

TERMS OF REFERENCE FOR:

Service supply to undertake preliminary study and analysis
Hydrogeological analysis and topographical survey for Fnaydek Dumpsite reclamation,
Jurd al Kaytee, Akkar, Lebanon



Project reference: "SWaM Akkar. Supporting Sustainable Solid Waste Management in Jurd al Kaitee"
ENI/2018/398054

Activity: 5.2.1 Fnaydek dumpsite hydrogeological analysis and topographical surveys

Date: April 2020

BACKGROUND INFORMATION

Survey to be conducted at the uncontrolled dumpsite of Fnaydek Municipality

Following the Updated masterplan for the closure and rehabilitation of uncontrolled dumpsites throughout the country of Lebanon updated in 2017, the old dumpsite in Fnaydek village is ranked 11th in the RSI (Risk Sensitivity Index) which identify the priorities for the country.

The site is still operational and used to dump Municipal Solid Waste (MSW) from Fnaydek municipality, it receives around 7 t/d of co-mingled residual MSW.

The Masterplan done in 2019 for the UoMJK, foreseen that all residual waste will be transported to Srar controlled dump.

KEY FUNCTIONS AND OBJECTIVES OF THE SERVICE SUPPLY

The required surveys and analysis aim to verify the Physical and Chemical status of the dumpsite area to estimate the volume of waste to be removed (m³), the level of pollution spread in watersheds, and cost for reclamation.

The key objectives are (but not limited to if relevant to add in the proposed quotation):

1. Hydrogeological, geological and orographic survey and maps of the dump site area

The surveys should include thematic maps, description of the surveys and methodology of data collection

2. Topographic survey of the dump site area

Topographic survey should be done enabling contour lines 1 m distance

3. Piezometric study: Presence of piezometers/wells upstream and downstream

Monitoring of aquifer pollution: The goal is to evaluation the impact of illegal dumping on underground water and to identify if some water extraction in the outskirt of the dumpsite might be contaminated and when (short, medium and long term).

- Define the position of the wells surrounding the area, the dept and use (agricultural, urban)
- Determine the aquifers type and hydrodynamic characteristics, depth of saturated soil
- Determine direction and yield of underground water in the area.
- Determine the pollutant dispersion area from the start of the dumpsite area.
- Determine a water analysis campaign for existing water points downstream the area. The study should highlight existing monitoring water points in the dispersion area to evaluate risk of contamination.

Analysis should be done following the Lebanese standards and specifications for clean water. Analysis should be foreseen at least in one well upstream and one downstream /analysis in Table)

Table 1 Ground Water analysis

| Parameters |
|---|
| Heavy metals /same as the soil/waste analysis |
| Electrical conductivity |
| COD |
| BOD |
| TDS |
| E. Coli |

| |
|----------------|
| Total Coliform |
| |

- The consultants are free to propose other referenced analysis and parameters.

4. Soil/waste analysis

○ Borehole analysis

(mandatory) Analysis in one point of the dump with bore hole one analysis at respectively 1,5m, at 4,5 m, 12m, and 20m depth.

(optional) Add quotation for each extra analysis in case trace of waste can be found at 20 m deep.

- Waste type: Determine waste type and quantity and target specific or dangerous contaminants representing the pollution

Chemical-physical analysis of a waste sample:

Preliminary analysis:

- Total Organic Carbon (TOC) of the waste (for each strata and after sampling);
- Desorption test in water on waste recovered (following UNI 12457) to define heavy metal presence and release. Perform DOC on the eluate. Heavy metals analysis as per Table 3. (above)
- Analysis on the calorific value of waste.

Table 2 analysis for waste analysis

| |
|-------------------------------|
| Parameters for waste analysis |
| U% |
| VS |
| Respirometry tests |
| Anaerobic components (biogas) |
| Putrescibility |

Table 3 Parameters to be analysed in MSW sample

| Parameters for leachate from waste/soil samples | |
|---|----------------|
| As | Arsenic |
| Ba | Barium |
| Cd | Cadmium |
| Cr total | Total Chromium |
| Cu | Copper |
| Hg | Mercury |
| Mo | Molybdenum |
| Ni | Nickel |
| Pb | Lead |
| Sb | Antimony |
| Se | Selenium |
| Zn | Zinc |
| TOC | |
| Fe | |
| N (all types) | |
| REDOX | |
| Electrical Conductivity | |
| pH | |
| COD | |
| BOD ₅ | |
| TDS | |
| E. Coli | |
| Total Coliform | |

- Determine waste quantity in m3. (current stage and future projection if no action taken), the firm should propose their methodology for waste analysis, the methodology proposed will be approved by the Contracting Authority
- Leachate production/composition: the study should estimate leachate production based on waste type and quantity. The study should consider seasonality (dry V wet season, rainfall and catchment area of the dumpsite).

KEY DELIVERABLE: ONE TECHNICAL REPORT

For the quotation

The request for quotation should include

- comments and justification when needed to detail price breakdown
- Gantt chart for the duration of the study, including all steps
- CV of the company and past experience (see qualification and experience section)
- Site visit report (if possible)

The consultants/company should provide in the offer a tentative Table of Content, in which at least the following aspects should be considered:

- Historical background (beginning of the dump, other analysis done in the past, articles in the news etc...)
- Analysis of the current environmental condition in the surrounding (minimum 500 m from the dumpsite), (geophysical analysis, general data of the area/basin and of the dumpsite, hydrogeological analysis, geotechnical analysis,
- Quantities and quality of the waste within the dumpsite areas
- Morphological status of the area (up to 500 m surrounding the dumpsite)
- Analysis of the potential solutions to reclaim the site (technical financial)
- Analysis of a similar environment to be used and a reference

For the contract

It is expected by the contractor to produce a technical report with all narrative, results, and required documents of the study and survey, considering the following content and formatting requirements:

- **Report to include:**
 - Description of the initiative
 - Narrative to answer Key functions and objectives, following this TOR structure (1 to 4) and any other relevant chapter
 - Methodology of the initiative
 - Conclusion of the study and survey, with clear answers of the general objective and key ones (both technical and narrative)
 - Clear cost estimation and technical solutions for reclamation of the dumpsite (infrastructure work to foresee, piezometric monitoring). The study should act as a pre-feasibility study for the reclamation and requalification of the dumpsite
 - References
 - Appendix (laboratory results, photos, site visit, etc.)
- **Format of the reports must include the following**
 - The reports must be written in high level of English
 - recent digital Microsoft Word copy and must use all appropriate features such as:
 - Styles: No Spacing / Font: Calibri 11, for the narrative. (titles and headers can be different but need to be in line with the overall formatting)
 - Page layout: Margin "Narrow ", size A4
 - Appropriate automatic headings for titles and all sections and sub-sections.
 - Appropriate automatic caption for tables, figures and pictures
 - Clear page numbering
 - Clear table of contents

- o Clear list of tables, figures and pictures, acronyms
- o Clear table of appendix

The contractor is expected to submit a draft technical report for review prior to final payment.

QUALIFICATIONS AND EXPERIENCE

Expertise requirements:

- At least three similar projects in the past three years

The two Key Experts working in the project should have the following skills:

- Team Leader, Waste management expert, at least 10 years of experience in waste management and at least 2 similar projects
- Geologist at least 10 years of experience related field and at least two projects in dumpsites/landfill reclamation.

The consultants are free to propose other expertise.

QUOTATION - COST BREAKDOWN

The following analysis and surveys are proposed to the contractor:

The quotation includes the deliverable production (production of one technical report for the whole study), and all site preparation.

| Items | unit | quantity | price USD | Comments / Justifications |
|---|------|----------|-----------|---------------------------|
| 1. Hydrogeological, geological and orographic survey and maps of the dump site area | Ls | | | |
| 2. Topographic survey of the dump site area | Ls | | | |
| 3. Presence of piezometers/wells upstream or downstream | Ls | | | |
| 4. Soil/waste analysis At least 4 analysis | Ls | | | |
| (mandatory) 4.1 Borehole depth 1.5 m | | | | |
| (mandatory) 4.2 Borehole depth 4.5 m | | | | |
| (mandatory) 4.3 Borehole depth 12 m | | | | |
| (mandatory) 4.4 Borehole depth 20 m | | | | |
| (optional) 4.5 Borehole depth 25 m | | | | |
| (optional) 4.6 Borehole depth 30 m | | | | |
| (optional) 4.7 Borehole depth 40 m | | | | |
| Total | | | | |