

TERMS OF REFERENCE FOR CONSULTANTS

DESIGN, CONSTRUCTION SUPERVISION AND MANAGEMENT CONSULTANCY FOR AIZAWL

1. Background Information

1. The Government of India is proposing to implement an investment program to improve urban conditions in North Eastern Region capital cities, namely, Agartala, Aizawl, Gangtok, Kohima and Shillong. The expected impact of the Investment Program is improved environment and well-being of urban residents in the five capital cities. The expected outcomes of the Investment Program will be an increased access to better urban services for the 1.5 million people expected to be living in the Investment Program cities by the 2014. To this end, the Program will (i) improve urban infrastructure and services, (ii) strengthen urban institutions for better service delivery build Program management and implementation capacity.

2. The Program will comprise two parts: Part A will cover urban infrastructure and services improvement including the rehabilitation, improvement and expansion of (i) water supply, (ii) sewerage and sanitation, and (iii) solid waste management. Part B will cover Investment Program management and implementation support and a comprehensive capacity building assistance to support the accomplishment of the urban institutional and financial reform agenda, and enhance planning, operation and maintenance (O&M), revenue mobilization, and financial management capabilities of service providers.

3. In Aizawl, the Program will specifically support rehabilitation and expansion of the water distributions system - namely storage, transmission and secondary distribution systems – and a comprehensive non-revenue water (NRW) program, which will include installation or replacement of bulk water meters as well as a leak detection program for rehabilitation and strengthening of the existing distribution network. In addition the program will also support the Government in (i) improving sanitation facilities, including sewerage and sewage treatment in most congested areas (core of Zone 1), construction of toilet blocks and assistance to Zone 1 households to convert pit latrines into flush latrines and (ii) developing solid waste management facilities, including composting facilities, an engineered landfills site, improvements to primary and secondary collection as well beneficiary awareness.

2. Overall Scope of Work

4. The work under this design and supervision consultancy for the investment program in Aizawl will consist of (a) conducting necessary surveys, investigations and tests, (b) technical appraisal of subprojects and updating preliminary designs (if deemed necessary), (c) detailed engineering designs, (d) preparation of bidding documents and technical support during evaluation, (e) construction supervision and contract monitoring.

5. The assignment will be structured in 3 parts or contracts, which will largely correspond to each of the tranches under implementation. The assignment has been structured to ensure that whilst designs may be completed in advance, supervision matches each of the tranche releases under the investment program. The summary has been provided in Table 1.

Table 1 – Proposed contract responsibilities and resource structure

Activity	Design	Construction Supervision
Water Supply		
UFW Program	-	Part1
Dedicated 132kV power line	Part 1	Part 2
Supply and installation of 13,000 HH meters	-	Part 1
Supply and installation of bulk meters (few additional)	Part 1	Part 2
Supply and installation of Chlorinators at 2 major reservoirs	-	Part 1
Replacement of 7 reservoirs	-	Part 1
Construction of 9 new reservoirs	Part 1	Part 2
Replacement (22 km) and augmentation (15 km) of primary network	Part 1	Part 2
Replacement (88 km) and augmentation (42 km) of secondary network	Part 1	Part 2
Sewerage		
Construction of 23 km primary network	Part 2	Part 3
Construction of 30 km secondary network	Part 2	Part 3
Construction of a 7 MLD sewage treatment plant	Part 2	Part 3
Installation of 3600 HH connections	Part 2	Part 3
Construction of 6 toilet and bathing blocks	Part 2	Part 3
Solid Waste Management		
Provision of primary collection equipment	Part 1	Part 3
Provision of secondary collection equipment	Part 1	Part 3
Construction of a 50MTD compost plant	Part 1	Part 2
Construction of 1 sanitary landfill site	Part 1	Part 2
Construction of transfer station	Part 1	Part 2
Procurement of machinery for the above	Part 1	Part 3

Activity	Management
Environmental Studies, Land acquisition and Resettlement	
Water Supply	Part 1
Solid Waste Management	Part 1
Sewerage	Part 2
Community Awareness Program	
Solid Waste Management	Part 1
Water and Sewerage Tariffs	Part 2
Compost Studies	Part 1
Non-Revenue Water Reduction Program	Part 1
Power and Water Audits	Part 2
Program Performance Monitoring System	
MIS/M&E program	Part 1
Baseline	Part 1
Operational Manuals	
Water Supply	Part 2
Solid Waste Management	Part 3
Sewerage	Part 3

3. Scope of Work for Part 1

6. The scope of work under Part 1 will include the following activities:

Design, Preparation of Bidding Documents and Support to Tender Evaluation

- (i) water distribution network including new storage reservoirs, primary and secondary networks;
- (ii) supply and installation of bulk meters;
- (iii) compost plant, sanitary landfill sites, transfer station and collection improvements.

Construction Supervision

- (i) implementation of the UFW program
- (ii) supply and installation of household meters
- (iii) supply and installation of chlorinators
- (iv) water reservoirs due for replacement.

Management

- (i) preparation of environmental and social safeguards (IEEs, EMPs, EIAS, RPs, IPDPs) documentation, as necessary;
- (ii) preparation and launch of the community awareness campaign (with special focus on solid waste management, cost recovery and charges);
- (iii) launch and implementation of the Non-Revenue Water Reduction Program;
- (iv) preparation of management and monitoring systems and baselines.

4. Consultancy Service Requirements

7. The team will comprise of 352 person months national consultants, as well as 256 person months of support staff time. Detail breakdown of the type of consultants, and individual inputs is given in Table 2. Specific tasks of the sub-teams and expertise required is given in the following paragraphs. The overall responsibility will be with the Team Leader. The indicative schedule of inputs is as follows:

Table 2 – Management, Design and Construction Supervision Consultancy

No	Position	Indicative Person Months		
		Part 1 2009-10	Part 2 2011-12	Part 3 2013-14
National Consultants				
01	Team Leader/Municipal Specialist	21	21	18
01	Dy Team Leader / Contract Management expert	15	16	16
01	Water Supply Engineer (Network Modeling Design)	8	4	
01	Water Supply (and UFW)	6	3	
01	Sewerage and Sanitation Engineer	4	7	4
01	Solid Waste Management Specialist	7	7	4
01	Electrical Engineers	3	3	
01	Mechanical Engineers	3	2	
01	Instrumentation, Controlling and Automation Engineer	2	2	
01	Structural Engineer	3	3	
01	Procurement Documentation Specialist	5	5	2
02	Civil Engineers/Asst. Resident Engineer (n=2)	20	24	24
01	Project financial management expert	7	5	
01	Economist	2.5	2.5	
01	Community development and public awareness expert	7	7	7
01	Resettlement Specialist	7	7	4

No	Position	Indicative Person Months		
		Part 1 2009-10	Part 2 2011-12	Part 3 2013-14
01	Environmental Specialist (Design and Compliance Monitoring)	8	8	6
01	Monitoring and Evaluation expert	6	3	3
02	Engineering Assistants (n=2)	16	30	30
02	Draftspersons (CAD)	12	12	
02	Quantity Surveyors	12	12	
01	Admin Assistant	22	22	22
01	Drivers	22	22	22
27	Total	219	228	162

8. It is envisaged that the consultant will provide adequate support staff such as secretarial staff, CAD operators, translators and drivers, as he considers necessary. All experts would be PERMANENTLY based in Aizawl. The Government will also provide complementing Program management experts. The consultant will be the Engineer's Representative in administering the contracts.

5. Overview of the Design and Supervision Engineering Services

9. General tasks of the team include:

- (i) assist the Program Director with the day-to-day implementation of contracts and Program activities;
- (ii) coordinate planning, control, and management of the work of a multidisciplinary team;
- (iii) develop implementation schedules and resource requirements;
- (iv) monitor progress, evaluate results, and identify and resolve constraints;
- (v) provide long-term input to the development of Program methodologies;
- (vi) evaluate demand and establish criteria to meet demand;
- (vii) identify appropriate technologies and the need for standardization of equipment and materials;
- (viii) assist Program managers in carrying out detail investigation and engineering surveys (geotechnical, topographical, bathymetric etc), wherever necessary;
- (ix) assist the Program team designing and undertaking construction supervision water supply, sewerage and sewage treatment and solid waste management schemes;
- (x) assist the Program Director in presenting of the designs to all stakeholders (including local government and communities), addressing their concerns where necessary;
- (xi) assist the Program Director in developing bidding documents, including bill of quantities and specifications following ADB's guidelines and assist in evaluation of bids;
- (xii) update costs and economic and financial information (including rates of return), when needed;
- (xiii) prepare and update implementation schedule and resource requirements (preferably in Microsoft Project Management);
- (xiv) define quality control mechanisms and parameters for subprojects/components;
- (xv) assist the Program Director in supervising all construction activities under the Project, including liaison with the other teams under the Program and other donor financed projects, and community development team;

- (xvi) develop and implement a quality assurance program for all works, securing compliance with design/standards;
- (xvii) assist the Program Director in supervising day-to-day construction management;
- (xviii) develop O&M manuals for future maintenance;
- (xix) prepare asset registry for all assets built under the Project;
- (xx) establish a contract tracking systems, including implementation schedules and milestones achievable;
- (xxi) assist the SIPMIU in issuing contract completion certificates, settlement of contractor's claims;
- (xxii) assist the SIPMIU during Program review missions;
- (xxiii) assist the SIPMIU in the preparation of Program guidelines;
- (xxiv) Prepare training programmes for effective implementation and O&M including Training Module, Training Plans and organize and conduct same through consultant's staff and other service delivery institutions

10. The DCSM will be specifically concerned with assisting (i) the review of designs prepared by the PPTA and bridging TA, as well as any other DPRs or related detailed engineering designs; (ii) the preparation detailed engineering designs and providing construction supervision for all water supply, sanitation and solid waste management scheme components; (iii) the review of designs to be prepared by Bidders; (iv) construction supervision to ensure the necessary standards are duly met. These schemes and the scope of work falling under the Supervising Engineers responsibility have been presented under Table 1 above.

11. The consultants will develop and implement a computer-based Program implementation plan, critical paths, resource maps. All reports required will be produced based on these systems. The consultants will coordinate with other consultants under the Program and with other similar other donor and government assisted projects.

12. **Designs and Tender Process.** The consultant will review the feasibility report with SIPMIU staff and prepare an Inception Report which should include the related works and details of the programme of works which the consultant proposes to implement. Overall scope of works will include:

- (i) Review the PPTA Report and subsequent reports together with SIPMIU staff.
- (ii) Assist SIPMIU in the review of the design for proposed (a) water scheme (storage, transmission and distribution), (b) sewerage and (c) solid waste management including all necessary designs, drawings and schedules, as well as indicative bills of quantities, specifications including commissioning specifications and on-site training for plant operation maintenance by contractors.
- (iii) Assist SIPMIU staff carrying out detailed investigations and engineering surveys including water testing and engineering surveys (soils, topography etc).
- (iv) Prepare a full hydrological network model for water distribution zoning (with CAD or other relevant computer package) and studies for water and sewerage components, which are, wherever relevant, to be based on data collected over a 12-month period.
- (v) Confirm the scope of provision of equipment for plant and equipment and review proposed specifications for the plant and equipment (E&M, vacuum tankers etc) for all 3 subsectors.
- (vi) Assist SIPMIU staff conducting detailed engineering designs as per Table 1, including all transmission and distribution networks, storage systems for water;

- sewerage network and treatment plant; and compost, landfill and other solid waste management facilities.
- (vii) The Consultant shall facilitate the dialogue with Central and State Government and ULB agencies.
- (viii) The Consultant shall support the SIPMIU in obtaining required EIAs, compliance with resettlement requirements and any other regulatory or permits.
- (ix) Assist SIPMIU staff reviewing designs prepared by bidders, including those that relate to primary and secondary distribution/collection and sewage treatment.
- (x) Check that the contractors' proposals are in agreement with all environmental and social safeguards requirements.
- (xi) Assist the SIPMIU staff to develop bidding documents, bills of quantities and specifications and drawings.
- (xii) Assist in bid evaluation.
- (xiii) Assist in the preparation of contracts for signature.

13. **Construction Supervision and Commissioning.** The consultant shall assist the SIPMIU staff carry out all the duties normally associated with supervision of construction. This will include but is not limited to checking contractors' insurances/ guarantees/ bonds; the review of contractors' process and M&E designs and any necessary modifications to the construction drawings; attending and reporting on factory tests and inspections; agreeing commissioning procedures and supervising commissioning. The consultant shall establish any necessary field laboratories for quality control or arrange for such services to be provided by acceptable Institutions.

14. The consultant shall
- (i) Assist the SIPMIU staff supervising and assure quality of implementation of the urban schemes.
 - (ii) Assist the SIPMIU staff supervising all construction activities under the Program and the implementation of the environmental management plan as required.
 - (iii) Co-ordinate interfaces between contracts and clients.
 - (iv) Support SIPMIU with contract management and recommendation for payments.
 - (v) Develop and implement a quality assurance program for all works.
 - (vi) Agree and prepare contractor's certificates; resolve any disputes and provide all necessary support for claims resolution and arbitration proceedings.

6. Overall Scope of Management Services

15. Overall scope of work can be defined as follows:
- (i) Set up systems and procedures for Program management, implementation and monitoring of the progress,
 - (ii) Assist SIPMIU in preparing annual work plans, staffing schedules, job descriptions, and, as necessary, budgets including equipment budgets, and detailed implementation schedule
 - (iii) Assist SIPMIU in preparing an overall Investment Program Performance Monitoring System (IPPMS) for the Program and ensure that the necessary independent inputs are in place when and where required;
 - (iv) Assist SIPMIU in operating the IPPMS and in monitoring the physical progress with urban infrastructure components as well as the progress with the implementation of the Urban Governance, Finance, and Service Delivery Improvement Action Plan and the loan covenants; and with the SIPMIU,

- ensure the effective and timely delivery of the program outputs as well as the Urban Governance, Finance, and Service Delivery Improvement Action Plan and the loan covenants.
- (v) Prepare on behalf of SIPMIU required Investment Program and Program progress reports, and submit timely reports to the Government and ADB on physical progress, financial progress, and progress on implementing Urban Governance, Finance, and Service Delivery Improvement Action Plan and the loan covenants, highlighting impediments to the quality and progress of the works and remedial actions,
 - (vi) Assist the SIPMIU and IPCC in establishing, testing and reviewing financial accounting and control systems and ensuring accurate and timely report submissions and funds flow from the ADB and onwards to the implementing agencies;
 - (vii) Assist SIPMIU and IPCC in identifying and preparing subprojects as per the subproject selection criteria, and assist SIPMIU in (a) appraising subprojects, (b) preparing subproject appraisal reports, (c) preparing Periodic Financing Requests as per the ADB required format, and (d) obtaining approvals of ADB.
 - (viii) Provide overall guidance to the various capacity building experts in order to ensure that their work support the implementation of the Urban Governance, Finance, and Service Delivery Improvement Action Plan, Water Utility Reform Action Plan and associated covenants and their time frames
 - (ix) Develop procedures and prepare guidelines for procurement including pre-qualification and post-qualification of contractors, evaluation of bids, recommendation of awards of contracts etc;
 - (x) Prepare and/or amend, existing procedures and guidelines for site supervision and quality control to include guidelines and detailed job descriptions for engineers and site supervisors.
 - (xi) Support the SIPMIU in technical matters such as preparing work orders for the design consultants; reviewing and approving surveys, studies and master plans; sub-program final designs, construction drawings and estimates; pre/post-qualification of contractors; approving contractors' works; ensuring sound supervision and quality control of sub-program construction and any other technical matters arising;
 - (xii) Assist the SIPMU with all aspects of procurement including pre/ post-qualification of contractors, tender document review and bid evaluation;
 - (xiv) Review construction supervision of quality, cost and time controls;
 - (xv) Support the SIPMIU in the preparation of documentation and meeting of all readiness criteria for any tranche releases under the program.
 - (xvi) Assist the SIPMIU in other tasks as assigned to it by the EA.

In addition, the consultants should

- (xvii) Closely coordinate with the Institutional Development Consultant in the implementation of the reform agenda;
- (xviii) Support Empowered Committee in the preparation of (i) municipalization situational assessments; (ii) municipal corporation and capacity development and resource programs plans and (iii) time-bound action plans for devolving functions to the municipalities in a phased manner.
- (xix) Support the preparation of a separate program for the establishment of a

separate agency (water circle) responsible for water in Aizawl city, considering the need for a modern and efficient structure and management systems.

7. Specific Terms of Reference

Team Leader/Municipal Engineer (Design and Construction Supervision)

16. The Team Leader will need to be a professionally qualified graduate chartered civil engineer with not less than twenty years experience in (i) designing (ii) Program management and (iii) contract management in major projects in the field of urban development. The Team Leader shall be solely responsible for the design review and construction supervision of the urban water and sanitation and solid waste management schemes. He/she shall also be responsible for overseeing the implementation of due diligence aspects into contractual agreements under the project. He will report directly to the SIPMIU Program Director. The Team leader should be competent in planning, designing, contractual management, resolving problems, quality maintenance, budgeting and financial control, progress monitoring, international procurement procedures, communication skills and documentation. The specific tasks include:

- (i) Assist the Program Director and other staff in the day-to-day management of Program activities.
- (ii) Assist the Program Director and other staff in planning, control and management of the teams' work.
- (iii) Assist in developing implementation schedules and resource requirements.
- (iv) Assist in monitoring progress, evaluating results and identification and resolution of constraints.
- (v) Coordinate activities with various implementing agencies and stakeholders, including communities and NGOs. Review the master plan of Aizawl prepared by the Department of Town and Country Planning, Government of Mizoram and advise improvement as necessary.
- (vi) Assist Department of Urban Development, Government of Mizoram in conducting other studies as necessary for the program.
- (vii) Prepare training programme for (a) potential contractors and (b) construction supervision staff and O&M staff and organize and conduct the training.
- (viii) Assist the EA in preparing necessary documentation to get approvals/permits from all concerned authorities such as local authority, PWD, NPCB, or any institutions for laying pipes and construction of other structures;
- (ix) Assist the SIPMIU incorporating IT-based systems in new offices, including means and methods to conduct cost accounting and tracking expenditure.
- (x) Prepare reports including inception, design review and weekly, monthly, quarterly, commissioning and final reports.

As well as

- (i) Review existing studies / documents and other resources available and formulate a best implementation approach including programmatic Program schedule;
- (ii) Prepare cash flows;
- (iii) Assist design preparation and review teams;
- (iv) Assist the investigation and design team for water supply, sewerage and solid waste management in preparing bidding documents;
- (v) Assist in ensuring that all bidding documents are complete in every respect;
- (vi) Assist in bid evaluation;

- (vii) Contractual management;
- (viii) Develop and implement quality assurance programme;
- (ix) Recommend payments;
- (x) Progress reporting;
- (xi) Assist the SIPMIU staff to design and review topographical geotechnical and other surveys for water and sewage works.
- (xii) Assist the EA in preparing necessary documentation to get approvals/permits from all concerned authorities such as local authority, PWD, NPCB, or any institutions for laying pipes and construction of other structures.

Deputy Team Leader/Contract Management Specialist/Chief Resident Engineer

- (i) Assist the SIPMIU staff Preparing detailed engineering designs and review tender documents with coordination of other specialists.
- (ii) To manage the local consultant team;
- (iii) Support SIPMIU with contract management and recommendation for payments.
- (iv) Establish contract tracking systems, including implementation schedules and milestones.
- (v) Arrange a training programme for construction supervision, O&M staff and conduct the training for contractors in respect of ADB's procedures and guidelines.
- (vi) Develop manuals pertaining to Program quality assurance and quality control.
- (vii) Check that the contractors' proposals are in agreement with all environmental and social safeguards requirements.
- (viii) Review methodology, designs and organization proposals of the contractor;
- (ix) Assist SIPMIU staff supervising the site activities of the contractor;
- (x) Coordinate with local authorities and other institutions as required for the Program delivery;
- (xi) Ensure that co-ordination and public awareness is maintained at all times.
- (xii) Assist the SIPMIU staff to supervise construction of all transmission networks, distribution networks, storage structures and treatment works for water and sewage works; as well as solid waste management subcomponents;
- (xiii) Assist the SIPMIU staff to prepare specifications, outline designs for program subcomponents.
- (xiv) Support the Program work in evaluations of design & Build contracts.
- (xv) Conduct training program for O&M staff during commissioning of the schemes.
- (xvi) Preparation of O&M manuals

Water Supply Engineer (Network Modeling Design)

17. The Water Supply Engineer will need to be a professionally qualified chartered engineers with not less than 10 years experience in managing major projects in the water sector. They will be responsible for

- (i) Designing and reviewing topographical, geotechnical and other surveys;
- (ii) Prepare a hydrological model for Aizawl's water supply schemes and optimize system operation;
- (iii) Conduct a full detailed engineering design treated water transmission lines for Aizawl, distribution networks, storage structures other parts of the system, as deemed necessary;
- (iv) Support the Program with bid document preparation and bid evaluation.

Water Supply Specialist

- (i) Advise and assist the SIPMIU in undertaking the planning and implementation of the “Location and Condition Assessment Surveys” and reviewing preparation of maps of the existing water supply distribution network wherever prepared.
- (ii) Advise and assist the SIPMIU on the planning and implementation of water optimisation studies in coordination and cooperation with the PHED, which will provide essential human resources.
- (iii) The expert will conduct on-the-job training particularly in Leak Detection and Rectification Programme (Non-Revenue Water Reduction) with use of the latest international equipment and techniques for (i) detecting and recording losses in the water distribution network, (ii) addressing both apparent and real water losses.
- (iv) Advise and assist the SIPMIU in computer analysis of the existing water supply networks. Identify existing hydraulic constraints and their rectification for incorporation, if necessary, in the proposed program.
- (v) Undertake the planning and implementation of a Power and Water Audit of the water supply system, from source to consumer, identify major efficiency losses and recommend, with detailed costs and economic justification, proposals for incorporating in the program.
- (vii) Develop a manual for water quality checks and assurance.
- (viii) Develop O&M manuals for comprehensive (future) maintenance.
- (vi) Prepare an asset registry for schemes prepared under the Project

Sewerage and Wastewater Treatment Specialist

18. The sewerage specialist shall be a professionally qualified engineer. He shall have not less than twelve years experience as an engineer of which minimum of eight years shall be in design of sewerage systems. The subteam’s specific tasks include:

- (i) assess the current and projected quantity and quality of effluent from households;
- (ii) plan and organize a wastewater sampling and analysis, to determine the concentration and volume of wastewater presently discharged review material selection options taking into account local conditions, and in particular pipe corrosion;
- (iii) plan and organize a sampling and analysis programme of the receiving water body;
- (iv) identify major wastewater producers and pollution sources that may require additional treatment prior to discharge to the public sewer. Recommend appropriate actions required;
- (v) Conduct detailed designs including calculations, BOQs, specifications and drawings for (a) Aizawl sewerage system and sewage treatment plant; (b) public toilet improvements and (c) household toilet program;
- (vi) based on bill of quantities, prepare detailed engineering cost estimates for the scheme;
- (vii) Ensure adequate site investigations are carried out for the design of the sewerage and other works;
- (viii) Assist in bid evaluation;
- (ix) Assist the Resident Engineers as required;
- (x) Review contractor’s proposals for the most suitable, economic and easy to operate and maintain system;

- (xi) Review training proposals of the contractor for the plant operators;
- (xii) Assist the contractor to get environmental clearance from MiPCB;
- (xiii) Review contractor's O&M proposals for such as training, human resources etc.;
- (xiv) Prepare O&M manual and construction record drawings;
- (xv) Assist the training officer in SIPMIU to prepare training programme for the relevant O&M staff;
- (xvi) Liaise with other specialists to ensure a consistent philosophy and integrated approach to the design and operation of the sewerage system.
- (xvii) Provide overall guidance and advice to the SPMIU in matters pertaining to sewerage and sanitation policies and their application;
- (xviii) Review the detailed designs prepared for Aizawl sewerage and provide advice to the SIPMIU;
- (xix) Prepare an overall strategy for sanitation in Aizawl leading to the prioritization of an ensuing sanitation program (including construction of public sanitation block and migration from one type of toilet to a different one);
- (xx) Prepare and manage with the community participation specialist the implementation of an improved sanitation community awareness campaign.
- (xxi) Develop a manual for effluent discharge quality checks and assurance.
- (xxii) Develop O&M manuals for comprehensive (future) maintenance of the sewerage system.
- (xxiii) Prepare an asset registry for sewerage scheme constructed under the investment program.
- (xxiv) Assist the SIPMIU staff to establish water treatment and sewage treatment guidelines and procedures for the detailed design of the water treatment plants in urban schemes.

Solid Waste Management Specialist

- (i) assess the current and projected quantity and quality of solid waste from households;
- (ii) plan and organize a solid sampling and composition, to determine the amount of biodegradables and recyclables present and prepare recovery projections accordingly;
- (iii) identify major non-municipal wastewater producers and pollution sources that may require careful attention and separation from municipal waste. Recommend appropriate actions required;
- (iv) Conduct detailed designs including calculations, BOQs, specifications and drawings for (a) Aizawl's compost plant; (b) landfill site and (c) transfer stations, primary and secondary collection and vehicles;
- (v) based on bill of quantities, prepare detailed engineering cost estimates for the scheme;
- (vi) Ensure adequate site investigations are carried out for the design of the solid waste management works;
- (vii) Assist in bid evaluation;
- (viii) Assist the Resident Engineers as required;
- (ix) Review contractor's proposals for the most suitable, economic and easy to operate and maintain system;
- (x) Provide overall guidance and advice to the SPMIU in matters pertaining to solid waste management policies and their application;
- (xi) Review the detailed designs prepared for Aizawl solid waste management and provide advice to the SIPMIU;

- (xii) Prepare an overall strategy for solid waste management in Aizawl with a time bound action plan for implementation;
- (xiii) Prepare vehicle and staff schedules for optimization of collection and transportation to solid waste management sites;
- (xiv) Conduct a compost marketing study for Aizawl;
- (xv) Prepare and manage with the community participation specialist the implementation of a solid waste segregation and 3R (reduce, reuse and recycle) community awareness campaign;
- (xvi) Prepare a manual and operational plan to optimize operation and maintenance of the site and thus maximize the life of the sanitary landfill site.

Electrical/Mechanical Engineers

19. The specialists shall be graduate engineer in the field of electrical and/or mechanical engineering having minimum experience of ten years. The engineer shall be very competent in the design of (a) plant for water, sewerage and solid waste management systems and pumping stations and (b) highly automated systems and shall have a minimum of five years experience on working on water or sewerage systems. The specific tasks include:

- (i) Review the design the electrical and mechanical plant equipment including specification and schedules;
- (ii) Liaise with the designers, electrical/mechanical and ICA engineers on operational philosophy and when preparing the system design and drawings;
- (iii) Assist in bid evaluation;
- (iv) Assist SIPMIU staff in the approval of specification of electromechanical goods to be supplied by the contractor;
- (v) Assist in the preparation of documentation and supervision of the dedicated power supply for the water scheme;
- (vi) Review the contractor's assessment of the power requirements and establish power availability and assist SIPMIU staff obtaining the requirement from CES;
- (vii) Assist SIPMIU staff approving O&M manuals prepared by contractors for electrical and mechanical equipment for future maintenance; and
- (viii) Assist SIPMIU staff inspecting and witness testing of electrical and mechanical equipment and commissioning.
- (ix) Design operational philosophies for relevant treatment plants, reservoirs and other parts of the system to meet the needs of the SIPMIU and O&M section
- (x) Design associated PLC control system/SCADA systems of pumping stations and water treatment plants to optimize operations and cash.
- (xi) Review and advice NWSDB Ro staff on Software programing relevant to automation and suitability of the proposals from contractors.
- (xii) Assist in approving the submittals for equipments and inspection
- (xiii) Provide necessary trainings to O&M staff.

Structural Engineer

20. The structural engineers shall be graduate engineer (civil) with relevant postgraduate experience in structural engineering. They should have a minimum of ten years experience of which six years shall be in structural design of concrete water retaining structures. The duties of Structural engineer are

- (i) Review soil investigations;
- (ii) to review all structural designs and necessary structural drawings and specifications, including components relating to reservoir

- construction/rehabilitation, water supply components, sewerage components and building construction;
- (iii) ensure compliance with applicable building rules of the State, with an specific focus on compliance on seismic resistant requirements.
- (iv) assist in bid evaluation, wherever necessary.

Procurement Specialist

21. The specialist should have a bachelor degree and ten years experience in procurement/contract management in the public/private sector. His/her specific tasks will be:

- (i) To review outline and detailed engineering designs and help in the preparation ;
- (ii) Support the SIPMIU in the preparation of pre-qualification requirements and evaluation;
- (iii) Prepare bidding documents compliant with ADB's latest standard bidding documents;
- (iv) Design post-qualification criteria which is compliant with ADB's guidelines.
- (v) Assist SIPMIU staff to in contract packaging and preparing procurement time schedules for each contract package in consultation with Program staff.

Resident Engineers

22. The Resident Engineers shall be senior chartered engineers with not less than twelve years of experience in supervising construction works within the water sector. They should have experience of construction works within large conurbations. The tasks will be to oversee the following activities:

- (i) Assist SIPMIU staff preparing detailed designs and review tender documents
- (ii) Review and approve the construction methodology and schedule submitted by the contractor;
- (iii) Implement a construction management system for the works;
- (iv) Directly supervise and monitor the contractors activity to ensure satisfactorily standards, quality assurance, control of workmanship and progress;
- (v) Check contractors' setting out.
- (vi) Taking measurements for the purpose of certifying payments and claims;
- (vii) Quality and quantity control of the materials and works;
- (viii) Coordination with the relevant authorities on site during construction;
- (ix) Keep daily records of all aspects of their supervision works;
- (x) Approve the materials and equipment brought by the contractor;
- (xi) Prepare and implement any minor adjustment required to the drawings and plans;
- (xii) Monitor the environmental impact during construction and coordinate with the environmental specialist in the Program office;
- (xiii) Check monthly measurement of work and certify payment;
- (xiv) Coordinate with other specialists such as environment, resettlement, community development, public awareness and training;
- (xv) Ensure co-ordination between contracts and contractors, that the authorities and the public are continually informed and consulted on the works programme and of the pipe laying in particular;
- (xvi) Ensure that complaints from the public and other stakeholders are attended to expeditiously and take the necessary action to resolve any conflicts arising;
- (xvii) Ensure that any dispute arising with day to day work is resolved at site level;

- (xviii) Advise Program office on claims, disputes and completions and defect corrections certification;
- (xix) Report progress, trends which are likely out come of contracts and other information required to the Deputy Team Leader;
- (xx) Ensure that comprehensive records of the construction works and testing are maintained; and
- (xxi) Supervise commissioning on completion and that as built records and that appropriate operation and maintenance manuals are prepared.
- (xxii) Any other duties assigned by The Engineer/Team Leader, relevant to the investment Program.

Community Awareness and Participation Specialist

- (i) Assist the SIPMIU in the design, preparation, planning and management of the community participation and awareness program;
- (ii) Prepare an inventory and review recent and current community-based initiatives in Aizawl; organizations involved, mechanisms used, successes achieved;
- (iii) Assist the SIPMIU with the invitation and selection of NGOs to be involved in the community participation programs; prepare TORs and job descriptions; interview and brief organizations on Program objectives and discuss proposed role of NGOs;
- (iv) Plan and deliver initial briefing, training and orientation to SIPMIU staff in community participation and awareness programs;
- (v) Assist and advise the SIPMIU on how to manage and co-ordinate the implementation of the environmental public health and water optimization awareness programs;
- (vi) Provide continuous guidance on suitable mechanisms for participatory interaction with and training of local government and CBOs;
- (vii) Develop and implement specific measures to ensure participation of vulnerable groups, including women and the poor.
- (viii) Monitor performance and impact of the community participation in the field and on the towns, if needed make adjustments to the program; review field reports; and advise SIPMIU on actions required; prepare annual reports on performance and impact of community participation and development activities.
- (ix) Plan and organize regular training events, including workshops and seminars for the duration of the Program;
- (x) Prepare Information, Education and Communication (IEC) materials and media campaigns, advertisement clippings, Web pages, etc of the Investment Program and first tranche.
- (xi) Promote Investment Program's Urban Governance, Finance, and Service Delivery Improvement Action Plan.
- (xii) Prepare Awareness campaign on (a) the need for and application of user charges for improved urban services, (b) water optimization and conservation program, (c) environmental and social issues, such as, and (d) resettlement entitlements through various media means.
- (xiii) Disseminate information about the Investment Program to the target groups especially women. Build stakeholders' awareness on the long-term benefits and short-term inconvenience of the Program in order to gain full support to the beneficiaries towards the Program.
- (xiv) Make the beneficiaries aware of preventive care to avoid any health related hazards.

- (xv) Make the beneficiaries aware of their responsibilities, including issues such as user charges and property tax reform etc for achieving the goal of the program.
- (xvi) Make the beneficiaries aware of the existing health care facilities and how to make optimal use of these.
- (ix) Invite feedback from beneficiaries on aspects of the program and sub-programs and advise the SIPMIU of how these might influence future program and sub-programs design.

Environmental Specialist

23. The Environmental specialists should possess a B.Sc degree in Environmental Science/ Engineering. The international expert will have at least fifteen years experience of which ten years shall be in the performance of environmental assessments with particular reference to dam construction and wastewater projects and the impact of construction works. The national experts should have no less than ten years experience in this field, of which six in the above areas. The experts's specific tasks include:

- (i) Assist the SIPMIU in the preparation of the necessary environmental impact assessments in accordance with ADB, GoI and GoMi standards for environmental assessment of Investment Program tranches and subprojects.
- (ii) Assist SIPMIU in obtaining environmental clearances and consents to establish and operate.
- (iii) Assist the SIPMIU in reviewing, preparing and updating initial environmental examinations and environmental management plan for the Project;
- (iv) Ensure the implementation of IEEs and EIAs are consistent with Government and ADB policies, and the EARF agreed upon by the Government and ADB for Mizoram's sub-projects.
- (v) Provide advice and support to ensure SIPMIU obtain necessary Government approvals.
- (vi) Provide necessary guidance in the classification, and development of all environmental safeguards documents to IPIUs, including the provision of training in the development and implementation of IEEs and EIAs.
- (vii) Review all classifications and environmental assessment (IEE and EIAs) developed by SIPMIU and ensure comments from MiSPCB and ADB are integrated in finalized documents.
- (viii) Assist the SIPMIU in the review and approval of IEEs. The ADB will review and approve IEE/EIA reports of: (i) all Category A and Category B-sensitive subprojects; (ii) subprojects with a capital cost of more than \$ 10 million in the towns, (iii) subprojects with solid waste landfill and sewerage collection/treatment components. The EA (through the SIPMIU) will review and approve IEE reports not falling under the above categories. Approval of the IEE/EIAs is a condition to the award of contracts. IEEs/EIAs will be consistent with Government and ADB's Environment Policy and the EARF for NERCCDIP.
- (ix) Provide advice on environmental impacts and review the contractor's mitigation measures for all proposed construction works including reservoir construction/rehabilitation, water supply and sewerage schemes;
- (x) Assist the SIPMIU in consolidating monthly reports and submit quarterly reports to ADB for review.

- (xi) Prepare consolidated monthly environmental monitoring reports and monthly reports on the implementation of mitigation measures by contractors, through the review of monthly progress reports from the SIPMIU.
- (xii) Provide advice on regulatory requirements and standards;
- (xiii) Assist in obtaining other related permits;
- (xiv) Ensure environmental monitoring consistent with the environmental monitoring plans in the IEEs and EIAs and consistent with the EARF agreed between the Government and ADB.
- (xv) Assist the SIPMIU in coordinating all environmental monitoring and ensuring that all sub-projects comply with Government and ADB environmental safeguards.
- (xvi) Train contractors' staff in the implementation of environmental mitigation measures during construction and prepare environmental monitoring checklists to be completed by Regional Offices environmental officers during the periods of design and construction;
- (xvii) Monitor disclosure and public consultation
- (xviii) Review surveys of municipal water quality, STP sludge and effluent, nutrient surveys in water bodies (lagoon or surface waters) in Aizawl and public health data.

Social Safeguards Specialist

24. Resettlement issues will be managed and coordinated by a domestic Resettlement Specialist in the SIPMIU. The specialist shall have a degree in a relevant subject (sociology, anthropology or related subject) with 10 years experience. The specialist shall provide advice on any resettlement issues and assist the SIPMIU and other bodies in the processing and resolution of resettlement claims. He/she shall provide advice on the correct procedures to be followed and prepare a schedule of when actions should be taken relevant to the design and construction program. The action plan shall comply with the relevant policies of the Government of India and ADB's Handbook on Resettlement. Specific responsibilities and actions include:

- (i) Review, update and/or prepare new resettlement plans (RPs) and IPDPs for tranche under implementation in Aizawl, consistent with the Resettlement Framework;
- (ii) Assist the SIPMIU in coordinating all social issues and ensuring that all sub-projects comply with Government and ADB social safeguards. Assist the SIPMIU in preparing and updating Resettlement Plans (RPs) and new RPs and Indigenous People Development Plans (IPDPs).
- (iii) Provide necessary guidance in the classification, and development of all social safeguards documents to SIPMIU, including the provision of training in the development and implementation of RPs.
- (iv) Coordinate valuation by the valuation committees and finalization of compensation packages.
- (v) Review all classifications and social safeguards documents (RPs and IPDPs) developed by SIPMIU and ensure that comments from the ADB are integrated in finalized documents.
- (vi) Supervise and monitor implementation of the Resettlement Plans and IPDPs (to be undertaken through an implementing NGO);
- (vii) Monitor the work related to dealing with complaints and grievances, and provide updates to the RP as required to address any recurring problems or complaints;

- (viii) Establish procedures and systems for monitoring progress in resettlement implementation and recognizing and addressing any problem areas--the Specialist will also undertake internal monitoring;
- (ix) Assist in the organization and implementation of public consultation and disclosure activities (including preparation of materials and delivery of presentations where necessary) to be undertaken by the implementing NGO);
- (x) Train Program staff on resettlement-related matters. Conduct internal seminars and training programs to raise the awareness of Program implementation staff on resettlement issues;
- (xi) Support the SIPMIU in recruiting NGO resettlement staff and oversee their work;
- (xii) Conduct/supervise detailed measurement surveys, business income surveys, surveys to determine market values and review result;
- (xiii) Coordinate and report grievance resolution committee activities;
- (xiv) Manage aspects relating to communications and disclosure of resettlement aspects under the Project.
- (xv) Report each month to the Program Director regarding the progress of resettlement issues.

Financial Management Specialist

25. The specialist should be a fully qualified accountant (Corporate membership of recognized professional institution in the field of finance/accounting) with a minimum of ten years professional experience. He/she should be knowledgeable in current international/national accounting standards and generally accepted procedure. The specialist should have experience in design and development of accounting and budgeting systems for public enterprises. He/she will

- (i) Liaise with senior accountants in the Investment Program Coordination Cell (IPCC) and SIPMIU;
- (ii) Establish a sound accounting practice and systems to manage resources available at the investment program;
- (iii) Develop budgetary control processes, design budget procedures and budget formats;
- (iv) Develop mechanisms for the transfer of funds from the IPCC to SIPMIU and from treasury to IPCC;
- (v) Train SIPMIU staff in the preparation of annual budget estimates and disbursement plans;
- (vi) Review the financial management system of Government agencies involved in the Program and make recommendations for optimal integration.
- (vii) Direct & advise on the establishment of billing & collection system.

Economist

- (i) The consultants will conduct project economic and financial analyses for tranche subprojects in accordance with ADB's *Guidelines for the Economic Analysis of Projects*, *Guidelines for Economic Analysis of Water Supply Projects*, *Guidelines for the Financial Governance and Management of Investment Projects Financed by the Asian Development Bank*, *Economic Analysis in 2002: a Retrospective*, and *Economic Analysis Retrospective 2003 Update*.¹

¹ ADB. 1997. *Guidelines for the Economic Analysis of Projects*, Manila; ADB. 1998. *Guidelines for Economic Analysis of Water Supply Projects*. Manila; ADB. 2003. *Guidelines for the Financial Governance and Management of*

- (ii) The consultants will (a) describe the macroeconomic and sector context; (b) update water demand, wastewater discharge, and solid waste generation and disposal levels, as well as projections for various end-user groups (e.g., irrigation water re-use);
- (iii) assess project alternatives and confirm the least-cost solution;
- (iv) review cost recovery policies and tariff levels in each town;²
- (v) propose (a) cost-recovery mechanisms (including necessary institutional arrangements) through taxes, user charges and/or other techniques for O&M and initial investment recovery, and (b) a short- and medium-term tariff structure for each subproject, taking into account affordability, willingness to pay, water conservation, cross-subsidization, and full cost-recovery requirements;³
- (vi) estimate the detailed economic project cost for the selected alternative, applying appropriate disaggregation of costs, standard conversion factors, and shadow prices as required;
- (vii) identify all quantifiable and unquantifiable project economic benefits, considering both with and without scenarios, as well as incremental and non-incremental benefits;
- (viii) prepare financial projections for operations 10 years after project completion;
- (ix) compute relevant financial indicators for each town to assess financial viability;
- (x) assess the financial viability of the project;
- (xi) estimate economic and financial internal rates of return and perform sensitivity analyses, including switching values and calculation of the real weighted-average cost of capital; and
- (xii) calculate the poverty impact ratio and conduct a distribution analysis.

Monitoring and Evaluation Specialist

26. The specialist shall have a degree in a relevant subject (evaluation, public health or related subject) with 10 years experience. He/she will:

- (i) assess the SIPMIU/Government's M&E procedures, indicators, and reports;
- (ii) identify physical, institutional, and financial data to be analyzed to monitor sustainability and impact of project services, and achievement of an Action Program and Performance Criteria for development, and agree these with the IPCC;
- (iii) Establish an Investment Program Performance Monitoring System within the three months of loan effectiveness and submit it to ADB
- (iv) Prepare a framework for continuous monitoring throughout the investment program;
- (v) draft a conceptual design of the MIS/M&E program;
- (vi) specify information that will be in Program progress reports by institution;
- (vii) after MIS conceptual design is implemented, make periodic visits to all investment program levels to discuss MIS procedures with Program staff and consultants;
- (viii) assess the quality and completeness of data gathered and its use by communities and Program management;

Investment Projects Financed by the Asian Development Bank. Manila; ADB. 2002. *Economic Analysis in 2002: a Retrospective.* Manila, and ADB. 2003. *Economic Analysis Retrospective 2003 Update.* Manila.

² While tariffs ensuring the sustainability of the schemes will be prepared for each of the sample subproject towns for water, sanitation and solid waste management (where relevant), it is also essential that brief guidelines be prepared and sample tariffs clearly presented so as to guide future investments under a sector loan.

³ The consultants will be informed by ADB's Economics Research Department Technical Notes 9, 10, and 17.

- (ix) train program staff in data collection;
- (x) oversee the collection of data for baseline and Investment Program completion surveys and prepare reports accordingly.
- (xi) Based on the findings, provide an independent monitoring and feedback mechanism to SIPMIU and ADB, to ensure that the primary objectives of the Program are being met, and recommend ways to modify the Program design and implementation mechanisms to meet the primary objectives of the Program.
- (xii) Mobilize local NGOs and community organizations in carrying out monitoring, quality control and reporting to bring transparency to the various construction activities, resettlement and compensation, and slum-upgrading under the Program.

Other Staff

27. The consultant should also provide approximately (i) 76 person months of engineering assistants time, (ii) 24 person-months of CAD operator/draughtsman's work and (iii) 24 person-months of quantity surveyor. The consultant shall also provide 66 person months of administrative assistance time, 66 person months drivers' person-months.

8. Schedule of Reporting and Submissions

28. The consultant is required to submit, for each tranche, the following reports to the SIPMIU Director in English. All reports should be submitted as required below and in an electronic and hard copy format.

- (i) Inception report in 5 copies plus a soft copy, one month after the issue of letter of commencement of work. This report should include the related works and details of programme of works, which the consultant proposes to implement.
- (ii) Preliminary design review report in 5 copies plus a soft copy three months after the commencement of work, which will give the opinion on design criteria, concepts, outline and implementation arrangements;
- (iii) Final design review report, inclusive of all bidding documents, in 5 copies plus a soft copy;
- (iv) Commissioning report in 5 copies plus a soft copy;
- (v) Report on completion in 5 copies plus a soft copy;
- (vi) Progress Reports in 5 copies plus a soft copy at monthly intervals, summarizing financial situation of all work and contracts, progress achieved, difficulties encountered and issue to be resolved.
- (vii) O&M manuals 5 copies plus a soft copy

9. Offices and Equipment

29. The Consultant shall be responsible for providing office space for the design review team. He/she will be solely responsible for the provision of all office equipment, supplies and communications and transport that he/she may require for the execution of the work at design stage.

30. At construction stage the Consultant's staff may work from offices provided by the contractor which shall be fully equipped and serviced by the contractor. However the Consultant will be responsible for operating and maintaining a Program office, including all office equipment, supplies and communications and transport.

31. After completion of Program the items purchased under Program shall be handed over to the SIPMIU.
32. Consultant to make arrangements to carry out relevant topographical surveys and soil investigation, as well as any other studies/tests deemed to be necessary.