PROJECT:

PROVISION OF A COMPREHENSIVE SOLID WASTE TREATMENT SOLUTION FOR THE CITY OF ERBIL AND ITS SURROUNDINGS

TENDER DOCUMENTS
VOLUME 2: TECHNICAL SPECIFICATIONS

July 2017

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1. Scope

The objective of this tender is to design, build and operate a solid waste treatment center (SWTC) in Erbil city and its surroundings to enable the recovery of recyclables, treatment of the biodegradable organic fraction of the solid waste and the safe disposal of the remaining fraction in a sanitary landfill. This center should be designed and constructed in order to maximize landfill diversion rate.

In order to be able to perform the services, the Contractor shall make use of the pre-selected site (refer to Appendix A of the ITB), design, construct, procure, commission and operate the SWTC. The responsibility of the Contractor shall also cover the necessary infrastructure (access roads, power supply, water supply, waste water disposal and other services) and any necessary vehicles and equipment. The Contractor shall determine the types, numbers and capacities of the Disposal Facilities to be installed with the goal to achieve an optimum of MSW minimization and cost effectiveness.

The Contractor shall treat any MSW prior to landfilling. The Contractor shall sort, compost or otherwise treat MSW in order to separate or produce a maximum of materials and products, which can be absorbed by the local or regional market, i.e. by recycling companies, compost users, or other offtakers, at a reasonable cost or revenue. It shall also be the Contractor's sole responsibility to identify these offtakers, to deal with them and to develop further markets for the materials and products.

The SWTC is to accept wastes 7 days a week and 365 days a year, irrespective of public holidays. The SWTC will only accept incoming solid waste from pre-determined government designated collectors from 06:00 am to midnight. During Ramadan and public holidays the opening hours for reception is 24 hours a day.

2. Standards

All facilities shall be designed, constructed and operated in accordance with USEPA standards. In the absence of any local standards, internationally recognized standards shall be used. Environmental standards issued by the Board of Environment shall apply.

3. General Requirements for Design and Construction

Design of the facilities shall include appropriate measures to achieve the following objectives:

- High flexibility regarding variation of incoming MSW in quantity and composition in the short term and long term considering the expected growth rate;
- Minimization of emissions into air and water;
- Prevention of soil contamination;
- Minimization of risks for health and safety of employees;
- Minimization of noise and odors inside and outside the plant;
- Minimization of consumption of energy, water and other natural resources;
- Minimization of nuisances and hazards arising from fire, wind-blown materials, birds, vermin and insects;
- Architectural design in line with surroundings.
- Monitoring of water and groundwater quality upstream and downstream of facility throughout the process of construction through the establishment of test wells.

The design of the SWTC shall include the following:

- Permanent internal roads, paved, fenced and constructed for heavy duty vehicles;
- Shaded parking lots for employees and visitors;
- Office and staff buildings including all required equipment for office and sanitation;
- Weighbridge;
- Waste collection area, including an area for temporary storage of unacceptable waste.
- Storage facilities for spare parts and maintenance and repair workshops;
- Garages for vehicles;
- Tire washing station;
- Fuel station;
- Sufficiently large waiting area at the entrance to allow entering vehicles to queue for the weighbridge;
- Appropriate firefighting equipment;
- Drainage system (storm water and waste water)

In order to ensure smooth and uninterrupted operations, routine maintenance of the Project Facilities shall include but not be limited to:

- Prompt repairs of the weigh-bridge, leachate collection drainage and treatment system, electrical items, drains, internal roads, sieving machinery, lighting and fencing;
- Replacement of equipment/consumables, maintenance and repairs to equipment, structures and other civil works which are part of the Project Facilities;
- Maintaining the shape, scope, full cross-section of the storm water drainage system and leachate collection and drainage system;
- Keeping the Project Facilities in a clean, tidy and orderly condition and taking all practical measures to prevent damage to the Project Facilities or any other property on or near the Sites;
- Preventing, with the assistance of law enforcement agencies, where necessary, any unauthorized entry to and exit from and any encroachments including any encroachments on the Sites;
- Taking all reasonable measures for the safety of all the workmen, material, supplies and equipment brought to the Sites.

4. Sorting Plant

4.1 General Considerations

Any sorting activity shall take place inside a closed building equipped with an appropriate ventilation system. The sorting plant shall be designed such as to handle all quantities of MSW in no more than a two-shift operation of 8hours per shift.

Materials separated within the sorting process in order to be recycled shall be kept separately and be prepared in the necessary way for their further treatment or transportation. Depending on the quality and type of the materials, these might be declared no further as solid waste materials. The further usage and final destination of these materials should be documented by the Contractor. The Contractor must dedicate enough area for the storage of recyclables. The contractor will have full ownership of the recovered materials, including the compost products and therefore all revenues generated by the sale of these products shall belong to the contractor.

The operator shall be free to sell or otherwise dispose of the recyclables, composted organic manure and/ or other material produced/ recovered after Processing the Municipal Solid Waste, at the Project

Facilities at such price and to such Persons and using such marketing and selling arrangements and strategies as it may deem appropriate .

4.2 Sorting Plant Equipment

The sorting plant shall comprise several sorting lines (not less than 3 lines) to handle the expected quantities of solid waste. The capacity of any sorting line shall not be less than 25 tons/hour. The Contractor has to propose different automation levels options for the sorting plant. The following list enumerates the type of equipment expected to be provided to maximize the sorting rate, which should not be less than 10% of the incoming waste by weight (please refer to Section 7):

1. Bag Opener
2. Plastic Bags Collection System
3. Trommel Screen
4. Ballistic Separator
5. Ferrous Metals Separator
6. Non-ferrous metals separator
7. Air Separation
8. Optical Separator
9. Shredder
10. Baling Press

The installation of sorting and processing equipment shall be done according to the detailed execution drawings and manufacturer instructions and guidelines. All installation activities shall be directly supervised by the equipment manufacturer in order to ensure proper alignment of equipment and smooth operation of the plant. A mobile crane will be used for the handling and mounting of the equipment itself or integral parts of it.

Platforms over which equipment will be installed, whether concrete slab or steel mounted platforms, are to be checked in terms of leveling and bearing capacity. Equipment must be secured from any potential displacement by special heavy duty dowels that fix it firmly to the ground.

Horizontal and inclined conveyor belts will be adjusted such as to fit into the proper limits of the subsequent parts: Sufficient space between conveyors and stationary components in order to prevent hindrances and blockages. Similarly, chutes and hoppers are to be kept at appropriate distance from all moving parts.

Qualified electricians will be responsible for the completion of all electrical works related to the equipment and its connection to the main electrical board. Industry mechanics shall be responsible for the assembly of the subject equipment.

5. Treatment

Treatment of the biodegradable fraction of the solid waste shall be done using composting technology. Composting aims at stabilizing the organic fraction, reduce the volume of waste, eliminate pathogens and conserve nutrients.

The composting plant shall be designed such as to handle the quantities of separated fraction of biodegradable organic waste. The Contractor shall construct the plant taking into consideration the area required for composting and maturation stages. The Contractor shall dedicate an area for the additional screening, refining and bagging of the final compost product.

The Contractor is asked to consider the suggested technology for composting: Composting in tunnels.

5.1 Composting in Tunnels

Tunnels are to be made of reinforced concrete with a mobile front door, an aerated floor and roof vents. Blowers shall be used to inject fresh air into the flooring area of the tunnel. Alternatively, the polluted air can be recirculated when and if needed. Polluted air is finally extracted and treated using a biofilter system. The tunnels shall be equipped with a sprinkler system to allow the addition of water or the recirculation of leachate into the composted material.

The Contractor shall propose the number of tunnels and the dimensions of each tunnel to be used during the composting stage. Furthermore, the Contractor shall provide area and capacity required for the biofilter and the type of filtration material. The Composting stage should not be less than 24 days in the tunnels. Additional time shall be given during the maturation phase.

The Contractor shall prepare a mass balance diagram for the composting process, and shall propose the number of air injection and air suction blowers needed for the composting plant. The off-gas of encapsulated treatment areas shall be captured and fed to an appropriate off-gas cleaning system, comprising a biofilter system to reduce air pollutants, particularly odour and dust. Leachate generated from the composting process shall be re-circulated if deemed beneficial or collected in a tank for further treatment prior to discharge.

Tunnel ing offers high level of process control (air flow, humidity and temperature). For the day-to-day operation, the Contractor shall maintain data on the main process control parameters (especially temperature) in order to ensure proper operation and Compost quality.

5.2 Compost Quality

Ideally, source separated household organics yield a good compost product. Mixed household wastes include many impurities and specifically metals that may reduce the quality of the final compost product. However, at a minimum, the composting process should result in a biostabilized material that can be used as daily cover in landfills.

The composting period shall be sufficiently long and adequate material temperature shall be maintained such as to reach an acceptable quality of the final compost product. The bidder is to detail the permissible value of the below parameters as detailed in Table 1 below:

Table 1: Compost Product Permissible Value

Parameter	Permissible Value
C/N ratio	18-22
Moisture Content	<40%
pH at 25 deg C	6.5-8
Organic Matter	>20%
Lead as Pb	<750 mg/kg
Chromium as Cr	<500 mg/kg
Nickel as Ni	<250 mg/kg
Zinc as Zn	<2000 mg/kg
Copper as Cu	<500 mg/kg
Mercury as Hg	<5 mg/kg

Cadmium as Cd	<7.5 mg/kg
Thermotolerant Coliforms (CFU/g)	<1,000 CFU/g
Salmonella/ 25g	No detection

6. Sanitary Landfill

The Contractor shall determine the area needed for the sanitary landfill within the Site allocated for the SWTC. This area shall be sufficient to accommodate the disposal of rejects generated by the sorting and composting plants over the contract duration plus five additional years.

6.1 Landfill Construction

It is the responsibility of the Contractor to examine the site existing levels, site condition, geotechnical investigation report, and to make all investigation necessary, both surface and subsurface, to determine and verify the site existing levels, and character of materials to be encountered and all other existing conditions affecting the work including availability of soil materials onsite and offsite.

The Contractor shall be responsible for setting out of work components for the Project. The Contractor shall conduct topographic survey of the landfill site to obtain level and contours and to plan the construction activities at the landfill site. The topographic survey shall be carried out by using standard equipment through standard procedures.

The Contractor shall perform all excavations necessary or required for the construction in accordance with safety regulations and practice. The Contractor is advised to stockpile any material that he may need during operation.

The Contractor shall design the capacity of the landfill taking into consideration a maximum height of waste 30 m above natural ground level, a compaction density of 850 kg/m^3 and side slopes not less than 3:1.

The Contractor is responsible for the installation of a liner system in accordance with USEPA standards as detailed below (from bottom to top):

- A Geotextile to cover the landfill floor (puncture force CBR 3.5KN)
- A high shear strength Geosynthetics Clay Liner (GCL)
- An HDPE Liner (the Geomembrane) 1.5mm thickness, structured along the slopes and smooth along the floor
- A high strength Geotextile protection layer (puncture force CBR 10.5KN)

The leachate drainage system shall comprise a drainage layer of gravel with a minimum hydraulic conductivity (10^{-3} m/s).

The leachate collection system is composed of HDPE pipes as follows:

- Later perforated secondary pipes with 150mm interior diameter
- Main perforated primary pipes with 200 mm interior diameter

The perforated HDPE lateral secondary pipes shall drain the generated leachate as they are sloped (with a 2% slope) towards the main pipe. The main pipe (collector) is also sloped (2% slope) along the diagonal path of the cell to discharge in a collection pit located at the edge of the landfill. The bottom of cell will have then a V-shape 2 % side slope converging towards the diagonal collector which has a

2% inclination leading to the extraction pit.

The bidder shall construct a gas collection system. The bidder shall specify in his proposal the suggested thickness of the gas venting layer as well as its permeability.

In addition, the Contractor active shall construct a surface and groundwater monitoring system, landfill gas management system (flare if needed), and a leachate treatment plant.

The Contractor shall provide and maintain all necessary infrastructure required for the sound operation of the facilities, comprising, but not limited to:

a) access roads to the facilities, constructed for heavy duty vehicles as used for transfer and transportation under this Agreement;
b) electric power supply;
c) water supply;
d) storm water drainage;
e) wastewater discharge; and
f) leachate treatment

Treatment of the generated leachate will be performed through two (2) connected leachate basins. These evaporation ponds will be designed to handle the expected amount of leachate. The ponds are lined with primary and secondary barriers, consisting from bottom to top of the following:

- A layer of compacted fill on the grade of the excavation
- A geotextile layer
- 1.5mm HDPE geomembrane liner
- A geotextile layer
- A GCL liner
- 2mm HDPE geomembrane liner
- A Geogrid/Geocomposite
- A concrete protection layer (10cm thick)

6.2 Landfill Operation

The Contractor shall be responsible for the daily operation and maintenance of the sanitary landfill. The Contractor shall make all possible efforts to reduce environmental risks associated with landfilling operations and propose measures to control odors and reduce dust. The Contractor will be responsible for the environmental monitoring and overall environmental reporting. The Contractor shall conduct monthly topographic surveys and report the remaining capacity of the landfill. The Contractor shall be responsible for the collection and treatment of landfill gas in order to reduce greenhouse gas emissions. Furthermore, leachate treatment shall be done onsite prior to discharge or to hauling offsite.

The Contractor is to prepare an operation plan for the sanitary landfill detailing the following:

- Reception of waste and operation hours
- Types of accepted and rejected wastes
- Record keeping
- Landfilling activities
- Filling Sequence and Working Face
- Equipment Movement

- Waste compaction
- Covers Management Plan
- Leachate Collection and Treatment Plant
- Landfill Gas Collection and Treatment Plant
- Storm water Management
- Surface water management
- Sampling and Monitoring Plan
- Closure Plan
- Emergency Preparedness and Response Plan
- Odors, Noise and Litter Control
- Training Program
- Health and Safety Plan
- Reporting
- Human Resources and Key Staff
- Equipment

7. Performance Specifications

The Contractor shall make all possible efforts to abide to the performance specifications that are listed in this section. Financial penalties will be imposed for not meeting these specifications as detailed in Clause 24 of the Services Contract.

Activities Undertaken by Contractor
1. Completion of the construction of the first cell of the sanitary landfill within 9 months from the date of contract signature
2. Completion of the construction of the sorting plant and procurement of the related equipment within 9 months of contract signature
3. Completion of the construction of the composting plant within 9 months of contract signature
4. Achieving a recovery rate of recyclables not less than 10% during the first 2 years of operating the sorting plant
5. Achieving a recovery rate of recyclables not less than 12% for years 3,4 and 5 of operating the sorting plant
6. Achieving a recovery rate of recyclables not less than 15% for years 6,7,8,9 and 10 of operating the sorting plant
7. Achieving a recovery rate of recyclables not less than 18% for years 10,11,12,13,14 and 15 of operating the sorting plant
8. Achieving a recovery rate of recyclables not less than 20% for years 16, 17, 18, 19 and 20 of operating the sorting plant
9. Landfill diversion rate of 40% during the first 2 years of operating the landfill
10. Landfill diversion rate of 42% during years 3,4 and 5 of operating the landfill
11. Landfill diversion rate of 45% during years 6, 7, 8, 9 and 10 of operating the landfill
12. Landfill diversion rate of 48% during years 11, 12, 13, 14 and 15 of operating the landfill
13. Landfill diversion rate of 50% during years 16, 17, 18, 19 and 20 of operating the landfill
14. Meeting the compost quality criteria listed in section 5.3

15. Analyze the waste composition treated and report findings to MOMT on a monthly basis
16. Analyze the landfill diversion rate and report findings to MOMT on a monthly basis

Recovery rate of recyclables is calculated on a three-month average basis.