Terms of Reference (TOR)

For

Detail Engineering Design of Material Recovery Facilities (MRF) Centers in annex -I municipalities and Two Prototype Design for KTM Valley Municipalities

Contract ID No. SWMTSC/S/QCBS-073/74-III

Ministry of Federal Affairs and Local Development
Solid Waste Management Technical Support Centre (SWMTSC)
Lalitpur, Nepal

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1. Background:

Increase in generation of solid waste has been common phenomena in many urban and semi-urban areas of Nepal due to rapid population growth and increase in urbanization. Proper solid waste management is innermost important in order to maintain clean and health environment in the city. However, due to poor and improper solid waste management, urban environment is rapidly deteriorating in most of cities of Nepal in terms of air, soil and water pollution. With increase in living standard and rapid change in pattern of living, various types of wastes have been generated in the world that made its management more challenging. Thus, the government of Nepal and respective local bodies has to prioritize this issue and its solution urgently for development of clean and healthy urban environment.

Whereas, Solid Waste Management Technical Support Centre (SWMTSC), a national entity established as technical department of Ministry of Federal Affair and Local Development under SWM Act 2011 whose main objective is to assist local bodies in sustainable solid waste management, improve environment and public health through technical assistance, research and development. SWMTSC has been carrying out various programmes to promote3R (reduce, reuse, recycle) principles, composting and applying energy recovery system.

Generally from various study conducted by different organizations and individuals, the waste composition of most of municipality shows that still more than 60 % of total municipal waste generated per day are biodegradable (organic) waste and about 20-25% are reusable / recyclable waste. Including both biodegradable and reusable/recyclable waste consumed 80-85% of total waste that can be recovered into valuable resources however, lot of these waste disposed in landfill site without proper recovery that has been increasing total expenditure for solid waste management as well as decreased lifespan of landfill site. Taking this into consideration,SWMTSC has taken this strategy to strengthen municipalities in infrastructure development for biodegradable waste and reusable /recyclable waste management through developing various composting technology, anaerobic digester and material recovery facilities (MRF) promoting 3R approach.

With the changing concept of solid waste management and changing scenario of our country,SWMTSC is planning to establish Material Recovery Facilities Center in selected municipalities listed in annex - 1 with an aim to provide final recovery of organic and inorganic waste before final disposal. Similarly, SWMTSC also plan to develop 2 prototype designs of Material Recovery Facilities (MRF) Centers for Kathmandu Valley.

In order to implement the said project, SWMTSC intends to carry out detail engineering design of MRFs Center through consulting firm.

2. Objectives:

The main objective of the consulting service is to prepare detail engineering design of Material Recovery Facilities (MRF) Center in selected municipalities and 2 proto type design of MRF Center in selected municipalities of Kathmandu Valley.

2.1 Specific objectives:

- To review the concerned literature (sample design, design guidelines, procedures, literatures etc.) related to waste processing center
- To review existing legal frameworks and prepare Policy and Legal reform requirements.
- To conduct all required surveys and investigations including, but not limited to, topographical survey, geo-technical investigation, soil investigation, hydro-geological investigation, meteorological investigation, identification of underground utilities etc.
- To conduct Detailed Engineering Surveys and Designs of various processing facilities likeComposting unit with leachate collection system, waste to energy unit, enclosed inorganic waste recovery center (with autonomous facilitiesof feeding conveyor, sorting platform, sorting conveyor, reversible belt conveyor, automatic press for compaction/packaging),residue management facilities, access road, internal service road, storm water diversion drainage and other required infrastructures etc.) Including civil, mechanical and electrical components of waste processing based on best international/national practices in identified places within the 7 various spots.
- To conduct environmental samplings and studies relevant to the waste management facilities and designs
- To conduct socio-economic survey relevant to the waste management facilities and designs,
- To develop the most cost-effective design concept to address environmental and social impact mitigation requirements,
- To prepare engineering drawings and cost estimation for Material Recovery Facility Center.
- To prepare technical specifications, operating manuals, and health and safety plans,
- To prepare Environmental and Social Management Plan,

- To prepare Monitoring Plan with Institutional Model for operation, maintenance and monitoring

3.Scope of Works:

The scope of services will include, but not necessarily be limited to following

3.1 Data Collection and Review:

- Collection and Review of related data, information and reports;
- Collection of Feasibility Study and EIA Reports of existing facilities
- Collect and review existing Acts, regulations, policy and guidelines, manuals related to solid waste management and particularly related to sorting station, MRF, waste processing centre.

3.2 Topographic Survey:

- Carry out topographical survey of the area indicating the settlements, access, roads, forests, water sources, electrical lines in and around the MRFarea and other important topographical features at scale 1:25,000
- Carry out topographical survey at scale 1:1000 for general layout planning and 1:100 for structural layout planning with 0.5m contour intervals as per need ,
- Carry out topographical survey of access roads to the MRF center

3.3 Geotechnical Investigation:

- Conduct trial pit tests to a depth of 2 m to assess the soil conditions, soil type and standard soil classification / characterization tests (i.e., sieve analysis, undisturbed soil sampling, standard penetration tests, atterberg limits, Cation Exchange Capacity - CEC, and permeability)at least one test hole for each site.

3.4 Hydrological Investigation:

- Identify groundwater and surface water sources in and around the MRF facility. Groundwater levels should be investigated in detail, and presented in a map. This must include the highest and lowest water level locations.
- Collect ground water samples and carry out physical and chemical characteristics of at least 2 samples.

3.5 Traffic and other surveys:

- Conduct traffic studies to determine the baseline use of the roads anticipated for use by waste collection trucks in traveling to and from the selected MRF site, and the "as constructed" adequacy of these roads, weight and number of vehicles anticipated for the waste processing site.

3.6Solid Waste Characteristics:

- Conduct Survey and collect sample for analysis to confirm the quantity and density of solid wastes, with projection over the design period, for which the Material Recovery Facility Center will be designed.
- Qualitative analysis of municipal solid waste needs to be presented with projection over the design period
- Collect and conduct leachate generation tests, as needed, to confirm the quantity and characteristic of leachate for which the composting facility leachate treatment facilities will be designed.

3.7 Process Design:

- Develop the design process for the detailed design of the proposed Material Recovery Facility Center considering all design parameters and requirements stipulated by the client and incorporating all findings, conclusions and decisions made to address significant impacts and concerns identified through the environmental assessment and public participation studies. Consultation and sharing with the local concerned stakeholders, the municipality, local NGOs/CBOs and community representatives should be prioritized.

3.8 Prepare detailed engineering design and proto type design of MRF Center:

3.8.1 Site and Access Development:

3.8.1.1 Site preparation works including landscaping, proper fencing, buffer zone and waste management facilities,

3.8.1.2 Safe and efficient processing process

3.8.1.3 Temporary on-site roads from the reception area within the site to the working face

3.8.2 Mechanical workshop for periodic and general repair and maintenance of plants and equipment

3.8.2.1 Washing facilities for MRF equipment and collection/transfer vehicles

3.8.2.2 All weather parking for different vehicles probable to be used for waste delivery and other services in the MRF

3.8.3 Surface water management

3.8.3.1 Drainage management, diversion and collection of surface runoff which has not come in contact with the solid waste, and erosion control.

3.8.4 Material recovery Facilities:

3.8.4.1 Reception station with weigh-bridge for different vehicles probable to be used for waste delivery in the MRF

3.8.4.2 Waste unloading platform

3.8.4.3 Inorganic waste sorting station (with autonomous facilities of feeding conveyor, sorting platform, sorting conveyor, reversible belt conveyor, automatic press for compaction/packaging)

3.8.4.4 Composting Unit as per the volume and nature of waste received in the MRF (not based on HH survey)

3.8.4.5 This should also include any special equipment needed for the open air windrow pile composting system, such as conveyor sorting belts, windrow turners, portable trammel and vibrating screens, as needed.

3.8.4.6 Waste to energy unit as per the volume and nature of wastes received in the MRF.

3.8.4.7 Storage unit for collected recyclable materials

3.8.4.8 Residual Waste Management Facility and incorporation of appropriate lining and safety measures including leachate and gas management. This should also include monitoring wells and final closure plan/post closure plan.

Any technology and waste management options relevant should be envisaged and recommended as per the waste nature, institutional capacity and feasibility in the service municipalities.TheMRF should strictly receive only the municipal waste.

3.8.5 MRFEquipments

Prepare a list of all equipment required to operate the MRF, including vehicles, mechanical sorting, separation, shredding, bailing, stockpiling, lifting, transfer, and processing

3.9 Development of Utilities:

3.9.1.1 Operation Unit
3.9.1.2 Sanitary system
3.9.1.3 Water supply system
3.9.1.4 Electrical system
3.9.1.5 Fire protection system
3.9.2 Landscape

3.10 Construction, Operation and Maintenance manuals

Prepare Operation and Maintenance manuals to guide all aspects of MRF construction, operation and monitoring with regard to:

a) MRF construction along with ESMP and OHSPlan of the MRF. WASH, medical care, emergency response, and evacuation procedures are to be outlined, as well as all other potentially useful procedures for ensuring the health and safety of all workers as well as visitorsat the site, and in the surrounding settlement.

b) MRF operation and post closure activitiesincluding waste to be accepted and rejected, weighing, unloading of wastes, litter control at the working face, waste segregation, waste compaction, composting of suitable waste streams, fire control, environmental monitoring, equipment maintenance and repair.

c) Institutional Modality for sustainable operation, HR analysis, staffing and job description should be a part of HR Plan for the MRF, and link this with Institutional Structure of the Municipality.

3.11 Legislative, Regulatory and Institutional Considerations:

- The national and local legislation and guidelines on waste management and minimization through recovery are to be described and reviewed in terms of adequacy of the legal framework to implement and operate the proposed facilities and propose for reform of Policy, guidelines and legal framework related to the Solid Waste Management and MRF development and operation
- Describe the authorities responsible for monitoring of construction and the environmentand any standards to be met for discharge from leachate treatment plants. Outline the steps for obtaining all necessary permitsincluding design, construction, operation and environmental aspects.
- Discuss needs for training, education, inspection and enforcement to comply with existing and proposed legislation and any other requirements needed to ensure fulfillment of the proposed environment monitoring at national and local level.
- Review the institutional capacity to implement, manage and monitor (in the short term as well as in the long-term) the proposed MRF. Recommend, if necessary, institutional strengthening at all levels.

3.12 Prepare Environmental and Social Management Plan (ESMP)

3.12.1 Development of ESMP shallhave *Mitigation Plan* and *Monitoring Plan*.

3.12.2 The Mitigation Plan should recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Indicate the impacts and costs of those measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties for impacts which cannot be mitigated.

The Mitigation Plan shall consider following aspects, but not limited to:

3.12.2.1 Impact to neighborhoods along direct haul routes from increased traffic (primarily noise, dust, litter, odor, and vibrations), and other socio-economic aspects;

3.12.2.2 Impacts to surrounding neighborhoods near the MRFfrom noise, odor, gaseous emissions, dust, air-borne pathogenic micro-organisms, and wind-blown litter potentially related to MRFconstruction and operation;

3.12.2.3 Creation of direct and secondary jobs related to MRFdevelopment;

3.12.2.4 Leachate emanating to surroundings through leakage in the proposed liner system;

3.12.3 Prepare management plan (including budget estimate, staffing requirements and other necessary support) to implement the mitigating measures.

TheMonitoring Plan shall comprise the following:

- Leachate and gas monitoring with respect to MRF operation
- Water quality monitoring upstreamand downstreamof MRF
- Compost production and final compost quality;
- Segregated recyclable waste quality;
- Construction materials and works (quality standards and design specifications)

The monitoring plan shall make every effort to outline monitoring procedures and indicator parameters which are uncomplicated and inexpensive to conduct and easy to evaluate.

3.13 Consultative meetings and Workshops

- Make presentation on field survey findings and Interim report findings
- Make presentation on the Draft reports
- Conduct Consultative meeting and workshop with local people,conduct Consultative meeting at SWMTSC and in the Ministry of Federal Affairs and Local Development
- Collect comments and suggestions from the meetings and workshops

3.14 Quantity, Cost Estimates and Specification

- Prepare the bill of quantities for all works and cost estimates of pay items for each component of the design. Define the methods of payment per item (lump sum, unit cost) which would be most appropriate to enable and facilitate cost and quality control. Separately note taxes which are anticipated for each pay item, such as value added taxes.
- complete set of final construction drawings, technical specifications, bill of quantities

4 Duration:

The assignment has to be completed within 6 months started from the date of assignment. The consultant should commence the work from the date of signing of the agreement.

5 Methodology:

The consultant shall adopt appropriate methodology to successfully complete the assignment. The following approach and methodology is suggested:

- Desk study or literature review including review of national and international best practices on MRFdesign
- Field study including conduction of various on-site investigation, local interactions
- Analysis of soil, water etc. tests in the laboratory

- Detail analysis of collected data
- Detail design of all structural components
- Preparation of drawings, cost estimation and bid documents

Consultative and participatory approach is to be applied for the task.

6 Team Composition and time input:

The consultant team should comprise at least of the following personnel as shown below:

SN	Designation	Basic Requirements		Input (man-months)
a	Team Leader/Solid Waste Management Expert	Should hold at least Master's Degree in Civil/Environmental Engineering with at least 15 years of general experience including 10 years of experience on Solid Waste Management, orenvironment engineering. He/she should have specific experience of designing as a team leader or deputy leader of min. three infrastructure/environment management projects.		5
b	Environmentalist	Should hold at least Master's Degree in Environmental Engineering/science /management with at least 10 years of general experience including 5 years of specific experience in solid waste management projects		3
c	Civil Engineer	should hold at least Bachelor Degree in Civil Engineering with at least 10 years of general experience including 5 years of specific experience in engineering design, specification and estimation		3
d	Hydro-geologist	Should hold at least Master's Degree in Hydrology/Geology with at least 10 years of general experience including 5 years of specific experience on hydrological studies. Experience of working on solid waste management is added benefit.		1.5
e	Mechanical Engineer	Graduate Mechanical Engineer (preferably Master's Degree) with at least 10 years of general experience including 5 years of specific experience on designing of water supply, wastewater and environment infrastructure projects. Experience of working on solid waste management is preferred		1.5
	Socio-	Master's Degree in sociology /economics with at		2

f	economist	least 10 years of general experience including 5 years of specific experience in related field		
g	InstitutionalDevelopment Expert	Master's degree in management and public administration. Minimum 5 years of general experience and minimum 3 years of experience in SWM related works		2
h	Surveyors (2)	Should hold at least Bachelor's Degree in Survey Engineering with at least 10 years of general experience including 5 years of specific experience on surveying of infrastructure projects. Experience of working on solid waste management is preferred		3

7 Reporting:

The consultant has to submit following reports:

S. No	Type of Report	Timeframe	Copies
1	Inception Report	One month after commencement of work	2
2	Interim Report (Field)	2 months after commencement of the work	2
3	Draft Report	3 months after commencement of the work	3
4	Final Report	Two weeks after comments on draft report	5
5	Other Reports:		
a	ESMP document	Along with final document	2
b	OHS Plan	Along with final document	2
c	Institutional Model	Along with final document	2
d	Closure and Post Closure Plan	Along with final document	2

The detailed design, including layouts, shall be accompanied by a notebook compiling in a clear and orderly manner all calculations and procedures used in the design and analysis with their corresponding quantity and construction cost estimate.

The consultancy service has to submit soft and hard copies with report including photos and necessary documents. The above-mentioned activity by the consultancy services including hard and soft copy of final report will be copyright of SWMTSC.

7.1 Contents:

- **Draft Final Report**

The draft report shall fully document all aspects of study. The consultant shall prepare separate draft report for each municipality's .The consultant shall make a presentation of their findings of the study at SWMTSC. The presentation shall help the consultant to collect feedback and comments on the submitted draft report.

The report should present following contents including the problem statement, background information, feasibility study concept, technical and financial viability of projects etc.

A. Executive summary

B. Introduction

- Background
- Objectives
- Scope of work
- Methodology

C. Existing Situation of SWM in listed municipalities

- Socio-economic details (including urban and rural population, social and economic conditions of the people living in listed municipalities and projection of population growth at least 20 years),
- Solid waste and composition in listed municipalities
- Existing waste generation rate and volume in listed municipalities
- Existing workforce, equipments and facilities for SWM in listed municipalities
- Waste management approach and technology adopted by listed municipalities ,
    - Waste collection and segregation,
    - Transportation service and used equipments,
    - Use of 3R (Reduce, Reuse and Recycle) concept,
    - Final disposal/sanitary landfill site,
- Existing Environmental situation of proposed area of listed municipalities ,
    - Surface and groundwater pollution,
    - Air pollution,
    - Adverse effect on public health
- Illustrations using the maps/ photographs whatever deemed necessary

D. Review of available reports and existing condition

- Critical review of existing strategy, policies, plan and regulation related to solid waste management ,
- Act, regulation related to solid waste management,
- Illustrations using the maps/ photographs whatever deemed necessary

E. Site Survey and investigation

- Topographic survey
- solid waste characteristics
- Traffic and other surveys
- soil survey and geotechnical investigation
- hydrological investigation
- Process Design

F. Detail Design

- Site and Access road
- surface water management
- Material recovery facilities

- weigh-bridge
- waste unloading platform
- inorganic waste sorting station
- composting unit
- waste to energy unit
- storage unit
- residue waste management facilities (in case of MRF out of KV)

G. MRF Equipments

H. Development Utilities

- Operation Unit
- Sanitary system
- Water supply system
- Electrical system
- Fire protection system
- Landscape

I. Legislative, regulatory and institutional considerations
J. Environment and Social Management Plan (ESMP)
K. Risk and Benefits
L. Cost Estimates
M. Implementation Plan
N. Construction, Operation and Maintenance Manuals
O. Conclusion and Recommendation

E. Maps and Drawings (Minimum A3 sized of paper)

- Existing situation of physical infrastructure, service centers and settlements,
- Topographic map (Base map) showing the existing details,
- Existing land use map of listed municipalities ,
- Population density map of listed municipalities and ,
  Proposed sites

F. Annexure

- Bibliography / References
- Existing land use map of listed municipalities
- Topographic map (Base map) showing the existing details
- Data, test reports, charts, photographs
- Drawing/ Design sheets (Minimum A3 sized of paper)

8. General Requirement of Consultant's Service:

- The consultant will perform the service to the satisfaction of SWMTSC and will provide all the requisite staffs, equipments, supplies, and logistic supports for the performance of the work,
- During the service, the consultant will cooperate fully with SWMTSC and also work in close coordination and consultation with other stakeholders, and
- The consultant shall always respect the interest of the client and shall carry out the services with due diligence and efficiency.

9. Mode of Payment:

Payments will be done after submission of the Consultant's Invoices according to the following schedule:

- 20% of the contract amount after submission of Inception Report
- 30% of the contract amount after submission of Interim Report
- 30% of the contract amount after submission of Draft Report
- 20% of the contract amount upon acceptance of the Final Report.

10. Facilities to be provided by the Client:

SWMTSC will provide all relevant background information, including previous studies and reports, project documents, including project commitment paper and project operational manual as required. SWMTC will also facilitate the consultant in obtaining relevant reports and data from municipalities, and in organizing stakeholder workshops. The consulting firm is required to manage all the arrangements with sufficient logistics, staff and infrastructure. No cost for such arrangements shall be borne by the Client.

11. Selection Method

The consulting firm shall be selected under Quality and Cost Based Selection (QCBS) methods set forth in Public Procurement Act, 2007 and Public Procurement Regulations, 2007. Maximum 6 firms shall be shortlisted based on the firm’s qualification and experience and only to those shortlisted firms shall be requested to submit their technical and financial proposal.