Earth Link & Advanced Resources Development
Selected References

Solid Waste Management

ELARD

SUB-CONSULTANCY SERVICES FOR PROVISION OF WASTE MANAGEMENT STRATEGY CONSULTANCY SERVICES FOR ALAATEDA MALL, DOHA, QATAR

Client

Meinhardt (Singapore) Pte. Ltd., Qatar Branch

Location

Doha - Qatar

Date

Oct. '14 – Sep. '15

Project Description

Alaateda Mall project is a commercial project consisting of 5 separate but connected blocks. The mall design has the ambience of a whole "Souk" market and is The project is based on the concept of a shaded open mall, with low development, construction and maintenance costs.

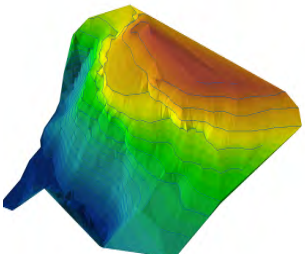
Scope of Work

- Provide a summary of understanding of the assumptions on the use and occupancies of individual units, and the estimated number of patrons for sign off.
- Provide estimates of the mass and volume of waste anticipated to be produced. Calculate the size of the Mall's central waste store. This will take into account the space required for any processing equipment, such as compactors, the number of bins required to store waste for the agreed maximum period, space to manoeuvre wheeled bins, and if needed, access space required for waste collection vehicles.
- Identify the individual waste streams.
- Quantify the likely volumes/ weights Method of storage, segregation and transfer within the Mall.
- Exploit opportunities for reduced environmental impact and how this impacts on the above.
- Provide recommended waste transfer arrangements.
- Provide a Waste Management Strategy including findings, conclusions and recommendations.

THREE ENVIRONMENTAL STUDIES IN THE AREA OF BAALBECK

Client

Italian Cooperation- Beirut, Lebanon



Location

Baalbeck, Bekaa

Date

Dec. '11 – Mar. '12

Project Description

The Project falls within the scope of the "Integrated Solid Waste Management of Baalbeck" project executed by the Ministry of Environment with the financial and technical support of the Italian Cooperation. The Ministry's project aims at 1) closing and restoring the two Kayal dumps under which lie the old Roman quarries, 2) creating a plant for solid waste sorting and composting, as well as a landfill for the disposal of rejects, and 3) building the capacities of the Ministry and the Municipality of Baalbeck in the SWM field. ELARD's assignment consisted of three main tasks:

- A topographic survey of the two existing Kayal dump sites and of the new proposed location for the construction of the landfill, using 1) High accuracy differential Geographical Positioning System (GPS) and 2) Detailed surveying using total station with a close grid.
- Estimation of the volume and depth of solid waste in the two Kayal dumps based on a comparison between the actual ground survey (actual DTM) and the photogrammetric survey using 1962 aerial photos (natural DTM).
- Waste categorization in the Baalbeck old (Kayal) and new dumps according to the ASTM D5231 standard (Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste). Solid waste samples from the burned and unburned sections of the old dump as well as samples from the new dump were sorted manually for an entire week, from March 19 to 25, 2012. The mean waste composition was calculated using

Scope of Work

- Topographic survey of the two existing Kayal dump sites and of the new proposed location for the construction of the landfill;
- Estimation of the volume and depth of solid waste in the two Kayal dumps;
- Categorization of solid waste in the two Kayal dumps in accordance with ASTM D 5231-92- Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste (MSW).

PREPARATION OF A MASTER PLAN FOR THE CLOSURE AND REHABILITATION OF UNCONTROLLED DUMPS IN LEBANON

Client	Location
United Nations Development Programme (UNDP)	Lebanon
Executing Agent	**Date**
Ministry of Environment	Sep. '10 - Jun. '11

Project Description

One of the major environmental problems in Lebanon is caused by the widespread of hundreds of uncontrolled dumps in the country. This has been re-iterated in several studies, including but not limited to the National Environmental Action Plan (NEAP) and the Strategic Environmental Assessment (SEA) document on key environmental issues prepared by MoE/UNDP, and the National Physical Plan of the Lebanese Territories (NPPLT) prepared by CDR. The problem has lately been formally acknowledged as a key priority to be addressed by the government by being integrated in MoE's Work Programme for the years 2010-2012.

Scope of Work

- Prepare an inventory of all dumps in Lebanon and characterize them according to predetermined criteria, and develop a GIS database.
- Prioritize dumps for their rehabilitation based on a multi-criteria analysis.
- Propose best rehabilitation option based on pre-determined criteria
- Develop a detailed action plan clearly identifying priority dumps to be rehabilitated, the proposed rehabilitation measure, its cost, and implementation road map (responsibility, financing sources, timeframe, environmental monitoring requirements, etc.).

SUSTAINABLE SOLID WASTE MANAGEMENT SYSTEM FOR ADISC RESIDENTIAL, LEISURE & COMMERCIAL COMPOUND

Client	Location
IMCC Management Consulting	Abu Dhabi, UAE
Executing Agent	**Date**
Fibrex Industrial and Construction Group	Sep. '09 – Jan. '10

Project Description

The Abu Dhabi International Shooting Club Compound is a mixed use compound that includes Residential, commercial and Leisure developments located in the emirate of Abu Dhabi, around 25 km from the city.

ELARD prepared a sustainable Solid Waste Management System for the development that ought to provide the proper recommendations in order to insure that the development meets the solid waste requirements of the Emirate of Abu Dhabi through improving the waste collection, transport, storage and disposal; encouraging waste separation and recycling; eliminating the health, environmental and safety risks and insuring that the development's solid waste management practices will be handled according to the guidelines.

Scope of Work

- Project Mobilization
- Review of existing Institutional, Legal and regulatory Framework
- Projects Description
- Assessment of Baseline Conditions
- Waste Characterization, and Assessment of Waste Management Options
- Solid Waste Minimization
- Recommendations
- Reporting

REGIONAL SOLID WASTE MANAGEMENT PROJECT IN MASHREQ AND MAGHREB COUNTRIES, NATIONAL ACTIVITY IN LEBANON

ELARD

Client

The World Bank Mediterranean Environmental Technical Assistance Program - METAP

Location

Lebanon

Executing Agent

Ministry of Environment (MoE)

Date

May '04 – Jun. '05

Project Description

The Regional Solid Waste Management Project (RSWMP) in Mashreq and Maghreb Countries is a regional project addressing the waste management needs of eight beneficiary countries in the Mediterranean region: Algeria, Egypt, Jordan, Lebanon, Morocco, Syria, Tunisia, and West Bank and Gaza.

The objective of the RSWMP is to promote the adoption of integrated and sustainable solid waste management (ISWM) through:

I. Providing the necessary tools to the beneficiary countries for designing, developing and implementing the main elements of ISWM;

II. Promoting the exchange of solid waste management information and experiences within the region.

The RSWMP gave special consideration to a range of issues, which go far beyond the technical aspects, such as ISWM policy, legal and institutional issues; financing and cost recovery; private sector participation; and public awareness and community participation.

Scope of Work

- Strengthening the existing Solid Waste Management (SWM) legal framework in Lebanon. This task includes the preparation of:
  - Law on Integrated Waste Management
  - Decree(s) of Application on Financing and Cost Recovery Mechanisms for SWM
  - Application Decree on Private Sector Participation in SWM.
- Development of national and municipal capacities for applying, enforcing and monitoring the strengthened legal framework. Includes the preparation of
  - National Capacity Building Workshops
  - Local Capacity Building Workshops
  - Dissemination Workshop
- Development of an economic model with relevant implementing tools that assist in selecting preferred SWM systems and defining costs.
- Application of two of the regional SWM guidelines (financing/cost recovery and private sector participation) through on-the-job training of central or local government authorities.

SUPPORT TO THE OFFICE OF THE MINISTER OF STATE FOR ADMINISTRATIVE REFORM IN THE IMPLEMENTATION OF SOLID WASTE MANAGEMENT PROJECTS IN LEBANESE MUNICIPALITIES

Client

Office of the Minister of State for Administrative Support (OMSAR)

Location

Lebanon

Date

Jun. '04 – Nov. '05

Project Description

In an agreement with the Lebanese government, the European Commission has signed a grant amounting to 10.2 million EURO to improve the local municipalities' quality of life, specifically by improving their waste management capabilities and infrastructure.

ELARD has been retained as the consultant to the Office to the Minister of State for Administrative Reform (OMSAR) to support the public agency in all activities related to the procurement, supervision and monitoring of the waste management facilities to the bidding municipalities. A total of 17 clusters of municipalities throughout the country have presented proposals to implement solid waste management projects in their respective areas. Projects ranged from single item procurement such as collection vehicles or composting plants to complete integrated solid waste management proposals. Proposals related to medical waste management were also included.

ELARD is responsible to support OMSAR in the evaluation of all proposals, to work closely with the municipalities to revise and upgrade the proposals according to their needs, to prepare tender documents and specifications for the projects, and to supervise their implementation.

Scope of Work

- Evaluation of solid waste management proposals presented by municipalities
- Coordination with municipalities to upgrade and revise the proposals as needed
- Preparation of terms of references, tender documents for all projects
- Assistance in the bidding processes for the selection of appropriate contractors to implement the projects
- Supervision of the implementation of all projects

FEASIBILITY STUDY & ENVIRONMENTAL IMPACT ASSESSMENT FOR THE ESTABLISHMENT OF A HEALTH CARE WASTE MANAGEMENT CENTER IN MAJDLAYA, NORTH LEBANON

Client

Evergreen Services

Location

Majdlaya, North Lebanon

Date

Mar. '04 – Jul. '04

Project Description

Evergreen Services is a local technology provider for the treatment of infectious and pathological health care wastes. Evergreen has plans to setup a health care waste management center in North Lebanon, Majdlaya a site close to the city of Tripoli.

Evergreen contacted ELARD to assist in the preparation of a feasibility study for the establishment of the site, including the identification of possible solutions to different waste streams, assessment of environmental impacts, and specification of guidelines for the collection, handling, treatment and final disposal of the treated waste and residues. ELARD used recent WHO guidelines in developing the recommendations to the client. In addition, a detailed Environmental Impact Assessment was prepared to be submitted for approval by the Ministry of Environment.

Scope of Work

- Preparation of guidelines for the collection, handling, storage, treatment and final disposal of treated wastes and residues using WHO guidelines; Evaluation of the existing surface water quality monitoring system;
- Preparation of Environmental Impact Assessment study including mathematical modeling for simulation of emissions and performance of emissions monitoring report; and
- Assessment of overall feasibility of the project based on potential regional clients and the costs of the services.

HEALTH CARE WASTE MANAGEMENT SERVICES & ENVIRONMENTAL IMPACT ASSESSMENT FOR NOTRE DAME DE LA PAIX HOSPITAL – QOBAYAT

Client

Notre Dame de la Paix (NDP) Hospital

Location

Qobayat, North Lebanon

Date

Feb. '04 – Jul. '04

Project Description

Health care waste management is a serious issue yet to be resolved in Lebanon. The lack of enforcement and government support leaves health care facilities without options for the disposal of their health care waste other than disposing it directly on the environment. Recently, however, the government has imposed on these facilities to find their own solutions.

As such, ELARD was contacted by Notre Dame de la Paix Hospital, (150 beds capacity) in request to setup a health care waste management system. ELARD assisted the hospital in identifying the types of wastes, setting up means for waste segregation, identification of measures and precautions to minimize the risks of infections, storage and handling requirements, identification of suitable treatment and disposal technologies, and training to personnel and staff. In addition, ELARD prepared the EIA for the treatment technology for the approval by the Ministry of Environment.

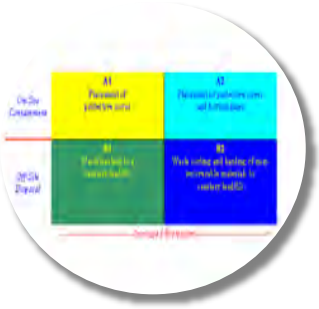
Scope of Work

- Audit of hospital waste management system;
- Identification of types and characteristics of wastes;
- Identification of segregation, handling and storage requirements;
- Identification of treatment technologies for the different streams of HCW;
- Personnel training;
- Preparation of Environmental Impact Assessment study.

RISK ASSESSMENT AND PROJECT FORMULATION OF THE CLOSURE OF AN OLD DUMP IN LEBANON

Client

Union of Chouf Es Souaijani Municipalities
Urban Community – Metropolitan Lille



Location

Chouf, Lebanon

Date

Mar. '02 – Aug. '02

Project Description

This project is the fruit of a tripartite agreement among the Union of Chouf Es Souaijani Municipalities, the municipality of Lille, and ELARD as the technical assistants.

The objective of the project was to minimize the impacts from the presence of an uncontrolled dump in the area by rehabilitating it while setting the foundations for an integrated solid waste management plan for the 9 municipalities forming the Union. The Slayeb dump had received all sorts of waste during the last 15 years, accumulating over 35,000 m^3 of waste.

In order to identify the best rehabilitation option, a detailed assessment of the environment was conducted, including geological and hydrogeological investigations, with sampling and analysis of major water resources. Similarly, the characteristics of the dump were assessed including waste extent and volume (by comparing topographic survey with aerial imagery before dumping activities) and stage of decomposition (by analyzing biogas and leachate samples).

A detailed plan for the rehabilitation was developed together with the main activities needed to implement an integrated waste management plan for the municipalities.

Scope of Work

- Detailed site assessment including geological and hydrogeological investigations
- Detailed assessment of the existing waste dump including topographic survey, waste volume calculations, biogas measurement, and leachate sampling and analysis.
- Risk assessment based on the degree of decomposition of the waste and the characteristics of the environment
- Assessment of rehabilitation options including on-site and off-site options and identification of best rehabilitation option based on technical, legal, social, and economic criteria.
- Preparation of guidelines for rehabilitation of the dump and integrated waste management for the municipalities.

HEALTH CARE WASTE MANAGEMENT SERVICES & ENVIRONMENTAL IMPACT ASSESSMENT FOR THE BAABDA GOVERNMENTAL UNIVERSITY HOSPITAL (BGUH)

Client

Baabda Governmental University Hospital (BGUH)

Location

Baabda, Lebanon

Date

Oct. '03 – Apr. '04

Project Description

Health care waste management is a serious issue yet to be resolved in Lebanon. The lack of enforcement and government support leaves health care facilities without options for the disposal of their health care waste other than disposing it directly on the environment. Recently, however, the government has imposed on these facilities to find their own solutions.

As such, ELARD was contacted by the Baabda Governmental University Hospital (BGUH), (100 beds capacity), in request to setup a health care waste management system. ELARD assisted the hospital in identifying the types of wastes, setting up means for waste segregation, identification of measures and precautions to minimize the risks of infections, storage and handling requirements, identification of suitable treatment and disposal technologies, and training to personnel and staff. In addition, ELARD prepared the EIA for the treatment technology for the approval by the Ministry of Environment.

Scope of Work

- Audit of hospital waste management system;
- Identification of types and characteristics of wastes;
- Identification of segregation, handling and storage requirements;
- Identification of treatment technologies for the different streams of HCW;
- Personnel training;
- Preparation of Environmental Impact Assessment study including mathematical modeling for simulation of emissions and performance of emissions monitoring report.

HEALTH CARE WASTE MANAGEMENT SERVICES & ENVIRONMENTAL IMPACT ASSESSMENT FOR HAIKAL HOSPITAL

Client

Albert Haikal - Hospital

Location

Tripoli, North Lebanon

Date

Dec. '03 – May '04

Project Description

Health care waste management is a serious issue yet to be resolved in Lebanon. The lack of enforcement and government support leaves health care facilities without options for the disposal of their health care waste other than disposing it directly on the environment. Recently, however, the government has imposed on these facilities to find their own solutions.

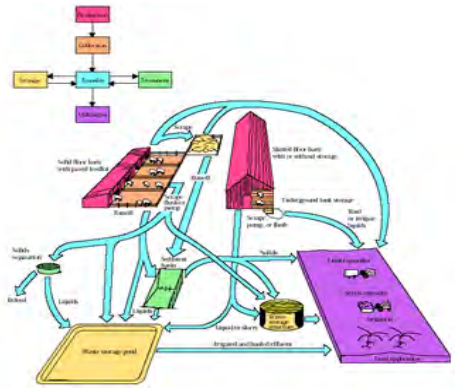
As such, ELARD was contacted by Haikal Hospital, (120 beds capacity), in request to setup a health care waste management system. ELARD assisted the hospital in identifying the types of wastes, setting up means for waste segregation, identification of measures and precautions to minimize the risks of infections, storage and handling requirements, identification of suitable treatment and disposal technologies, and training to personnel and staff. In addition, ELARD prepared the EIA for the treatment technology for the approval by the Ministry of Environment.

Scope of Work

- Audit of hospital waste management system;
- Identification of types and characteristics of wastes;
- Identification of segregation, handling and storage requirements;
- Identification of treatment technologies for the different streams of HCW;
- Personnel training;
- Preparation of Environmental Impact Assessment study.

IDENTIFICATION OF BEST TREATMENT ALTERNATIVES FOR FARM WASTE IN LEBANON (2003-2004)

Client	Location
UNDP - SPASI Project	Lebanon
Executing Agent	**Date**
Ministry of Environment	Jan. '02 – Jul. '02



Project Description

The agriculture sector can have negative impacts on the environment and can cause significant threat to the public health, if appropriate practices are not used. The Mismanagement of farm waste can cause such threat.

The SPASI unit financed by the European Commission, and executed by the Ministry of the Environment, has requested from ELARD a study to assess the various farm waste treatment alternatives available for each type and sizes of farms, and identify and recommend the best farm waste treatment alternative for each type and size of farms.

A revision of the legal context was initially conducted, subsequently, the various types and sizes of farms were identified, then the different wastes of the various farms were characterized (quantity and quality).

The most efficient methods for the treatment of farm waste were identified and assessed and ranked according to pre-selected criteria, and recommendations for the best treatment alternatives were made.

A method developed in Canada for calculating the minimum distance that separates the farms from residential areas was adapted. The method uses only the size and type of farms. This method was adopted by the government and a draft decree was prepared to set these distance limits.

Scope of Work

- Assessment of the existing legal framework for the management of Farm Waste in Lebanon;
- Identification of the types and sizes of farms in Lebanon;
- Characterization of the farm waste (quantity and quality) for each type and size of farm;
- Identification and assessment of the various farm waste treatment technologies required for each type and size of farm; and
- Adapting an existing method for calculating the minimum distance from residential area, allowed for the location of different types of farms.

SCREENING OF POTENTIAL LANDFILL SITES

Client

Council for Development and Reconstruction (CDR)

Location

North Lebanon & Mount Lebanon

Date

Apr. '02 – Aug. '02

Project Description

This project consisted of a detailed site selection process to identify suitable potential candidate sites to serve the waste generated in Greater Beirut Area and part of Mount Lebanon (over 2000 tons/day). It comprised a detailed desk study and numerous field trips to assess geological, hydrogeological and environmental characteristics of screened sites throughout the country, with primary focus on Mount Lebanon and North Lebanon. Specific screening criteria were used to select the candidate sites.

Scope of Work

- Geological and hydrogeological investigations;
- Environmental site assessments;
- Identification of potential landfill sites; and
- Recommendations for further assessment of the sites.

PRELIMINARY EVALUATION OF POTENTIAL QUARRY LANDFILL SITES FOR THE GREATER BEIRUT AREA AND PART OF MOUNT LEBANON

Client

Council for Development and Reconstruction (CDR)

Location

Beirut and Mount Lebanon

Date

Oct. '09 - Sep. '10

Project Description

This report has been prepared upon the request of the Council for Development and Reconstruction (CDR) to conduct an initial screening of quarry sites primarily in the Mount Lebanon Mohafazat for the purpose of assessing their suitability as landfill sites for accommodating the municipal solid waste (MSW) generated within the Greater Beirut Area (GBA) and part of Mount Lebanon. This request was addressed to LACECO under Cover Letter 1667/1 dated March 27, 2002. Emphasis was placed on the assessment of the suitability of existing quarries as stipulated in the Council of Ministers Decision 31 dated August 28, 1997. The main output of this study is a preliminary list of possible candidate sites that were retained for further evaluation. The results presented in this report represent the best available information that could be obtained given the temporal and geographical constraints of the project.

Scope of Work

- Reviewing previous landfill site selection studies conducted in Lebanon;
- Discussing with representatives from the CDR;
- Identifying quarries (Dar Al Handasah, 1996) located in geologically and hydrogeologically suitable lands with low potential for groundwater contamination and/or in coastal areas with groundwater affected by seawater intrusion;
- Preparing site description forms (Appendix A) to be filled in during site visits;
- Visiting and assessing potential quarry landfill sites in Mount Lebanon;
- Visiting and assessing to a limited extent non-quarry sites in Mount Lebanon and quarry sites in North Lebanon;
- Reporting.

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