

## Terms of Reference

### Contents

1	Background.....
2	Objective.....
3	Scope of Services.....
3.1	Scope of Services for Water supply
	Data Collection and assessment.....
	Planning and Design.....
	Capacity Enhancement and Sustainability
	Schedule of Completion of tasks.....
	Data, Services facilities to be provided by the Client.....
	Final outputs to be furnished by the consultant.....
	Composition of Review Committee.....
	Procedure for review of report.....
	Appraisal of D P R.....
	List of key professionals position.....
	Annexure-1
	Annexure-2
	Annexure-3

## **TERMS OF REFERENCE**

*Consultancy Services for preparation of DPR for Comprehensive Planning of Water supply, Septage Management and Storm Water Drainage System in non-AMRUT ULBs of AP.*

### **1. BACKGROUND**

Andhra Pradesh Municipal Development Project (APMDP) is a project implemented by Government of Andhra Pradesh (GoAP) with support from World Bank. The Government of India has received financing from the World Bank toward the cost of the Andhra Pradesh Municipal Development Project (APMDP) and intends to apply part of the proceeds for consulting services for Comprehensive Planning of Water Supply, Septage Management and Storm Water Drainage Systems in identified Non-AMRUT ULBs.

Non-AMRUT towns are towns with less than 1 lakh population as per 2001 census. Water supply, Septage Management and Storm Water Drains are identified as priority basic infrastructure facilities to be provided in Non-AMRUT towns. It is proposed to appoint a consultant to study the existing systems and to prepare Comprehensive Planning of Water Supply, Septage Management and Storm Water Drainage Systems in identified ULBs in Project Area.

### **2. OBJECTIVE**

The objective of this assignment is to prepare Detailed Project Reports for providing Integrated Water Supply System, Integrated Septage Management System and Integrated Storm Water Drainage System for identified ULBs by undertaking technical, financial, economic, environmental and social study and prepare prioritized capital investment plan, detailed designs, drawings, cost estimates and bidding documents (consisting of Technical Specifications, Specification Drawings and Bill of Quantities) for planning and implementation of proposed investments.

The consultant shall also study and include the impacts and mitigation measures of the ongoing and proposed water supply, sewerage/septage and storm water drainage projects in the project area in the Detailed Project Reports. The proposed water supply, septage management and SWD network shall seamlessly synergize with the existing networks in the Project area.

### **1. OBJECTIVE**

Now, it is proposed to prepare and implement a comprehensive sanitation and sewerage system for a design period of 30 years with for all the municipal waste waters being generated and to be generated duly considering the options for reuse, recycling by primary, secondary and tertiary treatment procedures including disposal of sludge in the form of sludge cakes and production of biogas and any other byproducts. The study shall also identify tertiary, secondary and primary sewers with interceptor sewers, trunk sewers and outfall sewers and integrating with the existing sewer network and arrive at a comprehensive sewerage network for entire town duly considering the new areas likely to come up along with the population projections, saturation densities for each zone, sub-zone for the design period of 30 years.

The design shall also consider the operation and maintenance of the facilities/infrastructure to be created and those existing with the various options including the option for outsourcing of the O&M under PPP arrangements. The equipment required for proper O&M of the facilities shall also be indicated.

### **3.0 SCOPE OF SERVICES**

The scope of services for water supply, sewerage/septage management and storm water drainage covers, but not limited to the following. The project area consists of Municipal areas of ULBs shown in Annexure.

### 3.1.0 SCOPE OF SERVICES FOR WATER SUPPLY

a) The scope shall broadly cover the following phases:

- A. *Reviewing the existing situation, and undertaking necessary assessments;*
- B. *Feasibility Analysis and detailed planning;*
- C. *Capacity Enhancement and Sustainability.*

The scope involves the following aspects:

- The work shall be done in a consultative manner by consulting various stakeholders at the ULB level, through the active participation of municipal staff involved in water supply.
- Undertake all necessary assessments, including technical, financial, economic, environmental and social, institutional that feed into the planning of interventions.
- The outputs and recommendations of the study shall be integrated with the state level initiatives.
- The proposals shall conform to the guide lines issued by the GOI and GOAP including CPHEEO manual on water supply and treatment, CPHEEO manual on O&M.
- Planning shall be done for the horizon of at least next 30 years (aiming at year 2045), unless justified otherwise. Rehabilitation measures on the existing system shall also be given due consideration based on feasibility before proposing any new investments.
- The designs shall be in compliance with the relevant Indian Standards (as amended up to date, with all correction slips) and CPHEEO manual. Wherever such standards are not available, appropriate standards shall be followed after discussions with the client.
- Environmental and social assessments shall be based on the Environmental and Social Mitigation Framework (ESMF) developed for the project;
- For any studies and assessments, the required equipment / tools / logistics shall be arranged by the consultants themselves.
- The consultant shall be wholly responsible for all the details of the proposal, the physical and site conditions, the execution methodology etc. All data utilized in preparation of the proposal shall be presented indicating the sources of the data and also the basis of assumptions, if any. The consultant shall be responsible for all the data or designs and drawings given by them.
- The Scope will include completion of planning exercise and preparation of reports and necessary procurement documentation.

Procurement and Implementation assistance shall be provided for undertaking detailed Water Audit exercise (see Section 3.A.2 (d), Step-2). The scope during this procurement assistance includes: helping the Employer/ULB prepared Notice Inviting bids, publish it, receive and evaluate bids, make recommendations, award; the scope in implementation support includes: overseeing implementation on behalf of the ULBs to see that implementation happens as planned, meets all technical, environmental and social requirements, progress is on time and help ULB process and make payments on time. Necessary progress review reports shall be submitted monthly.

- As part of the Inception Report, the consultants shall develop the overall structure of outputs and inter linkages between them. As the work progresses, the consultants shall also prepare the Table of contents of the reports and get that approved from CMDA.
- All documentation for obtaining permissions from the Pollution Control Board (PCB), CPHEEO etc. where ever required shall be prepared by the consultant, and necessary assistance will be provided by the client. The ULB will obtain the permissions. The consultant shall assist the Municipalities in obtaining technical sanction from competent authorities.

### **3.1.1. Reviewing the Existing Situation and undertaking assessments**

As indicated in the Background section, the ULBs have got the DPRs prepared for the water supply sector earlier, which cover mostly infrastructure improvement aspects. There is a gap in those DPRs in proposing a comprehensive outlook for water supply service improvements. The consultants would therefore review the present work done by the ULB, including the DPRs or any other assessments, to analyze the current strengths and weaknesses for providing efficient water service.

#### **3.1.1.1. Information Collection**

Collect and present the Information on the Existing situation in two strands: i) Background/ System Status and ii) Operational Approaches / Capacities. Plan and carry out necessary assessments to analyze the situation. The assessment should cover, inter-alia, the following key issues:

##### *1) Background / System Status*

- a) ULBs service area, economic growth, urban growth, physical and hydro-geological parameters, population growth and factors influencing;
- b) Demands and availability of water, water resources, source sustainability, conditions on water draws, alternate vendors/sources used by the beneficiaries;
- c) Infrastructure to serve the demands, along with key system components to maintain it efficiently
  - i) Status of existing assets and their rehabilitation needs;
  - ii) Assess whether typical system management components such as bulk flow meters, pressure regulating valves, transmission mains without illegal connection of distribution lines, energy efficient usage tools/equipment, domestic meters etc are available and functioning;
- d) Profile of slums and Service to the Poor

##### *2) Operational Approaches / Capacities*

- a) Operational approaches adopted by the ULB and the O&M performance;
  - i) Water Conservation, Optimal use of water resources and infrastructure, demand management,
  - b) Institutional skills / logistical arrangements for efficient service delivery;

- i) E.g., e-governance tools, customer information, Maps and data availability / data maintenance, billing and collection systems
- c) Costs of service delivery and revenues;
- d) Customer interface, user perception of service.
  - i) Current practices ( e.g., customer orientation, feed back systems, Complaint and grievance redressal mechanisms)
  - ii) Consumer perception on service improvements

In order to properly inform the subsequent planning exercise, the following specific assessments shall be undertaken, in addition to other assessments that the consultant may plan to cover the above issues. The framework for these assessments is given in the next section.

- a) Field Surveys and preparation / updation of base maps;
- b) Asset Status / Performance Review to determine the functional status and rehabilitation needs;
- c) Water Audit to understand the water production and consumption situation;
- d) Assessment of water demands in the service area
- e) Affordability study to determine the level of affordability against the desired service levels.

**Main Output:** the Main output of this exercise is a report on Existing Situation, Identified Priority interventions (with their procurement and implementation plan), Planning Parameters and Design basis to be considered in further designs, drawing upon these assessments.

After an agreement with the client on Priority Interventions, prepare the bid documents for the same.

There are some specific assessments to be undertaken as indicated in the Section below, the required outputs of which are indicated there-in.

### **3.1.1.2. Analytical Framework & Methodology for Collection of Data and Assessments**

The consultant shall develop the framework and methodology for completing the Tasks listed in 3.A.1. The methodology shall be agreed with the client before undertaking the assessments. Some of the specific assessments listed below shall follow the framework indicated:

- a) *Field Surveys and Preparation / Updation of Base Maps:* Undertake Total Station Survey and prepare / update the base maps on a GIS platform, indicating all the infrastructure elements along with their key features.

*Output: Base Maps with information on the Water Supply Infrastructure*

- b) *Asset Status and Performance Review:* Determine the data requirements and procedure for collecting the data on system installation and collect data relating to source (quantity, quality, seasonal fluctuations), transmission mains, pumping system, treatment plant, reservoirs, distribution system, O&M practices, breakdown history, efficiency, system leakages and losses, quantity of water handled etc., electrical data like contract demand, hours of operation, peak loads, supply availability, tariff levels, annual consumption, power costs etc. Salient parameters to be reviewed are listed in Annex-1.

Measure the flow and pressure at appropriate points of the system as required, in consultation with the ULB, in all existing zones and make an assessment of weaknesses of the existing water supply system by comparing the actual with the output of the network analysis and make an assessment of the condition of existing pipes by consulting the Municipal staff. Pressure measurement points may be put at appropriately selected locations – with more numbers in the defective water supply pockets. Based on this analysis, identify underlying causes for non-performance and not adhering to standards. Support the analysis with backup data.

*Output: Asset Status and Performance analysis.*

c) *Water Demands:* Water Demands for the city shall be estimated based on review of existing consumption patterns and likely realistic increments for future, based on a sample household survey of different categories of consumers. This exercise shall also inform the present service levels, the improvements that the consumers perceive as necessary.

*Output: Water Demands, Customer Service Perception (duration, quality, quantity, pressures; alternate sources, adaptations, costs etc)*

d) *Water Audit and Estimation of Non-Revenue water:*

The Water Audit exercise, shall inform the overall production of water (not to be based on just rated capacity of pumps), flows in different parts of water service area to determine areas of high/low consumption, losses – both physical and revenue. An analysis of this information along with the system status shall inform possible areas of high physical/revenue losses and priority areas of intervention and possible demand management options. This shall be done in two parallel steps: Step-1 for quick estimates to be used in the designs; Step-2: for refining the estimates for use as record by the ULB for future use.

Step-1: Study the existing water supply network up to the service connection through the information obtained from Field Surveys and Performance reviews and in discussion with the O&M staff of the Municipality, with a view to identify and prioritize rehabilitation needs of existing system and major leak spots in the system. For locations identified as having the maximum potential to reduce the loss of water suggest the improvements to be effected. Based on this, prioritize measures for taking up urgent repairs with minimum cost and time to get maximum benefits: e.g., replacement of inefficient pumps, replacement of leaking mains, repairs to leaking tanks etc. Quantify the water that could be saved by implementing these measures. Indicate possible demand management options.

*Output of Step-1: Overall Water Balance, Demand Management options, Major leak Spots, Priority Areas of intervention, Possible Water Savings, Customer meter Status, Metered and Un-metered water use by Consumers.*

Step-2: While it is recognized that installation of domestic meters and regularization of unauthorized connections by the ULB takes time, for refining the Water Audit, follow the methodology suggested in Chapter 15 of O&M Manual of CPHEEO. For the distribution system particularly, select at least two representative District Metered Areas (DMAs), in discussion with the ULB, representing at least 10% of the households in the ULB, by selecting the areas that can be easily segregated, preferably under the command area of different reservoirs. Undertake one round of Consumer meter sampling (if they exist)

as per the Manual to estimate the usage by customers (both metered and un-metered) and the possible losses in customer service lines and appurtenances.

If there are no consumer meters existing in the ULB, provide for stop-cocks to the consumer connections and public taps, to be able to close them for testing to analyze the losses in the system (main lines, feeder lines, ferrules, consumer connections). Also, in such a situation of no consumer meters existing, in order to derive water usage by consumers, identify sample representative consumers of various categories (e.g. in selected roads), fix consumer meters on their connections and measure the usage patterns.

This step requires capital investments as well in terms of establishing meters, closing connections, metering a sample consumer connections and public taps, valves for segregation etc. The consultants would therefore include such investments as priority investments, to be implemented early by the ULB. The consultants scope for this exercise would be to plan the exercise, identify the DMAs, identify the investments, procure and get the work done on behalf of the ULB, monitor the implementation and reassess the water audit and demands.

*Output of Step-2: Refined report of Step-1*

(Note: A separate exercise of detailed NRW assessment and Energy audits will be undertaken by the ULBs in parallel to implementation)

### **3.1.2 Feasibility Analysis and Detailed Planning**

Based on the information collected in the preceding phase, Plan the capital improvements to meet the desired service levels. Ensure that there is adequate focus on rehabilitation and strengthening as feasible, while opting for new investments.

Before proceeding with detailed designs, analyze the feasibility of options/alternatives looking from various analyses: technical, environmental, social (including resettlement and rehabilitation), financial and economic. Prepare concept plans highlighting possible options, benefits and impacts, drawings and preliminary costs, with a recommendation on the preferred option. Identify Short Term/Immediate, medium and long term investment plans for improvement of water supply,

Once the option and phased improvement plan is agreed with the client, undertake preliminary and detailed designs and finalize the respective analyses for that option. Prepare relevant documentation / IEC (Information, Education and Communication) material and assist the ULB in undertaking IEC activities including updating the Web-sites with relevant information.

Prepare cost estimates, contract packages, bid documents, procurement, implementation and O&M plans. Prepare strategies/practical plans for monitoring of progress of procurement, implementation and O&M. Finalize the Detailed Project Reports with all this information.

#### **3.1.2.1. Aspects to be covered**

Cover the following aspects in the analysis:

- a. *Service Levels*: Establish the present and Desired Service levels in a consultative manner, backed up by costs and impacts.
- b. *Population*: Population projections based on appropriate projection technique based on the growth status of the municipality and economic factors;
- c. *Development Factors*: Municipal development plans and developmental factors influencing water demands and their impact on the infrastructure planning;
- d. *Water Demands*: Demands based on sample analysis carried out in the Information collection exercise, and based on population growth and municipal development;
- e. *Water Resources*: Water Resource availability, quality and sustainability to serve the demands for the horizon year. For Source improvement,
  - Study the properties of the existing sources with regard to catchments, hydrological details etc.
  - Identify new potential sources (if required) for water in co-ordination with various departments to cater for ultimate demand.
  - Evaluate the method of treatment required.
- f. *Infrastructure planning* that is technically feasible, meets the growth needs of the municipal development, integrates into city development plan, economically effective and has least environmental and social impacts. While planning, factor-in the following issues:
  - reorganize the existing network to suit efficient O&M practices,
  - promote optimal/effective utilization of the existing infrastructure (e.g., reservoir capacities, trunk mains, water sources etc).
  - Provide for adequate flow and pressure control/regulation utilities, flow measurement devices.
  - Replace / Upgrade the consumer connections with appropriate material (e.g., MDPE) (as these are the most vulnerable portions of the system where the physical losses are more); and provide for consumer meters – replacing the non-functional meters (since there should be provision for measuring the supplies and raising revenues). The cost will be borne by the ULB initially as part of the project and will be recovered from the consumers later.
  - consider technological advancements, including new pipe / construction materials, variable speed drive pumps for energy efficiency, improved methods of water treatment with better clarifiers, plate and tube settlers, dual media and declining rate and high rate filters, new chemicals and poly – electrolytes, alternative methods of disinfection etc.
  - Integrate the services to the poor with the trunk infrastructure; review free supplies through stand-posts and plan for managing them;
  - Ensure a minimum residual pressure of 7m
  - Consider feasibility of 24/7 supplies, if not, plan for maximum possible supply hours with necessary peak factor. Justify the reasons for non-achievability of 24/7 currently and indicate a plan of action with cost implications.
- g. *Environmental Assessment*: The SEAMF governs the social assessment of sub-projects. During the feasibility stage, cover the following:
  - Review national, state and local environmental regulatory requirements on environmental aspects, including necessary clearances from state and central government in the context of proposed project components
  - establishing environmental baseline covering the specific location of water supply components including the designated project sites – such as supply source, site for locating water off-take; right of way for transmission mains and water treatment plants; storage reservoirs and pumping

stations; sites for elevated service reservoirs; distribution network; and existing facilities for waste water disposal;

- carry out environmental screening in the light of baseline conditions and proposed project activities to identify key environmental issues and defining the scope of detailed environmental assessment to be carried out as part of detailed project reports (DPRs). During screening, consideration shall be paid to (i) location of the sub-project with respect to environmentally sensitive areas, and community concerns; and (ii) volume, nature and technology of construction. The screening process shall include stakeholder consultations;
- conduct environmental analysis of alternatives for different project components and provide specific inputs to technical analysis of alternatives – the objective of such analysis shall be to minimize environmental impacts and provide specific inputs to feasibility analysis. Analysis of alternatives shall identify opportunities for environmental enhancements, where ever feasible

During the Detailed Environmental Assessment (EA), cover the following:

- conduct detailed environmental assessment (EA) covering all the components of the projects with supporting primary/secondary surveys. The environmental assessment shall identify expected environmental impacts (where ever applicable with quantitative/qualitative information) due to the proposed project. The primary surveys shall include source water quality analysis (minimum one week), environmental surveys including identification of severance, tree cutting schedules and forest diversion proposals (if necessary), and baseline noise quality monitoring at pumping stations,
- prepare a project component specific and implementable environmental management plans (EMPs) to minimize and mitigate environmental impacts. The EMP shall be integrated in to bid/contract documents with necessary contract covenants, technical specifications, and BOQ items for effective implementation. The EMP shall also include: implementation and monitoring mechanism, and institutional mechanism and resources required for implementation
- prepare an executive summary of EA and EMP and translate the same in to local language to facilitate disclosure.

Conduct the above activities involving stakeholders through consultations with prior information. The consultations shall focus to: (i) collect baseline information, (ii) obtain a better understanding of the potential impacts, (iii) appreciate the perspectives/concerns of the stakeholders, (iv) secure their active involvement during screening, impact assessment, and preparation of EMPs. All the stakeholder consultations shall be documented.

h. *Social Assessment*: The SEAMF governs the social assessment of sub-projects and the assessment should comprise:

- Screening of sub-projects and their classification into those having (High, medium or low) or not having resettlement impacts;
- Stakeholder consultations during the planning and design stages (which are to be documented) and plans for involvement of local people during sub- project implementation;
- For all the proposed measures, assess the potential dislocation of people's residence or livelihoods (either permanently or temporarily) and impacts on property (in accordance with the Social and Environmental Assessment and Management (SEAM) Framework of the World Bank-assisted **APTMD** Project), and identify the alternative with the least human and resettlement costs;

- Full analysis of R&R requirements, including likely impacts and entitlements of all persons potentially affected by sub-projects
  - Identification of Mechanisms to continue identification of resettlement issues at different stages of sub-project cycle;
  - Resettlement action plans (RAPs) in full consultation with the affected persons, including timelines specifying all actions to be completed before works are begun, in keeping with the World Bank's R&R policy, and likely costs, and
  - Roles and responsibilities of different agencies such as APUIF, ULBs and other government agencies in addressing resettlement issues.
- i. *Economic Analysis:* Undertake Quantitative cost-benefit analysis for subprojects estimated to cost over Rs 15 crore, and it should demonstrate an economic rate of return above the opportunity cost of capital, currently estimated at 12%, or cost-effectiveness.
- j. *Financial Analysis:* Undertake the financial analysis with the following objectives:
- To better understand the financial position of the ULB and arrive at an assessment of their financial capacity to sustain the proposed (prioritized) sub-projects / interventions, in terms of being able to provide counterpart financing, servicing any additional debt that the ULB may incur and meet Operation and Maintenance (O&M) cost obligations.
  - Assess the current financial position of the same as a “stand-alone” activity, including working out various financial indicators, tariff implications and then prepare a medium-term, sustainable business plan for improving delivery of water service.

The outputs from the financial assessments will include

- A Financial and Operating Plan (FOP) for the ULB as a whole, including 10-15 year financial projections separately for both the operating and capital budgets (a capital investment plan), taking into account the prioritized water supply sub-projects / interventions proposed to be undertaken over the medium term as part of this exercise as well as other priority subprojects that the ULBs proposes to implement / already implementing. The ULB needs to demonstrate operating (current account) surplus, sufficient to meet debt service obligations and O&M expenses, of more than 15% of the subproject cost(s) based on audited accounts.
- A 10-year business plan and financial forecast for the Water operations of the ULB on a stand-alone (“ring-fenced”) basis. This would include: (a) Key assumptions; (b) Summary Capex and summary Opex required to achieve intended improvements in service levels, including the financing mix for such capex (loans, grants, subsidies); (c) Summary financial statements covering income – expenditure, funds flows and balance sheet (if possible); (d) Projected tariff levels and structure so as to fully meet O&M costs over the medium term (3- 5 years) and begin meeting debt servicing / recovering capital expenditures; (e) Projections of a set of key financial indicators; (f) Scenario analyses to understand sensitivity changes in key variables.

At the Feasibility stage, organize a workshop in the ULB to present the findings of different feasible options and the preferred one. Justify this with respect to the impacts, costs and municipal capacities. Document the consultations.

### 3.1.3. Surveys, investigations and tests required:

All Surveys, investigations and tests required are to be done.

### 3.1.4.. Detailed Designing, Procurement and Implementation Planning

For the final option, prepare detailed engineering designs, drawings, Bill of Quantities (BoQs) and tender documents.

- a. *Designs:* The residual head at tail end shall be 7 m of water pressure. Undertake network analysis using standard software. Design the civil structures based on computerized structural analysis. Designs shall follow the latest Indian Standards with amendments. The consultants have freedom to choose the type of sub structure and superstructure provided code specification/CPHEEO stipulations agreement. The drawings and designs shall include a general arrangement drawing and detailed drawings of all components in appropriate size A0-A3. The level of detailing shall be such as to enable check of conformance with provisions of Indian Standard / Other Codes, including detailed construction drawings and bar bending schedules. Define the specifications followed for each of the components.
- b. *Cost Estimates:* For the final project, prepare detailed items and quantity schedules and cost estimates based on the market rates. Prepare detailed cost estimates item wise (AP PWD / PHED Schedule of Rates), with necessary road restoration charges wherever needed. For items not covered under schedule of rates, market rates are to be assessed. There should not be any lump sum items in the bill of quantities. Provide unit costs of various infrastructure components based on the estimated costs. Assist the municipality in getting administrative/technical sanction for the estimates from the competent authorities.
- c. *Network Maps and Asset Drawings:* Prepare Network maps with proper zoning using the updated information available from the tasks above and the proposed strengthening measures. Prepare Asset Drawings with relevant information to serve as an information archive.
- d. *Contract Packaging, Procurement Planning and Bid Documents:* For the identified works, define feasible contract packages, prepare procurement plans as per the Project Standard requirements, and prepare draft bid documents in the World Bank prescribed format.
- e. *Implementation Plan:* Prioritize the actions into Short, Medium and Long term actions. Prepare an implementation schedule for these. Draw up project budget with monthly targets, furnish network analysis such as CPM/PERT by using MS Project/Primavera software package for purposes of effective project monitoring and regular reports. Give due considerations to the permissions / clearances required from various authorities, time required for supply of material (considering material availability constraints, manufacturing and supply periods etc).

Plan to ensure that R&R actions are implemented before commencement of works.

Propose strategies for monitoring of implementation and contract management. Highlight focus areas for close monitoring in terms of quality control / implementation progress. While proposing the specifications for construction / implementation, consider new construction

technologies, Trench less technology / Micro-tunneling, better pipe laying and plumbing techniques, etc.

f. *Service Improvement Plan*: For the proposed option, develop a Service Improvement plan covering the following:

- Progressive achievement of service levels defined and strategies to achieve this over time. Define the service levels based on the framework suggested by the Ministry of Urban Development, Government of India. The physical investments under the subproject and other initiatives are expected to progressively enhance the service performance of the ULB.
- Bulk system operation based on assessed strengths of the system, source capacities, optimal use of available water resources (seasonal, long-term), demands on the system in different parts of the service area and their seasonal variation, demand management, consistency with the phased strengthening measures, equitable supplies and management of pressures and flows;
- Distribution system operation to manage each zone together at once with minimal valve operations (without any block regulation as has been the current practice); along with pressure and flow management strategies;
- Treatment Plant and Pumping system operations;
- Possible automation in O&M;
- review of free supplies through stand posts and their effective management / control, control of illegal connections, handling water contamination risks;
- possible strategies for NRW management based on assessments undertaken, including possible incentives for NRW management; preventive maintenance and progressive asset rehabilitation based on expected life of the assets,
- Water Audit plan based on experiences of DMAs, Energy audit plan, progressive domestic metering plan ;
- spares, tools and equipment – procurement plan, annual budgeting for them, maintenance of tools and equipment;
- institutional roles and responsibility, structure of O&M unit, outsourcing possibilities, citizen involvement, training to O&M staff, O&M monitoring, supervision of O&M responsibilities, job description for operators and staff;
- Costs, Funding and budgeting; revenue management including tariff improvements to meet the costs of operations. Consider identification of revenue losses, revenue improvements, suggestion for pricing, rationalisation of connection charges, water tariff and pricing for bulk supplies, possibilities for commercialisation like bottling etc. Tariff shall consider life-line supplies to the poor, including transparent cross-subsidies as required.
- complaint monitoring and redressal, billing and collection, service monitoring and dissemination of performance.
- Tips and guidelines on reduction of costs through preventive maintenance, better pipe laying and plumbing techniques,
- Propose strategies for continuous service monitoring, linking to the state framework with relevant indicators

Provide the necessary linkage of output of this exercise with the Capacity Enhancement and Sustainability assessment done in the Phase-C.

**Output:** The outputs of this exercise are:

- Feasibility and Concept Plans;
- Detailed Project Report with all the information above, supplemented with drawings, other supplementary reports and IEC material as required.

### 3.1.5 Capacity Enhancement and Sustainability

Drawing upon the analyses done under Feasibility and Detailed Planning, Prepare an Action Plan for Capacity Enhancement within the ULB to handle the proposed investments and services in a sustainable manner. The Action Plan shall be compiled in a report “Capacity Enhancement Action Plan (CEAP)” as a supplementary report to the DPR. Develop the CEAP in a consultative manner, involving the ULB staff. Link the proposed training and capacity enhancement activities with the State level strategies. Provide implementation strategies for the initiatives proposed.

Amongst all the activities proposed, identify the activities that can be started early on, parallel to the Priority Investments implementation, which can add value. To help analyze this, a separate matrix of possible state level initiatives and those that can be taken up in parallel with the planning and implementation of sub-projects in the ULBs is given in Annex-3.

The CEAP shall cover the following:

b) *Institutional Assessment*: Institutional set-up at the ULB, capacity gaps for addressing implementation (technical, environmental, social issues, contract management, implementation monitoring), O&M (set up, staffing and capacities, logistics (e.g., MIS, computerized billing systems, separate accounting), infrastructure (e.g., office space, vehicles, tools, plant and equipment), ability to oversee outsourced contracts), Community Interface (IEC, community involvement, grievance redressal systems, efficient service provision); and suggestions for improvements.

Review this with specific reference to roles, responsibilities, authorities and accountabilities, appropriate level of centralization/decentralization, efficient coordination of functions, convergence of results etc.

c) *Operational Sustainability*: Implementation / technical practices leading to poor O&M performance, O&M approaches, progressive improvements to enhance sustainability;

d) *Financial Sustainability*: Capacity to withstand proposed measures, FOPs and a 10 year Business Plan for Water Operations.

e) *Sub-Project Management Capacity*: ULB’s institutional capacity to handle APMDP subprojects, which should comprise

- Staffing for sub-project civil work procurement, and fund drawdown and application;
- Recording and reporting of sub-project physical and financial progress;
- Compliance with audit requirement under the project.

f) *Capacity Building Strategies*: staffing requirements, assessment of training needs, skill up- gradation measures (induction training, on / off-job training, exposure visits etc), linkage with state level interventions.

Output: Capacity Enhancement Action Plan for the ULB

### **3.1.6 Data, services and facilities to be provided by the client**

- (i) The maps and other data related to this work, to the extent available in the Municipal office will be provided.
- (ii) Assistance for obtaining FMB sketches and adangal for preparing land plans from the land survey department will be given by the client.
- (iii) A copy of all the available DPRs as in where in condition would be provided.

### **3.1.7 Final Outputs (drawings, reports etc.) to be furnished by the consultant**

#### **a. Inception Report:**

Comments on the available DPR's missing components and strategy for their study and detailing in the revision. General discussion about source of water, present distribution system and macro level details along with framework for collection and interpretation of data, further work plan. Proposed approach and methodology, methodology for data collection, planning and design approaches, Indication that consultants have thoroughly reviewed the SEAM Framework and associated policies, and are in a position to apply it to the DPRs under revision/preparation.

#### **b. Existing Situation and Design Basis Report, Priority Interventions, Procurement Documents for Priority Interventions**

Based on the understanding developed on the existing system through studies and assessments, present the existing situation; and develop the Basis of Designs and Planning parameters for Phase-B: Feasibility and Detailed Planning.

Identify the priority interventions with their costs for the immediate term, that will give maximum benefits to the ULB with reasonable cost and time. Provide a procurement and implementation plan for these along with bid documents.

#### **c. Outputs of Assessments of Phase-A**

Provide outputs of general assessments undertaken and the specific assessments listed under Phase-A, except for NRW detailed assessment for the distribution system.

##### **i. Feasibility and Concept Plan**

Results of Feasibility analysis for various options, along with Environmental and Social Screening, documentation of stakeholder consultation, preliminary costs; Concept Plan of preferred option supported by justification, drawings and costs.

##### **ii. Detailed Designs and Estimates and Bid Documents**

Detailed designs for the finalized plan, detailed cost estimates, with supplementary reports, drawings, IEC material, procurement and implementation plans including timeline of R&R actions to be taken before commencement of works, EAs, EMPs and RAPs, project monitoring plans.

Bid documents as per the World Bank model documents.

**iii. Capacity Enhancement Action Plan (CEAP)**

Options for enhancing the capacity of the ULB to sustain the investments, with priority interventions and implementation plans.

**iv. Interim Progress Reports**

Interim reports highlighting progress made, prospective plans, ULB/client intervention areas, The consultants should submit 5 copies of all reports, documents and drawings mentioned above other than final bid documents of which he shall supply 10 copies. Soft copy of all reports and documents (MS word format) and drawings (Auto Cad) shall also be submitted.

### 3. 2.0 SCOPE OF SERVICES FOR SEPTAGE MANAGEMENT

The consultant shall prepare Detailed Project Reports for a comprehensive sewerage/septage system for a design period of 30 years for all the municipal waste waters being generated and to be generated duly considering the options for reuse, recycling by primary, secondary and tertiary treatment procedures including disposal of sludge in the form of sludge cakes and production of biogas and any other byproducts. The study shall also identify tertiary, secondary and primary sewers with interceptor sewers, trunk sewers and outfall sewers and integrating with the existing sewer network and arrive at a comprehensive sewerage network for entire town duly considering the new areas likely to come up along with the population projections, saturation densities for each zone, sub-zone for the design period of 30 years.

The design shall also consider the operation and maintenance of the facilities/infrastructure to be created and those existing with the various options including the option for outsourcing of the O&M under PPP arrangements. The equipment required for proper O&M of the facilities shall also be indicated.

The consultant shall conduct a comprehensive sanitation and sewerage/septage system study for the selected municipalities for proper conveyance, treatment and disposal of municipal and industrial waste waters with the most environmentally friendly, economically viable and cost effective treatment processes to achieve good sanitation levels for the town. The sewage effluent shall meet the required standards of CPCB / CPHEEO for land/river/canal/lake disposal without causing any health hazards or adverse environmental impacts.

- i) Prepare a comprehensive Septage Management (SMP) for the horizon year 2046 with appropriate technological solutions for treatment including sludge treatment, duly prioritizing the actions under Immediate, Medium/Short term and Long term projects, duly costed;
- ii) Prepare detailed designs, specifications, drawings, detailed estimates and cost estimates for all the projects, and model bid documents for all the components.

The study shall provide the municipality with a comprehensive assessment and understanding of the municipal sanitation and sewerage/septage system, and a planning tool for prioritizing sanitation interventions including **identification of gaps** and assessing the environmental impacts that new developments will have on town wide sanitation.

The consultant shall work in close liaison with the municipality and the APMDP and shall be responsible for completing the following tasks to the satisfaction of the municipality, the APMDP, CDMA, MA&UD Dept and the Govt. of AP.

#### Summary of Tasks:

1. Review of existing data, maps, reports, designs, drawings etc. and its analysis; assessment of data gaps;
2. Review and analysis of existing system and its assessment;

3. Conducting Field surveys among all HHs of ULB and collect data on HH s with septic tanks, HH with Twin pit toilets, HH without toilets, HH disposing off sulage into open drains, frequency of de-sludging, number of tankers collecting and disposing the septage.
4. Identify the condition and the gaps in existing infrastructure, propose **immediate actions / projects** for rehabilitation, repair and for improving efficiency and functioning of existing system.
5. Establish design principles, identify design options based on local conditions;
6. Select options, prioritize and **short / medium term** and **long term** projects / activities with cost interventions;
7. Also prepare suitable design options for improving sanitation and septage management in the **short / medium term** like STPs/ DEWATS etc. and the concurrent / complementary infrastructure interventions (in the same sector or in other sectors like Storm Water Drainage or Solid Waste Management) to make it satisfactorily function;
8. Offer **long term design options** and best alternative for comprehensive sanitation and sewerage/septage management;
9. Develop model treatment options, designs and plans for independent sewage treatment systems for large institutions / apartments / hotels with cost analysis, O&M implications and O&M costs for promoting reduction of waste water to effect economy;
10. Recommend options for Reduction, recycling and reuse of waste water – Policy, bye-laws, guidelines, options and incentives for promoting recycling and reuse of waste / grey water;
11. Detailed estimates and EIRR / FIRR;
12. Recommend organizational setup for project implementation with Third party QA/QC, O&M arrangements, PPP options;
13. Formulate a capacity building action plan with costs for imparting training to municipal engineers and O&M staff at different levels;
14. Final study report with detailed designs, specification drawings, bid documents, O&M action plan.

Consultant has to:

- Assess the quantity of septage per day to be treated in the septage Treatment plant to be set up in different zones of the town.
- Assess the quality parameters of the septage to be brought to the Treatment plant to ascertain the methodology of Treatment
- Provide a preliminary process flowchart and area required for the plant

### **3.2.1. PERMISSIONS REQUIRED**

All documentation for obtaining permissions from the Andhra Pradesh Pollution Control Board (APPCB), CPHEEO etc. where ever required shall be prepared by the consultant, and necessary assistance will be provided by the client.

### 3.2.2 DETAILED TASKS TO BE PERFORMED

#### 3.2.2.1 Review of existing situation and estimate flows

- I. Review existing data, maps, previous studies if any and other related documentation to obtain a better understanding of the town's sanitation and sewerage system if any, prior to commencement of field work. The consultant shall access and obtain related maps and previous related studies.
- II. Conduct field visit to assess the existing sanitation / sewerage/septage systems and their condition, adequacy, accessibility and affordability to the customers; examine the existing O&M arrangements, their adequacy, efficiency and cost effectiveness.
- III. Present necessary proposals for rehabilitating and upgrading the existing sanitation / sewerage/septage system i.e., sewer network and other components like pumping stations and STP etc. and incorporate proposals to integrate the same with the proposed comprehensive sanitation/sewerage system, duly calculating the EIRR/FIRR.
- IV. Conduct field visit to the entire town to assess the topography, soil characteristics in different areas and ground profile, zoning/sub-zoning, ground water level, geographical conditions and environmental factors, suitability, extent and availability of land availability which are likely to affect the type and location of treatment facilities and laying of sewer network;
- V. Study the municipal water supply system, per capita supply as per municipal records, and other water supplies like individual bore wells, community bore wells, supplies to remote colonies, new colonies, future developments based on the population demand and saturation densities for the horizon year 2042 so as to assess the per capita sewage contribution for commercial establishments, public conveniences, function halls, theatres, schools, colleges, hostels including industrial wastewater for the present and for the future industries if any;
- VI. Study the existing sanitation systems like low cost sanitation, individual septic tanks, community septic tanks, community toilets, public toilets and any other sewage treatment units available with the community/commercial establishments/institutions and industry;
- VII. suggest designs and plans for isolated/localized compact treatment plants for cost effectiveness duly considering possible adverse environmental impacts;
- VIII. Collect the IMD data on daily rainfall intensities draw IDF curves and arrive at the storm runoff for the design storm and consider its impact on the sewerage system design;
- IX. Conduct topographical survey with ETS instrument and autolevel and prepare the Contour Map covering the entire town at an interval of 0.5 m;
- X. Study the topography and identify the locations for the Sewage Treatment Plants to be proposed for the prospective and ultimate population; generate suitable technical options for STPs –Decentralized Waste Water Treatment Plants, Conventional STPs, and other environment friendly, low energy consuming and sustainable options;
- XI. Minimize the pumping requirements for sewage by thorough study of the topography;
- XII. Design the septage management with sustainable, cost effective, enabling low O&M costs like HDPE / HDPE DWC / DI pipes based on technical criteria;

- XIII. Study the options for treatment, and disposal of final treated effluent through land, water bodies, sea or reuse.
- XIV. Conduct regular meetings (at least once per week) with the municipality and work closely with the Municipal Engineers and Sanitary Inspectors. In the initial meetings, the municipality's main concerns shall be identified and copies of town maps shall be obtained. In successive meetings, the municipality and the PHED shall be informed of the consultant's work progress. This work shall be in addition to involving the Municipal Engineers and Sanitary Inspectors in the study and provide training to them.
- XV. Identify the location of STPss and related pollution and other environmental issues; **identify gaps** in the existing septage system. Additionally, identify physical constraints to sanitation and septage management; adequacy of gradients, availability of space for pumping systems and treatment units.
- XVI. The proposed *Septage management* network shall seamlessly synergize with the existing network in the Project area.**
- XVII. Working with town planner and other concerned officials (including Urban Development Authority), assess the current development in the town w.r.t. saturated density and growth potential, construction of roads and railways and other human interventions in the sanitation and sewerage system. Examine the existing sewerage /septage system and assess its capacity to carry the design flows. The impacts of growth and human interventions on the Sewerage/Septage system should be assessed along with possible future land use to assess the sewerage design requirements.
- XVIII. Working with the MHO, assess Water stagnation and unhygienic areas of the Town for attending to specific areas and problems and assessing Environmental issues.
- XIX. In exceptional cases where it is not possible to lay sewer lines and storm water drains separately, with prior consultation with the municipality and APMDP, estimate both existing and future dry-weather flows, storm water runoff and waste water flows in the various catchments and wherever essential and feasible, combined sewerage system may be designed. Appropriate design interventions shall be made to divert the excess storm water flow in to the sewers where no other option is available.
- XX. Produce town plans with the existing sanitation and sewerage system and its condition, duly considering the sewage contribution from adjoining and upstream areas (including the areas outside municipal boundary).
- XXI. Present practices of operation and maintenance including type of tools, equipment and machinery available shall be analyzed along with the manpower requirement and necessary measures shall be proposed for effective operation and maintenance of the sewerage/septage system.
- XXII. Prepare Guidelines on selection of motors and pumps for sewage/effluent pumping and for their effective operation and maintenance in the form of working manual which can be used by the operators.
- XXIII. Prepare formats for all sewage pumps with the parameters to be monitored daily and propose annual maintenance contract procedures for outsourcing.

- XXIV. Propose the most feasible and viable sewage treatment system adaptable to the local conditions along with comparison of different treatment options available considering the latest environment friendly and low-maintenance, energy efficient technologies.
- XXV. Propose the parameters for land disposal/river disposal for BOD/COD/SS/Phosphates/Nitrates/Heavy metals/toxic materials.

### 3.2.2.2 Establish Design Principles and prepare options

- I. Design principles are to be as per CPHEEO Manual for sewerage and sewage treatment, Ministry of Urban Development, Govt. of India.
- II. Design period shall be 30 years for sewerage system and 15 years for pumping systems with provision for future expansion as necessary.
- III. The consultant shall formulate a set of functional criteria for the system and provide justification for the design parameters adopted and assumptions if any.
- IV. Divide the town into various septage management zones/sub zones based on relevant requirements to draw up hierarchy of the sewerage system and their locations for designing the most cost-effective and viable system.
- V. Prepare project cost estimates including capital, operation and maintenance costs and carry out project financial analysis **and economic analysis** including Economic Internal Rate of Return of the project. Justify the assumptions made with illustrations which are implementable.
- VI. Identify the extent of coverage to poorer segments of the population depending upon location, kind of habitation (e.g. poor settlements), type of coverage (individual households or community coverage), Capital cost and O&M cost and make provisions for low cost sanitation facilities wherever required.
- VII. Estimate the sewer connection charges and the monthly tariff to be collected from the residents along with annual indexation for hike in tariff / connection charges. Conduct a Socio-Economic survey using stratified sampling and collect details regarding willingness to pay for sewer connection charges and the monthly tariff and suggest cross subsidy if required for poorer sections of society.
- VIII. The treatment units are so selected based on topography that they are decentralized as far as possible, and shall be most cost effective, energy efficient, environment friendly and low-Operation and Maintenance based on local conditions. The location shall be so selected that it does not cause any inconvenience or which may not lead to any public health hazards due to foul smell, fly or mosquito menace or ground water contamination. Sufficient buffer zone between habitation and the STP shall be provided with provision for green belt; necessary diversion arrangements shall be provided in times of heavy monsoon; the STPs would be provided with modular design;
- IX. The design shall ensure that the effluents shall not contaminate ground water.
- X. The design shall ensure that the industrial effluents shall not be mixed with municipal sewage without minimizing the concentration of the industrial effluents.
- XI. Financial analysis shall be carried out for recycling of sewage effluent for domestic purposes other than drinking and cooking.

- XII. Entire town shall be surveyed with autolevels and TBMs shall be established on the ground at an interval of 0.5 km along the trunk mains duly carrying out from nearest GTS benchmarks with the standard design approved by the Competent Authority / APMDP.
- XIII. To the extent possible, pumping shall be minimized, and shall be suggested where no other option is available. If inevitable, selection of number and capacity of pump sets and the technology shall be such that the pumping systems can handle the sewage at all times in the most cost effective manner during dry and wet seasons. The levels of pumping stations shall be above maximum flood levels to avoid submergence in rainy season.
- XIV. The disposal of the effluent into water bodies/rivers/canals etc. shall ensure that the source of water supply or bathing ghats on the downstream side of the disposal point are not polluted.
- XV. The material and dia. of sewerage network shall be durable for the design period and beyond at the optimum cost duly comparing various materials of pipes for sewers. **New technological developments** in the design of sewerage network to reduce the size and depth of sewer and the no., size and depth of manholes required may be examined and compared, and an appropriate sewer network design may be adopted.
- XVI. Provision should be made to allow storm water to enter in the u/s starting nodes of network to achieve flushing velocities during the monsoon season.
- XVII. Using key design principles, develop and enumerate options for sewage treatment duly considering environment friendly technologies like DEWATS (Decentralized Waste Water Treatment Systems) / baffled septic tanks, CAMUS-SBT, Phytorid, constructed wetlands, fixed bed filters etc. also for evaluating and selecting the most appropriate treatment option with low operation and maintenance costs and improved efficiency including conventional treatment systems like waste stabilization ponds, activated sludge process, trickling filters, UASB, FAB, MBBR, SBR.
- XVIII. Life cycle costs shall be worked for various alternatives and the most viable, environment friendly and cost effective option shall be selected. Necessary field surveys shall be conducted for preparing the options.
- XIX. Necessary hydraulic calculations shall be made for the present, prospective and ultimate demands and shall be enclosed. The design procedure shall be carried out after *due concurrence* of the population projections and hydraulic calculations from the competent authority / APMDP.
- XX. Detailed and innovative solutions shall be presented for the bottlenecks like crossings (manmade or natural structures) and land acquisition for treatment works, pumping stations and sewer lines.
- XXI. Provide necessary bypass / over flow arrangements at pumping stations and treatment units in order to reduce load during flooding and heavy flows while taking into consideration pollution, aesthetics etc.
- XXII. Recommend organizational setup for implementation of the project with 3<sup>rd</sup> party QA and QC, with operation and maintenance arrangements and PPP options.
- XXIII. Formulate a capacity building action plan with costs for imparting training to the municipal engineers and technical staff at different levels including operating and maintenance staff.

**3.2.3. Key design principles** for collection and conveyance of sewage flows and for selection of treatment methods and design procedures include, among others:

- a) Environmental protection;
- b) Identification of industrial wastewater discharges;
- c) Estimates of industrial and municipal wastewater flows including seasonal fluctuations – the consultants shall agree future design horizons with the municipality and APMDP;
- d) Identify opportunities for segregating industrial and municipal wastewater discharges and treatment;
- e) Identify possible locations and treatment options for municipal wastewater treatment facilities and conceptual costs; identify location of treatment plants with reference to location of the town and wind direction;
- f) For municipal wastewater treatment options, consider “low maintenance and environment friendly, durable and financially sustainable waste water treatment systems”. Any localized solutions may also be suggested with merits and justification.

Prepare plans showing the existing facilities and all the components of the above facilities features to a suitable scale.

#### **3.2.4. Select options, prioritize and cost**

Cost will be an important factor in selecting the most viable and feasible option out of the various options developed. The following costs shall be developed.

- i) Detailed costs for the laterals, interceptor/sub-main sewers, main sewers/trunk sewers and outfall sewers and treatment of sewage with phasing of works;
- ii) Develop a comprehensive and integrated sewerage system plans for the municipality detailing the selected options and how they integrate into the overall town wide sewerage system plan.

#### **3.2.5. At the end of the performance of the tasks, the Expected Outcomes are:**

- An accurate assessment of the quantities and composition of sewage, sullage and other inflows like ground water infiltration, industrial waste water, waste water from institutions, commercial establishments etc. for the present and future population for design period;
- A complete and comprehensive septage management plan for the entire town and its expanded areas after design period showing complete details like sewer size, material, slope, depth, ground levels and invert levels and all hydraulic details;
- The complete details of various physical, chemical and biological processes, detailed hydraulic and structural designs for the various treatment process units for primary, secondary and tertiary treatment and safe disposal to land or river/canal/nala/lake water disposal standards as per site conditions.

- Model Treatment options and relevant designs shall also be furnished for independent sewage treatment systems for large institutions/apartments/hotels with cost analysis and O&M implications and costs so as to reduce, reuse and recycling of waste water and to effect economy in water use;
- Incentives for reduction/reuse/recycling of waste water and the policy to be adopted therefor;
- Cost estimates for sewerage system i.e, sewers of all categories including laterals, earth work, manholes and other appurtenances and treatment units, zone wise with phasing and implementation plan;
- O & M plan for the proposed system with additional manpower and financial obligation with type of training and capacity building required for maintenance; detailed O&M estimates with costs and budgetary provisions to be made;
- Tariff policy and tariff plan supported by cost economics for sustainability of the sewerage system. Equity shall be kept in mind.
- Short and long term sanitation and sewerage strategy which includes recycling of waste water, selling of fuel gas, sludge cakes;
- Increased awareness of municipal engineering and operating staff to sanitation and sewerage issues.

### **3.2.6 Feasibility Analysis and Detailed Designs**

- i. For the identified components, analyse the technical, operational, financial, environmental and economic feasibility. Study the finances of the municipality and quantify the impact of the investments proposed. Identify the financing, sources, including revenue generation by revision of tariff policy and tariff rationalization, and potential financing packages.
- ii. Verify the availability of required plans, and update the key plan, system layout plan, flow diagram, sewerage network plans and maps of other system components such as pumping stations and STPs etc. including contour map of the town.
- iii. For the feasible options, prepare detailed designs with specifications, working drawings , and prepare the BoQ with costing.
- iv. Study the existing organizational set-up and wherever necessary, suggest institutional strengthening measures.
- v. Identify training and capacity building requirements for the staff along with costs and prepare a phased Capacity Building Plan with costs.

### **3.2.7 Detailed Project Reports (DPRs)**

The objective behind preparing DPRs is to arrive at detailed engineering designs, drawings, Bill of Quantities (BoQs) and tender documents for the sub-projects. The DPR shall also contain Resettlement Action Plans (RAPs) and Environmental Management Plans (EMPs), where required, and Economic and Financial analyses. Engineering surveys, socio-economic surveys, slum household surveys, and other relevant surveys required to support identified sub-projects should be carried out to support the DPR. Operations and Maintenance Plan shall form a part of the DPR with costs.

**i. Technical/Design Survey & Estimates:** The technical component of the DPR should comprise Quantity of Septage to be treated per day, Quality parameters of Septage, how often the de-sludging of septage is being carried out, present mode of disposal of septage, cost involved in the disposal of septage for a household, whether disposal affects water bodies, Average quantity of sludge disposed for day from the ULB, Environmental hazards of present mode of disposal if any, need for septage plants, detailed engineering designs, detailed estimates with specifications and drawings for sub-projects. National and International (where appropriate) standards shall be followed for all designs. Costing shall be based on latest AP Common Schedule of Rates (SoRs) and locally available materials. Technical alternatives with highest feasibility and economy should be suggested.

**ii. Institutional Assessment and O & M Plan:** The institutional assessment component should review and evaluate existing arrangement for operation and maintenance of assets and additional requirement resulting from proposed investments or alternative means of operating and maintaining the services. If operation and maintenance is carried out by other agencies, the assessment should outline the obligations of parties in terms of functions and financial arrangements. Innovative alternatives for ensuring sustainable and cost effective O&M may be suggested which will add value to the DPR.

**iii. Economic Analysis:** Economic analysis should be carried out covering capital cost of the septage management, approximate cost of conveying septage per day, financial viability of the system and problems faced thereon approximate O &M costs incurred like O & M costs incurred like operator's costs, energy costs, etc Individual sub-projects will be evaluated by either cost-benefit analysis (requiring a minimum EIRR of 12%) or cost effectiveness analysis (applicable to sub-projects with non-quantifiable benefits or sub-projects costing less than US\$300,000).

**iv. Financial Analysis:** The financial assessment methodology should focus on two aspects:

- Sub-project level financial viability: This would apply to only cost recovery sub-projects (water, waste-water, solid waste projects) and would see to ascertain sub-project level Net Present Value (NPV)/Financial Internal Rate of Return (FIRR); and
- Overall ULB Level Financial Sustainability.

**v. Financial Management Systems:** The FMS assessment should focus on ULB's institutional capacity to handle APMDP sub-projects, which should comprise:

- Proposal for financial sustainability of Septage Management System
- Proposal for viable institutional arrangement for the Septage Management system
- Staffing for sub-project civil work procurement, and fund drawdown and application;
- Recording and reporting of sub-project physical and financial progress;
- Budgetary provision for APMDP-funded sub-projects;
- Proposal for the user charges to be collected from the beneficiaries; and
- Compliance with audit requirement under the project.

**vi. Social Assessment:** The SEMF governs the social assessment of sub-projects and the assessment should comprise:

- Screening procedures for reviewing sub-projects in order to classify them as those having high or medium, or low resettlement impacts;
- Mechanisms for addressing resettlement issues at different stages of sub-project cycle;
- Stakeholder consultations during preparation, and involvement of local people during project implementation;
- R&R policy identifying likely impacts and entitlement framework for the persons affected by sub-projects
- Resettlement Action Plans (RAPs) and
- Roles and responsibilities of different agencies such as APUIF, ULBs and other government agencies in addressing resettlement issues.

**vii. Environmental Assessment:** The SEMF governs the environmental assessment of sub-projects also and the assessment should comprise:

- National, state and local legal requirements on environmental issues that will be applicable to the urban sector sub-projects;
- Screening procedures for reviewing sub-projects in order to classify them as those having high or medium or low environmental impacts;
- Sub-project cycle and methods to address environmental considerations and assessments at different stages;
- Carry out documentation disclosure activities;
- Public/stakeholder consultation done, and approach during project implementation; and
- Environmental Management Plans (EMPs)
- Environmental roles and responsibilities of different Government agencies such as APUIF and ULBs.

After carrying out the studies, drawings and designs in paras stated above, the consultant shall prepare the following.

- a. For such of those items requiring investments, prepare detailed cost estimates item wise, using the latest AP Common Schedule of Rates. Estimate necessary road restoration charges wherever needed. The consultant shall assist the municipality in getting administrative/technical sanction for the estimates from the competent authorities. There should not be any lump sum items in the bill of quantities. For items not covered under schedule of rates, market rates are to be assessed.
- b. Prepare environmental and social assessment reports as per the ESR guidelines. Wherever necessary, prepare Environmental Management Plans (EMPs) and Resettlement Action Plans (RAPs).
- c. Prepare bid documents based on the standard bidding document of the World Bank.
- d. Prepare the project implementation schedule for execution and contract packaging plan.
- e. Draw up project budget with monthly targets, furnish network analysis such as CPM/PERT by using MS Project/Primavera project management software package for purposes of effective project monitoring and regular reports.

- f. Involve the Engineer/Commissioner of the Municipality at all stages.
- g. The D.P.R should be comprehensive with detailed designs, drawings detailed estimates and BOQs for all the components phase-wise i.e., for the Immediate, Short / Medium Term and Long Term Action Plans.

### **3.2.8. Consultant's Responsibilities**

The consultant's responsibilities would include:

#### **a. Data**

The details given in the technical conditions and specifications taken in conjunction with the study, is only a reasonable preliminary basis. The nature of the overall contract is such that after the proposal, the consultant shall be wholly responsible for all the details of the proposal, the physical and site conditions, the execution methodology etc. All data utilized in preparation of the proposal shall be presented indicating the sources of the data and also the basis of assumptions if any. The consultant shall be responsible for all the data, designs, and drawings given by them.

#### **b. Survey and Analysis**

The consultant shall conduct his own studies and prepare estimates based on latest Schedule of Rates specified by Government but updated to reflect actual market conditions wherever necessary. The APUIF, MSU as well as the local body concerned shall not be responsible (except as to risks specifically accepted under the conditions of contract) for the validity of the project details and designs and estimates.

#### **c. Project site survey**

The local body shall indicate the Project sites and their measurements. The consultant shall be responsible for its verification. The consultants shall be responsible for carrying out the survey to determine the condition of the existing sewer network, the no.of households with septic tanks, the efficiency of existing STPs if any, tentative assessment of losses of water in the system.

#### **d. Soil Investigation and Tests**

Soil tests as per relevant IS/IRC Standards have to be done by consultants to arrive at design parameters for the formation and safe bearing capacity. At locations proposed for important installations like pump house, sumps, STP etc., at least one bore hole for every such installation, should be made to determine the SPT N values at depth specified in the relevant IS codes. Soil samples taken from boreholes should be visually classified, index properties determined and presented along with the final report. These boreholes should be normally taken to a depth whose N value is greater than 100 plus a further 3m depth (to account for any drastic fall in N value below these strata). The subsurface water at each borehole be sampled and a chemical analysis carried out, to recommend appropriate cement/admixture for use in concrete mixed for the foundations. Recommendations of a geo-technical expert should be

furnished in the soil report and should cover aspects e.g., appropriate soil stabilisation measures if required, bearing capacity of the founding strata. The bearing capacity shall be found considering the shear strength as well as based on the settlement criterion.

**e. Instrumentation**

All necessary instrumentation such as flow meters, energy meters etc., to carry out the study shall be arranged and operated by the consultants at their own cost.

**f. Project Designs**

For the given purpose and functional use of the respective projects, proper design has to be developed. The consultants have freedom to choose the type of sub-structure and superstructure in compliance with relevant IS code specification/CPHEEO stipulations specified in the agreement. The drawings and designs shall include a general arrangement drawing and detailed drawings of all components in size A1 or A0. The level of detailing shall be such as to enable check of conformance with codal provisions, including detailed construction drawings and bar bending schedules.

**g. Estimation of Quantities:** Based on the surveys and designs evolved by the consultants, within the framework and the requirements of the project, the consultants have to prepare detailed items and quantity schedules and subsequently work out the cost estimates with the latest AP Common SoR.

**h. Bids:** Preparation of draft model bid documents in the World Bank prescribed format for each component.

**i. Technical sanction:**

The consultant shall assist the Municipalities in obtaining technical sanction from competent authorities.

**3.2.9. Data, Services and Facilities to be provided by the Client**

- i. The maps and other data related to this work, to the extent available in the Municipal office will be provided.
- ii. Assistance for obtaining FMB sketches and adangal for preparing land plans from the land survey department will be given by the client.

**3.2.10. Final Outputs (drawings, reports etc.) to be furnished by the Consultant**

3.2.10.1 During the study period, the consultant shall make four submittals per town, they are:

**a. Inception Report** shall be submitted detailing:

- General discussion about the existing sanitation from collection to treatment and disposal and the public health issues involved

- the data collected; macro level details; framework for collection of further data and data interpretation; work done,
- proposed study methodology, further work plan
- key professionals deployment schedule,
- a map at agreed scale showing the existing sanitation and sewerage system highlighting the worst affected areas with insanitation and vulnerable to public health hazards.
- Organization and staff deployment schedule with time lines.

b. **Concept Report** shall be submitted outlining:

- the progress to date, discuss study conducted, analysis of existing system, its condition, deficiencies etc. , findings, additional data collected
- proposed concept over which the proposals are being formulated;
- further study and further work planned,
- the concepts over which the proposals are being formulated,
- proposals for rehabilitation and refurbishment of damaged / inefficient components,
- proposals for treatment capacity and improvement of other components,
- identification of alternatives, their analysis and suggesting the best techno-economic alternative etc.;
- energy audit, sewerage network study, feasibility analysis preliminary designs, alternate proposals/designs
- draft training plans, institutional strengthening proposals prepared and costed
- an agreed list of immediate basic actions to be taken up with costs and responsibilities;
- detailed medium/long term actions which may or may not require capital investment;
- identified, prioritized and outline costs prepared;
- further studies identified and costed where investment will best improve performance;
- financial analysis, Economic analysis, Social impact assessment, Environmental impact assessment.
- designs and drawings for project proposals and outline for the draft report.

c. **Draft Final Report** shall be a complete report containing:

- Comprehensive Sanitation & Sewerage Study report,
- Master Plan comprising prioritized (immediate, medium term and long term) and phased investments duly costed,
- Draft DPR with Detailed Designs, Specifications, Drawings, system lay out plan, network plans, flow chart, Detailed Estimates and Cost Estimates, Model Bid Documents for each component,
- Draft DPR would also comprise O&M plan with costs, RAP & EMP and other details, Project monitoring documents comprising phasing of expenditure, PERT/CPM charts **with Implementation Schedule and project budget.** support calculations, maps, photos, community consultations, workshops,

- The findings of this draft Final Report shall be presented in a workshop to be arranged by the Consultant to the relevant municipality staff and the APMDP.

**d. Final Report** shall incorporate:

- Comments from the client and the APMDP on the Draft Final Report duly addressed by the consultant with Final version of all items mentioned under Draft Final Report above complete.
- Comprehensive Sanitation / Sewerage Study report with Master Plan comprising prioritized and phased investments, Final DPR with detailed designs, drawings, detailed estimates and cost estimates, and Model bid documents for all components.

The details of submission of copies of the reports at various stages are given separately.

### **3.3.0 SCOPE OF SERVICES FOR STORM WATER DRAINAGE**

- a) The scope of work involves reviewing the ongoing/ proposed projects or proposals, review of the existing storm water drains including micro/ macro drains arrangements in and around the project area, study of the storm water drain arrangements (both existing and proposed), identifying if any dry weather flows from sewage and sullage of houses is flowing in storm water drains, status of free flow or stagnation in the drains and reasons for stagnation, analyse the present disposal arrangements of storm water whether into any lake or pond or water body, whether such disposal from storm water drains is causing environmental pollution, suggesting improvements to the existing SWD's, identifying critical bottlenecks and problems of the existing system, whether it is feasible to have combined storm water and sullage in a single drain, or a separate sewer network is necessary for isolating sullage/ sewage from storm water drains, undertaking detailed topographic survey of the project area and levelling survey and preparation of the base maps to improve the basic, analysing the existing storm water drainage system (if any) in the project area using standard software for design of storm water drains after consultations which various stakeholders providing realistic technical solutions that are technically, economically, socially, environmentally and institutionally acceptable to the community. Necessary micro/macro drains as required shall also be designed by the consultants. In case the dry weather flows have to be continued and discharged in to the same receiving body, proper treatment facilities have to be designed for such disposal.
- b) Based on the preferred solutions, identify a prioritized capital investments plan, for which prepare details designs, contract packages, implementations plans, including environmental management plan, RAP and bid documents; the consultant should hold consultation on the draft RAP with the PAPs and other stakeholders to explain the RAP contents and provisions. The outcome of consultation should be brought into the Final Report.
- c) Prepare Financial Operating Plan, Maintenance Management Plan, O&M costs and strategies to meet these costs.
- d) Involve the officials of the concerned departments/agencies at all stages of the work, shall liaise with the ULB on a day to day basis.

#### **3.3.1 TASKS TO BE CARRIED OUT:**

##### **A. Data Collection and assessment**

- i. Based on the available secondary information (with due validation) and reconnaissance survey of the project area, get a broader understanding of the status and issues of the existing storm water drainage, its catchment patterns, the existing and proposed land use planning, existing condition of water bodies with the municipality apart from the final disposal locations; particularly identify dry weather flows consisting of sewage and sullage are flowing into the storm water drains and natural drainage streams. Whether the storm water drains and natural streams are used for connecting the sewers and septic tanks and whether the drains and streams are used for dumping garbag

ii. Collect and update information regarding maximum water levels in existing storm water drains and natural drainage streams, flooding levels in the streets of project area during rainfalls of different intensity. Based on the topography mark on the town maps the drainage basins with contributory areas which may be outside the ULB boundary, mark ridges and valleys and existing storm water drains discharging into the natural drains. Based on the field surveys prepare legible maps to identify the catchment and sub-catchment areas of the network and contributory areas from outside the project area, and the major outfalls and assess their capacity to receive the storm water from the project area; assess the soil characteristics for finding the infiltration of rainfall based and hence determine the run off coefficients based on future area development patterns.

iii. Assess the status of the existing storm water drainage, its functionality, structural soundness, status of equipment where pumps are installed for handling of storm water, other structures for detention/retention of storm water, any other faculties for handing the storm water, and assess the levels of deficiencies such as problem areas, drain alignment changes, clogging/silting of drains, encroachments, on the natural drains, unplanned developments which are likely to be flooded in storm flows, critical flooding areas and reasons thereof. Carry out an inventory of existing storm water drainage system including natural watercourses, ponds and roadside drains, bridges and culverts, their existing capacity for disposal of storm water, extent of mixing of storm water and sewage effluents, points of major interface between sewerage and storm water drains; the receiving water course for safe discharges. Develop due designation / indexation system to refer to the drainage system and its components.

iv. Based on this information base, prepare the maps showing the major drains and their catchment areas, major outfalls, flow pattern and prepare preliminary catchment areas for major drains, their preliminary longitudinal sections, drain reaches etc. Prepare field investigation reports with photo documentation and GPS referencing.

v. Carry out detailed topographical survey of the Project area on a GIS platform and to prepare longitudinal sections of the system and cross sections of important streams, major nallahs and drains covering width of 10 m on either bank generally at intervals of 30 m along with L sections (unless restricted by any physical features), 5 m on either side of smaller drains and detailing all the temporary and permanent structures met with that width. All the structures and encroachments will also be marked with enough details. Take existing levels and preparation of existing natural and storm water drains network leading to final disposal. Indicate the details of other underground services, mainly sewers and water mains (electrical cables) which are in the vicinity of the storm water drainage system and show their distance from storm drain and for deciding their location. The surveys shall be done along with the Engineer's of the ULB. At least 5% of the survey work has to be cross checked in field along with the local body engineers.

vi. Collect the available information data in a GIS format. The existing master plan of the town shall be used as base layer. The base line data gathering and analysis will consider the water sheds. GIS base maps for the existing base plans and future master plans shall show following detailed layers.

- (a) Roads with width, type of pavement, available width for providing storm water drains.
- (b) Major buildings
- (c) Drains/Rivers/Canals including drainage catchment areas/ boundaries including contributory areas lying outside the ULB boundary
- (d) Natural Storm storage tank locations, capacities , hydraulic particulars of bunds, the surplus weir sand sluices, and usage
- (e) Sewerage net work, pumping locations, overflow locations connections including sewer shed.(if available)
- (f) Land use maps
- (g) Slum encroachment in the natural Stream boundaries on GIS maps /records including the number of families estimated in the encroachment.

vii. Locate the all public and temple ponds and flood water holding ponds/zones, structures which are at present serving as holding basins should be shown on plan along with various arrangements / devises (existing) to dispose of the accumulated water to nearest outfall or conserve the water so as to reduce the shortage of water supply and to be shown in a tabular proforma.

viii. Indicate the existing inundation areas clearly, showing probable depth of water accumulation in case of heavy rainfall intensities. Assess the reasons for such inundation based on the information collected.

ix. Collection of rainfall records to 30 years from IMD; provide a range of potential of changes in intensity –Duration –Frequency (IDF) value based on appropriate global climate scenarios, and evaluate impact of potential mitigation measures for an agreed planning scenario. Storm event records including the return frequency of the storms (e.g. Storm event record for 1 in 2,5,10 and 30 years Storm); Flooding records including extent of flooding area of inundation and depth; Existing drainage system records including the size, invert levels and ground levels of the drains; Hydrographical and Topographical data of the main channels. Sewerage network, pumping station, over flow locations. Connections. Industrial type, locations, waste discharge characteristics and our fall locations if available.

x. Social Screening, Social Categorization and Household Census surveys as per SEAMF. Entitlement Matrix shall be updated as per The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013.

xi. Details of sensitive component like schools, hospitals, religious structures, trees, public utilities etc. present along the entire stretch with the width and adjustment to be provided along with a map.

### **3.3.2 Planning and Design**

- Divide the project areas into various drainage zones (preferably based on ULBs Zonal boundaries) considering the natural topography and contributory areas with a view to adopt decentralized approach as far as possible and economize the cost of overall system and also to avoid pumping stations. Zonings should be done after detailed field survey and investigation. Consultants shall also study the impact of the project on the adjoining areas.
- Identify appropriate planning and design parameters based on the project area situations; mainly, the appropriate design frequencies of the storms (based on degree of protections needed vs. Permitted flooding, based in type of area – residential, commercial, business districts etc.) the run-off

coefficients, proposed method of computation, proposed channel shapes etc. And design shall be based on CEPHEO guidelines, with appropriate justified modifications if needed.

- Utilizing proven and readily available computer software that to carry out analysis of existing situation of storm water drains to identify deficiencies and develop alternative strategies and option for expansion / augmentation of the existing system to address System deficiencies. While planning the system, give considerations to the principles and functional requirements listed below:

Principles: The proposed solutions should

1. Collect and safely convey storm water to receiving waters.
2. To flood proof important buildings/areas (major drainage design).
3. To cater for frequent or nuisance storm water flows (minor drainage design).
4. To retain within each catchment as much incident rain as possible by maximizing use of existing natural water courses and providing flood way reservations/minor detention measures within the catchment area.
5. Follow the general alignment of the existing water way.
6. Provide minimum interference with manmade/natural obstructions (particularly on the drain alignment).
7. Reduce land acquisition requirements; Possible alternates to reduce land acquisition and social impacts.
8. Meet the existing and proposed developmental needs and ongoing / proposed projects in and around the project area.
9. Study the project alternatives and minimise the impact on the surrounding areas such as trees and other Sensitive Environmental Components (SEC) and suggest mitigation measures for design, construction and O & M phases.
10. Meet the functional requirements:
  - a. Sustainability (maximizing use of natural drainage, storage's);
  - b. Functionality (ease of maintenance, reliability of suggested measures)
  - c. Levels of service (alleviation from flooding, community expectations through consultations with various stakeholders, obtaining and incorporating the feed backs received as appropriate, damage consequences); and
  - d. Cost effectiveness (maintenance, environmental benefits, balance between allowed damages vs. Safety)
  - e. Possibility of recharge pits along storm water drains and natural streams.
11. Using preliminary longitudinal sections of the existing drains and water courses, and their tentative slopes fixed early on, undertake trial designs, to compare alternative drain reaches, based on which select the most suitable alternative for the final design, which are technically and economically justifiable.
12. Drains should be planned taking into consideration the ground levels, slope of the ground, valley and ridges and also approved land use plan for development of Venkatagiri Municipality. For each length

of Storm drain, the drainage area should be indicated clearly on the map and measured. The boundaries of each tributary are dependent on topography, land use, nature of development and shape of the drainage basins. The incremental area may be indicated separately on complication sheet and the total area computed.

13. **Identify if any** temporary flooding of selected areas **has to be** allowed, on economic considerations. The analysis of the level of intensity / frequency of rain beyond which such flooding is likely to happen, and the areas where it is likely shall be done, based on various scenarios and costs; which shall be agreed by the client.

14. While formulating designs, the existing side drains, canals, other major storm water canals / rivers maintained by the I&CAD Department, R&B and NHAI should be analyzed based on the maximum rainfall and storm water runoff for the project area on a scientific basis.

15. In case the capacity of existing major drains/rivers connecting the river/canals are not sufficient to take care of the maximum runoff, then remodelling of the existing major drains and new additional drains may be proposed so as to avoid any inundation of rain water in the project area. The adequacy of the outlet of the existing major rivers / canals may also be checked for the total maximum run off in the project area and propose suitable measures to address the issues.

16. Where there is interface between sewerage system and storm water drainage, **and wherever the drains are being used for dumping garbage** propose appropriate plans to remove /reduce the interface; and/ or reduce the impact. **Propose covered drains where it is necessary to prevent misuse; however manholes have to be provided on covered drains to remove the silt.**

17. The existing SWD system in the Municipal area and the proposed system shall seamlessly merge so as to function without bottlenecks.

18. The designs shall be prepared taking into consideration all potential risks from the works and site constraints to ensure safety during implementation, potential and maintenance. The access difficulties in frequented places like schools, religious places, offices, etc, public utilises that cross the drain needs to be specifically considered for design of drains in such points.

19. Based on this analysis, identify the most appropriate alternatives that may include drain improvements, augmentation/extension, flood detention measures, improvements in flood handling equipments/structures, strengthening of existing structures etc. The proposed alternative (which consists various sub-alternatives on major drains / decisions on flood water retention / pumping **if required**.) shall be the economic one amongst the selected alternatives, looking from capital / O& M costs angle; in addition to meeting the planning and design requirements mentioned above.

### **3.3.3 . Other Assessments and Reporting**

1. **Finalise the design sections of proposed storm water drains, sizes of elements and covers where required along with street inlets, silt pits, recharge pits etc, Carry out** Feasibility for **use of** pre-cast **storm drain elements**. Structural designs to be adopted based on soil investigation report for channel improvements; Design of new channel bed profile that includes low flow channel to maintain ecological flow' and improve sediment transport to limit deposition. Strategies to assess feasibility of increasing existing tank storage and provision of rain water harvesting structure at designate locations along storm

water drain. Structural and non structural measures to regulate and curb dumping of solid waste in channel. Feasibility of storm water quality management devices along the storm water system e.g trash racks, float booms; Provision of silt trap pits along the channels and storm water system. Mean Sea Level (MSL) **Bench Marks** will be established at permanent structures (e.g Culverts, Bridges & Buildings) in all water ways/water sheds; if any other data required according to the site conditions furnished with desirable rates.

2. Prepare a financial operating Plan of the ULB as appropriate. The financial operating plan shall consist of financial assessment of ULBs for ascertaining financial sustainability of proposed investments, undertaking of financial analysis of existing financial situation and also preparation of 10-15 year financial projects for ULBs (the Financial and Operating Plan) covering summary Income-Expenditure and Balance Sheet/Capital Account statements of the ULB after taking into account the capital and operating costs of the proposed SWD investments. This will be an important input into the phasing of SWD investments as well.

3. Consultant shall also prepare a financial plan for the proposed investments.

4. Prepare structural designs of Storm Water handling structures, major drains, to withstand the hydraulic/ other forces.

5. Consultant to suggest suitable materials for consideration with cost benefit analysis.

6. Study the extent of road crossings required for different types of roads maintained by different agencies. Consultant to suggest the most effective way in making the road crossings for traffic prone areas. The cost of road cutes shall be included in the cost estimates.

7. Prepare detailed cost estimates based on item rate basis using the latest schedule of rates / market rates as appropriate. Estimate necessary road restoration charges wherever needed. Assist the ULBs in getting administrative / technical sanction for the scheme from competent authorities. There should not be any lump sum items in the bill of quantities. For items not covered under schedule of rates, market rates to be assessed.

8. Prepare suitable procurement plan, tender documents based on priority, project implementation schedule for extension and contract packaging plans including phasing.

9. Prepare maps with latest existing and proposed measures, along with their phasing and current land use.

- i. Overall Master Plan map, showing major and Secondary drains, salient facilities, catchment areas, outfalls, receiving Water Bodies etc.,
- ii. Schematic diagram showing flow directions, flows, facility sizing nomenclature etc. For the drains, L-section and cross section drawing showing minimum 10 meters on either side of the drain, @ 30m interval with details of underground facilities, salient structures/obstructions of all the existing drains to be remodelled and the proposed drains

indicating the details of drains.

- iii. GTS benchmark shall be followed. List of TBMs and PBMs established shall be submitted as part of the output.

### **3.3.3 Environmental & Social Assessment:**

For the proposed alternatives, do Environmental and Social Screening including Environmental & Social categorisation as per the Environmental and Social Framework (SEAMF) for APMDP and compliance requirement as per E & S categorisation such as determining the need for carrying out a detailed Environmental / Social Assessment, the appropriate Environmental Management Plans, Resettlement and Rehabilitation measures (Resettlement Action Plans) and prepare Environmental and Social Assessment Reports.

**3.3.3.1 Environmental Assessment:** The Environmental Assessment shall cover screening of the project area the sensitive environmental components, identifying possible impacts, considering alternatives in the design to avoid or minimise the impact and whatever there are proposed impacts identifying management measures to minimise the impacts and planning of compensatory measures.

- During the Environmental screening of the project corridor, the sensitive environmental components) like trees, schools, hospitals, water bodies, etc) and sensitive land users, other Public utilities along the corridor shall be identified and provided in map providing with more information like components that would require to be protected, trees that need to removed, or retained with protection, utilities that require shifting with prior permission etc.
- Alternatives shall be evaluated to minimise the impact on sensitive components and the hydraulic suitability of the receiving water bodies need to assessed for finalising the designs of the drains, all of which shall be clearly brought out in the assessment report.
- As part of the Environmental Assessment, monitoring of various environmental parameters shall be carried out at sensitive locations and respective stations along the entire project corridor and the baseline data shall be provided in the Environmental Assessment Report.
- Detailed consultations shall be conducted with various stakeholders like Government departments like I&CAD, NGOs, general public, etc with specific deliberations on project proposals, to receive opinions. The suggestions received from the consultations shall be reviews and be considered in finalising the designs.
- The consultations and outcome shall be documented and included as part of the report.
- The EMP shall provide at clear management measures for all proposed activities in the project, including those mentioned below.
- The regulatory requirement and permissions required from other departments/ agencies shall be listed along with the responsibility and time frame.
- The excavation shall be quantified, the management measures at the place of work and disposal arrangement during construction and disposal of debris / silt during maintenance shall be clearly addressed in the EMP, and provision required in the bid document shall be provided for such disposal.
- Schedule for utility shifting shall be prepared and temporary arrangements to be identified, sign

boards to mark the utility also to be suggested.

- For the sensitive components identified, mitigation measures shall be developed for both during construction phase like noise and air pollution mitigation, removal of extracted earth, access difficulties etc and for operation phase especially with respect to access difficulty and maintenance activities.
- Specific protection arrangement for trees and other sensitive environmental components shall be identified.
- Tree cutting requirement if any shall be clearly identified and listed with schedule of permission from regulatory authorities to facilitate cutting, compensatory plantation plan along with location of plantation identifying maintenance arrangements.
- This particular aspect of access difficulty needs consideration in design of drains near such points, and specific discussion shall be carried out with such groups to arrive at the requirement.
- Traffic Management requirement shall be identified and plan be provided in the EMP.
- Safety both in project implementation, (pre project, construction and operation & maintenance) shall be detailed out. The personal protective equipments both during construction and maintenance shall be listed and the need for cost provision to be identified.
- Monitoring requirement for compliance to environmental management measures during construction and operation & maintenance to be identified along with responsibility and reporting mechanism.
- Cost estimates and BOQ: Based on the EMP, cost estimates shall be prepared which shall be included in the project cost and necessary BOQs shall be identified for inclusion in the bid document to ensure implementation of EMP.

**EA Report:** The EA report prepared shall include separate chapters on initial environmental screening report, description of project proposal, analysis of alternatives, base line environmental data, impact prediction, details of public consultation and action taken report on the suggestions received, environmental management plan including plan for environmental and compliance monitoring for all the phases of project – design, construction and operation & maintenance, list of BOQ items and cost estimates.

Identify the prioritized investments and phasing. For the flood prone areas identified in the Background, indicate appropriate measures that need to be taken up on priority.

### **3.3.3.2 Social Assessment:**

Systematically identify the potential social impacts in the existing and proposed SWDs of areas included in this SWD study. Various stages of this is Social screening , identify potential impacts such as PAPs, type of affected structures, area of the structure, trees, wells and inventory of affected Common Property Resources, Community & Religious structures and so on. Assessing the nature of impact as per Social Safeguards and Entitlements matrix as per ESF. Provide details of required land with ownership and current land use. Suggest steps for alienation and acquiring land, describe the alternatives

considered for minimizing social impact. Describe the mechanism to reduce resettlement to the extent possible during implementation. Carryout census socio-economic surveys of the project (Project affected Families) PAFs if required. Assess the magnitude of impact. Social categorisation, compliance requirements of the sub project as per Environmental and Social Framework (SEAMF). Preparation of RAP (Resettlement Action Plan) should take into account of policy provisions and entitlements available in the LARR Act 2013 along with the provisions of SEAMF. Conduct stakeholder consultation stage by stage by disclosing social outputs of the study.

SIA shall be carried out as per the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013 and Andhra Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2014.

Public Disclosure: Disclosing the environmental and Social outcomes of the study in the websites of APMDP and implementing agencies. The final approved EMP and RAP's will be disclosed in the website and public place accessible to the local people.

**3.3.4 Economic Analyses:** The Consultant shall also carry out economic analyses as per agreed methodology and arrive at Economic Rates of Returns (ERR) taking into account economic benefits that are quantifiable, including reduction in risk and cost of flooding.

**Regulatory Clearances:** The Consultant shall clearly list all the regulatory clearances, including an assessment based on consultations with the concerned agencies of the time required and process involved in obtaining the and its impact on overall implementation period.

#### **D. Maintenance Aspects.**

Provide for installation of automatic rain gauges at appropriate places. Review existing arrangements for maintenance of the storm water drains, the institutional arrangements and capacities and gaps, assess O & M costs – recurring and additional for the proposed investments; based on which prepare Maintenance Management Plan, including future renewal plans, strategies to meet O & M costs, institutional authority and scope of SWD Zones falling under the authority, institutional strengthening measures including possible outsourcing activities. Possible steps to avoid encroachment/squatting (by developing footpaths, walkways, parking lots, and so on) during O & M Stage. Prepare maintenance management Plan using the mechanical devices will be proposed for desilting the storm water channels.

#### **3.3.5 Detailed Designs and Cost estimates:**

**Project Designs:** For the given purpose and functional use of the proposed project, proper design has to be developed. The system will be designed following relevant IS codes/ CPHEEO stipulations. In built-up areas and junctions, a network of sub-surface drains with interception chambers may be considered to intercept the surface flow. Proposed system shall conform to relevant IS codes/ CPHEEO stipulations. The drawings and designs shall include a general arrangement drawing and a detailed longitudinal section drawing of all components in size A1 to A2. The level of detailing shall be such as to enable check of conformance with codal provisions including detailed construction drawings and bar bending schedules

**Estimation of Quantities:** Based on the surveys and designs and EMPs evolved by the consultants,

within the framework and the requirements of the project, the consultants have to prepare detailed item and quantity schedules and work out the cost estimates.

**Tender:** Preparation of Bid documents as per the rules and regulations and in the prescribed format of World Bank/GOAP.

**3.3.6 Final outputs:** Inception report: General discussion of status of existing storm water drains, whether sullage is flowing into the drains, where the storm water is disposed its impact on environment, about street drains and natural drains along with solution to the flood prone areas indicated.

a) Interim report: Feasibility analysis and preliminary design including possible alternatives, broad costs of proposals, survey reports and E & S initial screening reports, Social Assessment Report and Resettlement Action Plan, Environmental Assessment Report, O & M plans, economic analysis and justification, details of confirmation to planning, design and O & M as per TOR.

b) Draft Final Report: Draft detailed design, Social Assessment Report & RAP draft Environmental Assessment Report and Environmental Management Plan, cost estimate ( including items identified in EMP, procurement and implementation plans) BOQ, Financial Operating Plan, phasing and contract packaging etc.

c) Final Report: Final detailed design along with flow chart, drawings, final SAR & RAP, EA and EMP report, cost estimates, financial operating plan, phasing and contract packaging etc.

d) Draft Bid Documents as per the procurement plan.

e) Final Bid document (Package wise).

Consultants shall submit periodical monthly reports in detail to the client and shall attend periodical reviews to be conducted by the clients with various department as required during various stages of the assignment.

The consultant would be required to submit 10 copies of each of the reports besides providing a soft copy of all reports and Auto CAD drawings.

### **3.3.7 Data, services and facilities to be provided by the client**

(i) The maps, master plan of the town with proposed land use plans and other data related to this work, to the extent available in the Municipal office will be provided.

(ii) Possible assistance for obtaining FMB sketches and adangal for preparing land plans from the land survey department will be given by the client.

(iii) A copy of all the available relevant DPRs would be provided.

### **3.3.8 Final Outputs (drawings, reports etc.) to be furnished by the consultant**

#### **a. Inception Report:**

Comments on the available DPR's missing components and strategy for their study and detailing in the revision. General discussion about source of water, present distribution system and macro level details along with framework for collection and interpretation of data, further work plan. Proposed approach and methodology, methodology for data collection, planning and design approaches, Indication that

consultants have thoroughly reviewed the SEAM Framework and associated policies, and are in a position to apply it to the DPRs under revision/preparation.

**b. Existing Situation and Design Basis Report, Priority Interventions, Procurement Documents for Priority Interventions**

Based on the understanding developed on the existing system through studies and assessments, present the existing situation; and develop the Basis of Designs and Planning parameters for Phase-B: Feasibility and Detailed Planning.

Identify the priority interventions with their costs for the immediate term, that will give maximum benefits to the ULB with reasonable cost and time. Provide a procurement and implementation plan for these along with bid documents.

**c. Feasibility and Concept Plan**

Results of Feasibility analysis for various options, along with Environmental and Social Screening, documentation of stakeholder consultation, preliminary costs; Concept Plan of preferred option supported by justification, drawings and costs.

**d. Detailed Designs and Estimates and Bid Documents**

Detailed designs for the finalized plan, detailed cost estimates, with supplementary reports, drawings, IEC material, procurement and implementation plans including SIA, RAP and timeline of R&R actions to be taken before commencement of works, EAs, EMPs and project monitoring plans.

Bid documents as per the World Bank model documents.

**e. Capacity Enhancement Action Plan (CEAP)**

Options for enhancing the capacity of the ULB to sustain the investments, with priority interventions and implementation plans.

**f. Interim Progress Reports**

Interim reports highlighting progress made, prospective plans, ULB/client intervention areas,

The consultants should submit 5 copies of all reports, documents and drawings mentioned above other than final bid documents of which he shall supply 5 copies. Soft copy of all reports and documents (MS word format) and drawings (Auto Cad & PDF) shall also be submitted.

**4. Composition of Review Committee:**

- Project Director/Additional Project Director, APMDP
- Commissioner & Municipal Engineer of ULB concerned
- Nominee of APUFIDC
- Nominee of Chief Engineer, PHED
- Superintending Engineer, PHED concerned
- Executive Engineer, PHED concerned

**5. Procedure for review of progress reports.**

The review committee will review the progress of the work. The decision/suggestion carried out will be reviewed in the next meeting. The comments or view on the various reports shall be given to the consultant within 10 days of submission. The Draft Final Report may be reviewed by the World Bank

**6. Schedule of completion of tasks:**

The total contract period is of 3 months period. Specific timelines are the following:

Inception Report	1 week
Existing Situation and Design Basis Report	2 weeks
Feasibility Analysis and Concept Plan	2 weeks
Interim Report with Priority Interventions, Procurement & Implementation Plan	3 weeks
For Priority Investments - Detailed Designs (as needed), Procurement Documents	6 weeks
Draft final DPR, draft Capacity Enhancement Action Plan, draft bid documents	10 weeks
Final Reports – all, Detailed Project Report with Supplementary Reports, drawings	12 weeks
Final Bid documents and Final Capacity Enhancement Action Plan	12 weeks

(Minimum Time taken by Client for approval after submission shall be considered as two weeks.)  
 (Time taken by Client for approval/after submission of every report shall be excluded)

**7. Appraisal of Detailed Project Reports**

- I. Financial and Economic appraisal: Financial and Economic appraisal will be done by APUIF.
- II. Technical appraisal: The Technical appraisal including O & M appraisal of D P R will be done by the Chief Engineer, PHED.
- III. Social appraisal: Social appraisal will be done by the Social Scientist, MSU/designated Social Consultant
- IV. Environmental appraisal: Environmental appraisal and Energy audit appraisal will be done by Environmental Specialist, MSU/designated Environmental Consultant
- V. Project Appraisal Committee (PAC) – overall appraisal.

The DPR will be declared appraised by PAC and approved by the Steering Committee as per GO Ms No. 288, MA dated 21-04-2009 and G.O.Rt.No.197, Dt.26.03.2015.

**8. List of key professionals/ position whose CV and experience would be evaluated:**

<b>S. No.</b>	<b>Key Staff / Position</b>	<b>Minimum Qualifications and Experience desired.</b>
1	Project Manager (Team Leader)	Post Graduate in Civil Engineering with 25 years of experience or Graduate in Civil Engineering with 30 years of experience in studies, design/construction of Water supply/Sewerage/Storm Water Drainage projects and sound knowledge of operation and maintenance of Water supply/Sewerage/Storm Water Drainage systems. Experience in Project Management will be preferred.
2	Urban Specialist	Post graduate in Urban/ regional planning or equivalent with 10 years experience.
3	Municipal Finance/ Institutional Expert	Masters in Management / Business Administration or a Chartered Accountant with 10 years specific experience in Municipal Finance / Infrastructure Finance and economic analysis of municipal infrastructure and institutional development and good exposure of assessing the willingness of people to pay and fixation of tariff for urban utilities.
4	Social Development Expert	A post-graduate in Social Sciences (Sociology/Social work) with at least 10 years experience in SIA , RAP preparation and Community consultations with skills in impact assessment of the infrastructure proposed under the study and imparting skills to the local community for better planning, implementation and O&M procedures.
5	Environmental Specialist	A post graduate degree in civil or Env. Engg. / Env. Plng. with civil engineering background with at least 10 years experience.
	<b>Water supply</b>	
6	Water supply expert	Graduate in Civil Engineering with 15 years of experience in design of water supply systems and network using software. Knowledge of Water supply systems and its operation and maintenance is essential.
7(a)	Project Engineer (water	Graduate in Civil Engineering with 10 years of

	supply)Design/Survey/CAD	experience in design <b>of water supply systems.</b>
(b)	Project Engineer (Elec/Mech)	Graduate in Elec/Mech Engineering with 10 years of experience in relevant field in the design, selection, installation and O & M of pumps and motors including electrical panel boards etc. He shall have good exposure to energy audit studies.
	<b>Septage Management</b>	
8	Sanitation and Sewerage expert	Graduate in Civil Engineering with 15 years of experience in design <b>of sewerage systems/septage management using software.</b> Knowledge of Sewerage system and its operation and maintenance is essential.
9(a)	Project Engineer Septage Management Design/Survey/CAD	Graduate in Civil Engineering with 15 years of experience in design <b>of septage management.</b>
(b)	Project Engineer (Elec/Mech)	Graduate in Elec/Mech Engineering with 15 or 10 years of experience in relevant field
	<b>Storm water drainage</b>	
10	Storm water drainage expert	Post Graduate in Civil Engineering with 10 years experience or Graduate in Civil Engineering with 15 years of experience in in the field of Hydrology with exposure in assessment of Storm water runoff, Intensity, Duration curves as per CPHEEO Manual Procedures. Knowledge of Storm Water Drainage system and its operation and maintenance is essential.
11(a)	Project Engineer Storm water drainage Design/Survey/CAD	Graduate in Civil Engineering with 15 years of experience in design <b>of storm water drains.</b>
(b)	Project Engineer (Elec/Mech)	Graduate in Elec/Mech Engineering with 10 years of experience in relevant field

Other support personnel especially environmental and social specialists should assist the above team to ensure that these safeguards are complied with. The consultants shall propose all the additional professional personnel along with supporting staff for completing the surveys/consultations/studies in a period of THREE (3) months.

