition or displacement of people, as all interventions are focused on improving existing systems for better service delivery. In the de-silting operations on existing lakes, disposal of silt can be a concern. Disposal of silt might need to be transported to a suitable place to dump or the silt can be distributed to local farmers based on the nutritional value of silt for usage as manure. Therefore, the proposed PFS interventions (NRW Reduction and source sustainability projects, IMIS, Energy Audit, Water Quality Management, and, Training and Capacity Building) will not cause any kind of significant environmental impact in the city of Visakhapatnam. The interventions are designed to protect the environmental resources and to improve service delivery of Water Supply and Distribution Department of GVMC.

## Social analysis

15. All these options have been evaluated for social dimension also and all the proposed options have been consulted with the relevant stakeholders including urban poor. It was noted that urban poor people are willing to pay for uninterrupted water supply for 45-60 minutes every day.

## Financial analysis

16. Financial analysis has been done in depth to evaluate the different tariff scenario and each and every proposed intervention has been analysed and evaluated in detail. All the PFS options are economically, socially, environmentally and technically feasible and will help to reduce the NRW losses, bridge the demand supply gap and will ensure sustainability of the water supply projects