Environmental Assessment – El Kablat Medical Center and Two Closed Secondary Lead Smelters

Livelihood and Income from the Environment Program
Lead Pollution Clean-up in Qalyoubia

September 26, 2006

CONTENTS

Appendices

Figures

Tables

The author’s views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

ACRONYMS

ASU-RL	Ain Shams University- Reference Laboratory
AQMC	Air Quality Monitoring Component
BHHRA	Baseline Human Health Risk Assessment
CAA	Competent Administrative Authority
CAIP	Cairo Air Improvement Project
Chemonics	Chemonics International
DHHS	Department of Health and Human Services
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EEAA	Egyptian Environmental Affairs Agency
EMP	Environmental Management Plan
EMRA	Egyptian Mineral Resources Authority
ER	Executive Regulations
ERP	Emergency Response Plan
GOE	Government of Egypt
GOQ	Governorate of Qalyoubia
HEPA	High Efficiency Particulate Air
HI	Hazard Index
LIFE	Livelihood and Income From the Environment program
LSAP	Lead Smelter Action Plan
MSE	Millennium Science & Engineering, Inc.
PM	Particulate Matter
RAGS	Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual, (Part A), Interim Final
RBRG	Risk-Based Remediation Goal
URF	Unit Risk Factor
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
XRF	X-Ray Fluorescence
WHO	World Health Organization

Symbols for Metals

As	Arsenic
Cd	Cadmium
Cr	Chromium
Hg	Mercury
Pb	Lead
Sb	Antimony

Units of Measurement

m	meter
m^2	square meter
mg/kg	milligram per kilogram (parts per million)
$\mu g/ft^2$	microgram per square foot
µg/g	microgram per gram (parts per million)
mg/L	milligram per liter
µm	micrometer (micron)

EXECUTIVE SUMMARY AND RECOMMENDATION

Millennium Science & Engineering, Inc. in association with Chemonics International (MSE/Chemonics) has prepared this Environmental Assessment (EA) for the United States Agency for International Development (USAID). The purpose of the EA is to address the impacts associated with the remediation of El Kablat Medical Center and two closed secondary lead smelter sites in Shoubra El Kheima, Qalyoubia. The EA is being funded through the USAID's Livelihood and Income from the Environment Program, Lead Pollution Clean-Up in Qalyoubia Project (LIFE-Lead).

Project Description

Lead contamination from secondary lead smelters in Shoubra El Kheima poses serious health threats to the people living and working near the former smelters. To address this problem, the USAID and the Government of Egypt (GOE) designed a lead clean-up component under the LIFE program. The overall goal of the project is to empower local residents in the polluted communities to improve their living conditions. The goal of this activity within the project is to remediate heavy metal pollution in the El Kablat Medical Center and two closed secondary lead smelter sites located in Shoubra El Kheima. In addition to site remediation, the project includes activities in community involvement and public participation, communication, capacity building, and policy/legal support.

The original project scope included the remediation of five secondary lead smelters and the El Shahid Ahmed Shaalan School in Shoubra El Kheima, Qalyoubia. The area is highly industrialized and lead contamination has a significant impact on human health and the environment of the area. The remediation of the lead smelters will result in reduced risks to human health and the environment by lowering lead contamination to acceptable levels. Five lead smelters and El Shahid Ahmed Shaalan School have already been remediated.

The project completion date has been extended from August 17, 2006 to March 31, 2007 to allow for the remediation of the Delta Solb Preparatory School, the El Kablat Medical Center, and the closed Osama Zakaria and Khaled Saad Secondary Lead Smelters. The Delta Solb School remediation began on June 15, 2006 during the school's summer recess and was completed on September 17, 2006.

Several governmental and non-governmental entities are directly or indirectly involved in the implementation of the project activities. Governmental entities include the Egyptian Environmental Affairs Agency (EEAA), the Governorate of Qalyoubia (GOQ), and the Ministries of Health, Education, and Industry. Non-governmental organizations include Community Development Associations, the Integrated Care Society, the National Council for Women, the private sector, and the media.

The proposed project actions include the remediation of El Kablat Medical Center and two closed secondary lead smelter sites. The remediation design calls for remediation of soil, buildings, and structures to levels equal to or less than the proposed baseline human health risk goals set by the project in cooperation with the EEAA. After remediation, the future use of the medical center and the smelters will be safe for the users of each establishment.

Following the conduct of site characterization studies for the El Kablat Medical Center and two closed secondary lead smelter sites, a short list of remediation alternatives was developed for each site. The proposed action and the No-action Alternative are fully considered in this EA.

Environmental Setting

The population in Hai Shark (East District) of Shoubra El Kheima increased from 454,000 in 1996 to 536,900 in 2001 with an annual population growth rate of 3.7 percent. This annual growth rate is higher than in other parts of Shoubra El Kheima, the GOQ, or in Egypt as a whole.

The population of concern is 182,096 residents in the study area, which is defined as a circle with a radius of one kilometer around the Awadallah Secondary Lead Smelter No. 1. The population inhabiting the study area in the immediate vicinity around the sites is less than the total population.

The El Kablat Medical Center and the two closed secondary lead smelter sites are located in mixed industrial, residential, and agricultural land uses within the Nile River flood plain. The topography of the area is almost flat with an average elevation of 17 meters above mean sea level. The climate of the site is considered arid with annual rainfall of approximately 25 millimeters.

The general area of the project is underlain by two hydrogeologic units, an upper silt and clay layer beneath which is an alluvial aquifer. The top of the water table is from five to six meters below the ground surface. The groundwater flow direction trends to the NNW consistent with the flow direction of the Ismailia Canal. Seasonal variations in flow direction are negligible as the canal is maintained at near the same level throughout the year. Generally, the aquifer in Shoubra El Kheima is used by local industries and is not a drinking source. Potable water is provided to the residents by the GOQ.

The sites are located approximately 500 to 800 meters north of the Ismailia Canal. The Ismailia Canal is a source of recharge to the aquifer as well as a source of drinking water in other areas of the GOQ.

Air pollution in Shoubra El Kheima is mainly a result of industrial activities and vehicle traffic. Particulate matter (PM) and lead monitoring results were obtained from 36 sites in the Greater Cairo metropolitan area from October 1998 to July 1999. The results indicated that the highest PM 10, PM 2.5, and lead concentrations were observed in the industrial areas of Shoubra El Kheima.

The project site is located within the urban landscape matrix of Greater Cairo, parallel to the Ismailia Canal. The project area, which can be considered as a man made environment, appears to have little ecological significance and low biodiversity due to the immense alteration of the natural ecology. The most important ecological feature is the Ismailia Canal that runs as a corridor to the south of the project site.

Impact Assessment

The GOE is currently developing an industrial relocation plan for industries located in residential areas that have a significant negative impact on public health and the environment. The project is consistent with those planning efforts as the secondary lead smelters were some of the initial industries identified in the GOE industrial relocation plan that needed to be closed and remediated. Factors identified during the scoping activities were assessed for potential impacts associated with the remediation actions of the project

The remediation activities were found to have positive impacts relative to the following:

- Employment benefits for the local community during the period of site remediation.
- Initiation of new hazardous waste site remediation businesses.

- Improvement in the quality of life of the residents.
- Appreciation of the value of land in Shoubra El Kheima.

Minimal or negligible negative impacts are expected in the following areas:

- Air Quality (Fugitive dusts and gaseous emissions).
- Noise.
- Traffic.
- Soil quality along transportation routes to disposal sites could be negatively impacted if transported waste is not properly covered.
- Hindrance of the medical services provided by the Medical Center.

No major negative impacts on natural, physical, or economic resources were identified during the development of this EA. No cross-sectoral or cumulative impacts have been identified.

Comparison of Alternatives

The No-action Alternative represents a further increase in pollution hazards for the users and workers of the medical center and for the neighbors of the two smelters.

El Kablat Medical Center--

The Baseline Human Health Risk Assessment conducted for the center assessed the potential human health risks associated with carcinogenic and non-carcinogenic heavy metals of concern in surface soil for three types of receptors, namely children and adults visiting the medical center and workers at the center.

For children visiting the El Kablat Medical Center, a non-carcinogenic hazard index (HI) of 0.9 was calculated. The total carcinogenic risk to children visiting the El Kablat Medical Center is 2×10^{-6}. For adults visiting the El Kablat Medical Center, a non-carcinogenic hazard index (HI) of 0.1 was calculated. The total carcinogenic risk to adults visiting the El Kablat Medical Center is 1×10^{-6}.

For workers at the El Kablat Medical Center, a non-carcinogenic HI of 1.3 was calculated. Approximately 81% of this HI is attributed to antimony, 12% to cadmium, and 7% to arsenic. The total carcinogenic risk to workers at the medical center is 1×10^{-5} indicating that corrective action may be needed. This carcinogenic risk is due to exposure to arsenic in soil and dust.

Osama Zakaria Secondary Lead Smelter--

The non-carcinogenic HI for workers at the Osama Zakaria Secondary Lead Smelter is 20 indicating that a non-carcinogenic health hazard is expected. The carcinogenic risk to workers at this smelter is 3×10^{-3}. These health risks are due to exposure to arsenic, lead, antimony, and cadmium in soils and dust. Blood lead modeling showed that 100 percent of the workers are expected to have blood lead levels greater than 10 µg/dl. These risk estimates indicate that corrective action is necessary.

Khaled Saad Secondary Lead Smelter--

The non-carcinogenic HI for workers at the Khaled Saad Secondary Lead Smelter is 3.1 indicating that a non-carcinogenic health hazard is expected. The carcinogenic risk to workers at this smelter is 4×10^{-4}. These health risks are due to exposure from arsenic, lead, antimony, and cadmium in soils and dust. Blood lead modeling showed that 99 percent of the workers are expected to have blood lead levels greater than 10 µg/dl. These risk estimates indicate that corrective action is necessary.

In the absence of significant negative impacts, the proposed remediation actions will offer substantial benefits relative to the No-action Alternative.

Management, Mitigation, and Monitoring

Mitigation measures will be implemented to control potential negative impacts to the environment due to the remediation process. Mitigation measures will include the following:

- Dust generation control.
- Emissions control.
- Noise abatement.
- Onsite storage and handling of hazardous materials.
- Mitigation of potential impacts on traffic through traffic control planning.
- Health and safety protection will be enforced on remediation workers.
- Relocating the services provided by the El Kablat Medical Center to Masjid El Rahman Hospital until completion of remediation works in the center.

Monitoring of the following will be undertaken during the remediation activities:

- Air quality (ambient and indoors).
- Noise.
- Soil.

Recommendation

The remediation of the contaminated sites whether they were sources of pollution or receptors will have a direct positive impact on the health conditions of the residents of Shoubra El Kheima in general. However, remediation activities should go in parallel with improving the environmental performance of existing neighbouring sources of pollution in the project area such as the Delta Solb Company and the El Kablat Company.

PROJECT DESCRIPTION

The LIFE-Lead Pollution Clean-up in Qalyoubia project is being implemented by Millennium Science & Engineering, Inc. in association with Chemonics International (MSE/Chemonics). The original project scope included the remediation of five secondary lead smelters and the El Shahid Ahmed Shaalan School in Shoubra El Kheima, Qalyoubia. The area is highly industrialized and lead contamination has a significant impact on human health and the environment of the area.

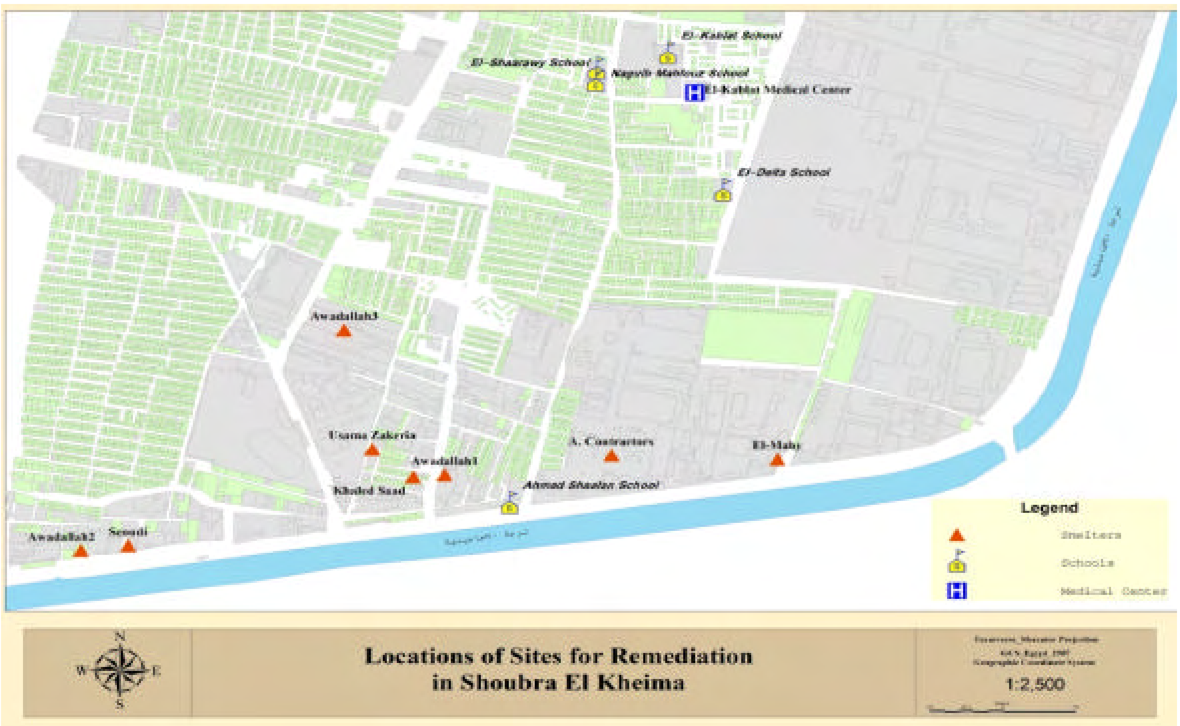
The project extension allows for the remediation of the Delta Solb (Delta for Steel) Preparatory School, the El Kablat Medical Center, and two closed secondary lead smelters (Osama Zakaria and Khaled Saad Smelters). In addition to site remediation, the project includes activities in community involvement and public participation, communications, capacity building, and policy/legal support.

<u>Project Setting</u>

Location--

All of the sites included in the LIFE-Lead remediation project are located near the southern border of the Governorate of Qalyoubia (GOQ) in the Hai Shark (East District) of the City of Shoubra El Kheima. The locations of the sites of both the original scope of work and the extension phase are presented in Figure 1. Remediation of the Awadallah Secondary Lead Smelters (3 sites), and the El Mahy and Seoudi Secondary Smelters in addition to El Shahid Ahmed Shaalan School were completed in June 2006 as the original scope of work for the project. The remediation of the Delta Solb Preparatory School, the first site of the extension phase scope of work, was completed on September 17, 2006.

Figure 1: Locations of the Sites for Remediation

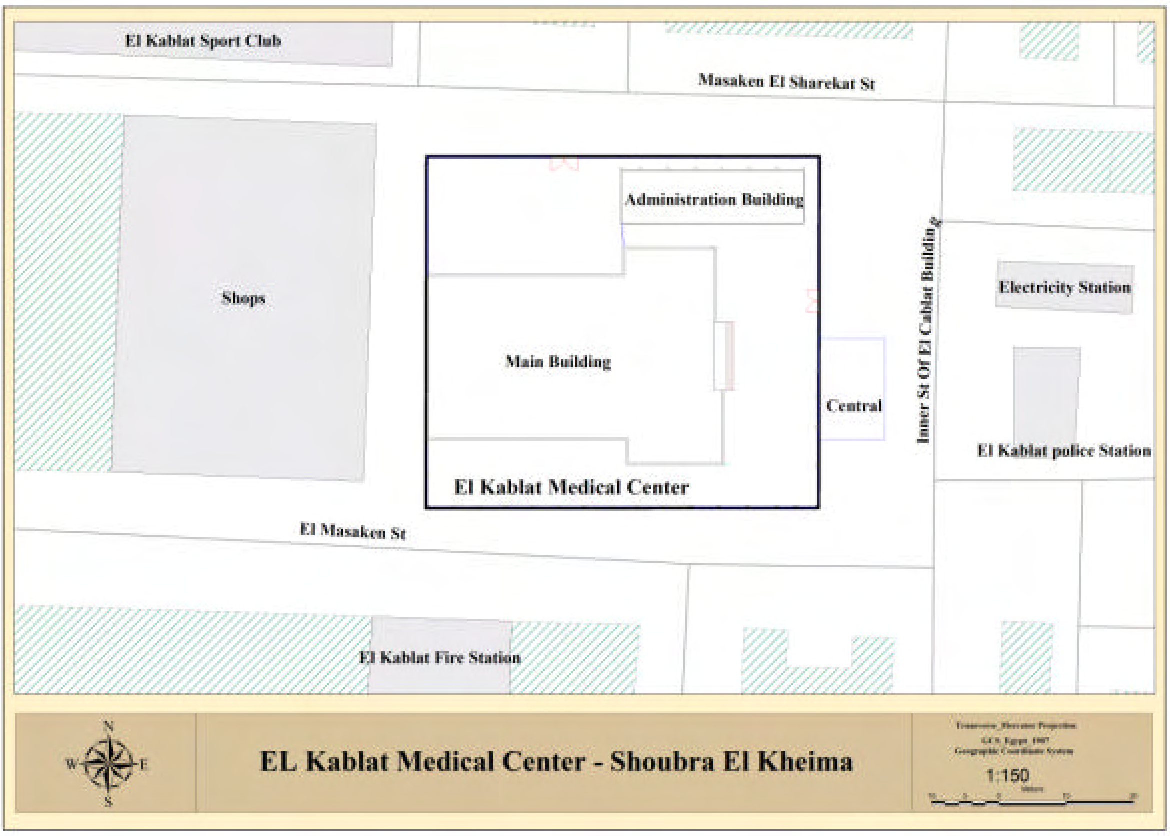


The sites that will be remediated and included within the scope of this EA include the following:

- El Kablat Medical Center located near El Kablat Sporting Center.
- Osama Zakaria Smelter located on Ibrahim Lotfy Street near the Ismailia Canal Road.
- Khaled Saad Smelter located on El Khalil Ibrahim Mousa Street.

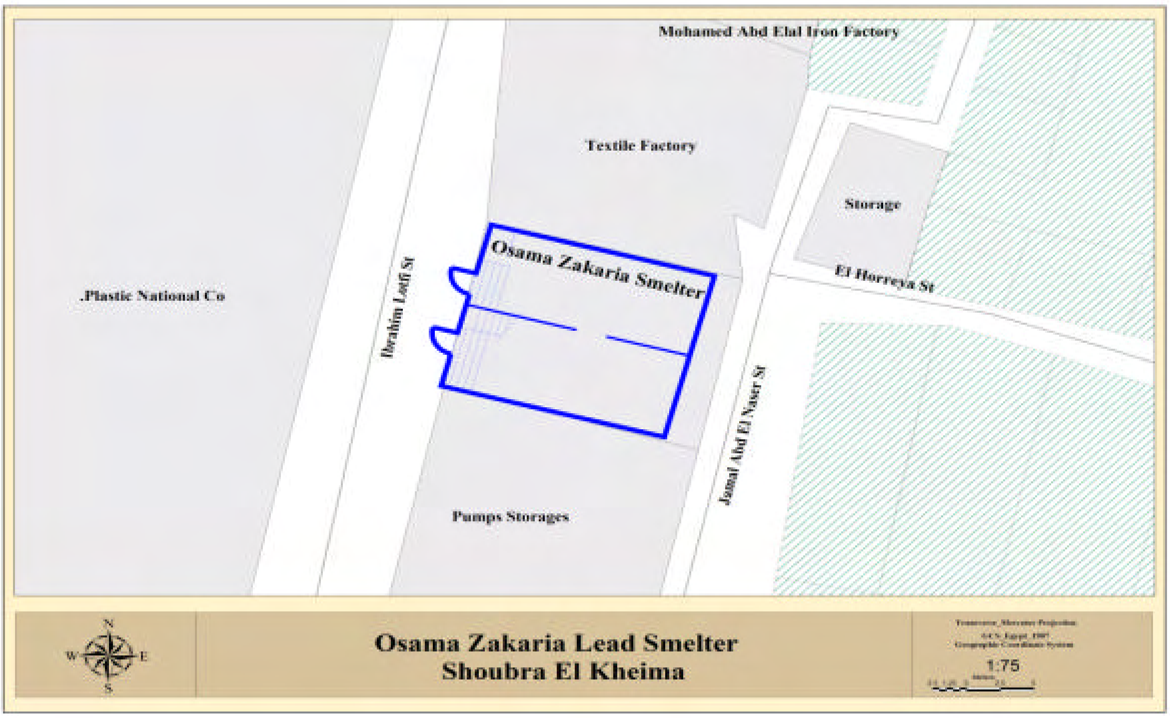
The El Kablat Medical Center was inaugurated in 1976. The center property encompasses an area of approximately 2,112 square meters (m^2) and consists of a two-story building and landscaped areas as shown in Figure 2. The center is bordered by unpaved roads, Masaken El Sharekat Street on the north, and residential blocs on the four sides as well as a local market. Currently, the center employs 59 personnel, including 15 physicians and 18 medical support staff. On an average day, approximately 350 patients visit the center for medical services.

Figure 2: Location of El Kablat Medical Center



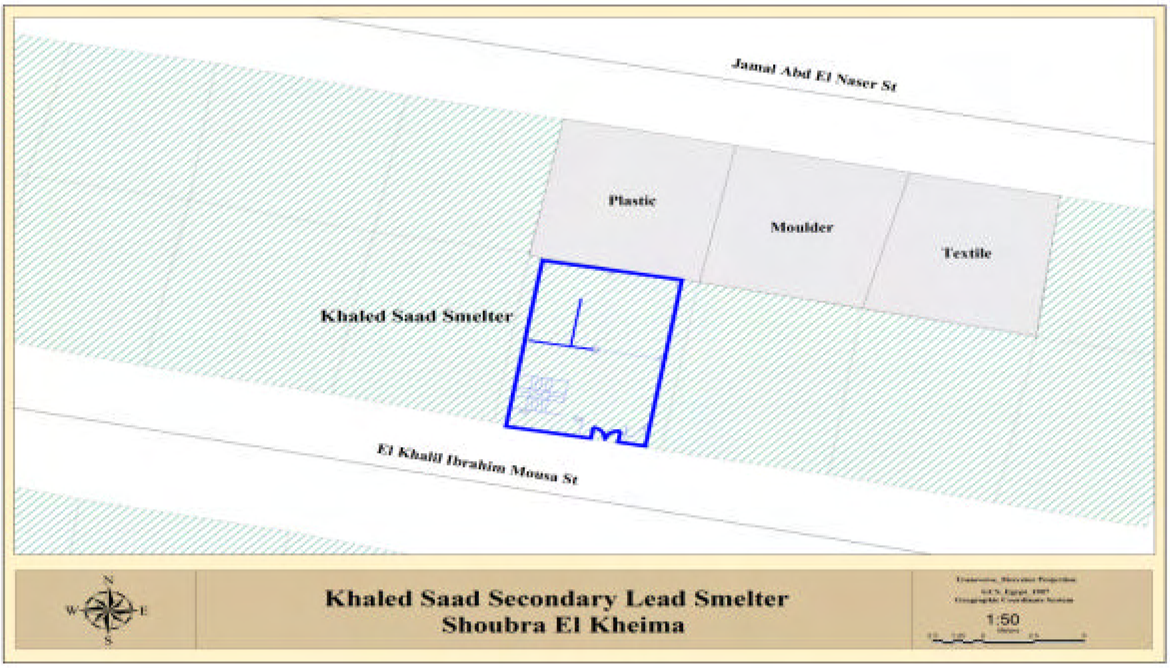
The Osama Zakaria Secondary Lead Smelter is currently closed and is kept as a storage room for nails by the new owner. The smelter property encompasses an area of approximately 120 square meters (m^2) and consists of three wide rooms occupying the first and second floors of a two story building as shown in Figure 3.

Figure 3: Location of Osama Zakaria Secondary Lead Smelter



The Khaled Saad Secondary Lead Smelter is currently closed and a new owner is in charge. The smelter property encompasses an area of approximately 140 square meters (m^2) and consists of two wide empty rooms and an entrance occupying the ground and first floors of a two story building as shown in Figure 4. Only the first floor was used for lead smelting, while the ground floor was used by a nail producing workshop.

Figure 4: Location of Khaled Saad Secondary Lead Smelter



Purpose--

The overall goal of the project is to empower local residents in the polluted communities to improve their living conditions. The focus of this project is remediation of the El Kablat Medical Center and the closed Osama Zakaria and Khaled Saad Secondary Lead Smelters. In addition to site remediation, the project includes activities in community involvement and public participation, communications, capacity building, and policy/legal support. The scope of the LIFE-Lead project does not include remediation outside the boundaries of these three sites.

Stage in Planning Process--

Several USAID funded analyses have assisted with the development of an understanding of lead pollution in Egypt and the potential for reducing it. The project addressed the threats through remediation of the five closed secondary lead smelter sites and a nearby school as part of its original scope of work. Due to the significant success of the implemented remediation activities, the project was extended from August 17, 2006 to March 31, 2007 in a contract modification signed in late March 2006. This extension allows the project to continue remediation efforts in Shoubra El Kheima to include the remediation of the Delta Solb Preparatory School, El Kablat Medical Center and closed Osama Zakaria and Khaled Saad Secondary Lead Smelters. This project extension includes the following activities:

- Site characterizations.
- Development of remediation strategies.
- Provides for significant capacity building to local contractors.
- Preparation of remediation designs and tender packages.
- Implementation of remediation activities.

Summary of USAID and Egypt's Environmental Procedures--

<u>USAID Procedures</u>--

All projects funded by USAID are subject to United States governmental regulations for environmental impact assessment.[1] Under these regulations, actions that will have a significant impact on the environment in the country of implementation require the preparation of an Environmental Assessment (EA).

An Initial Environmental Examination is conducted as the first review of the reasonably foreseeable effect of a proposed action and provides a brief statement of the factual basis for deciding whether an EA will be required. USAID has determined that the clean-up activities to be conducted by LIFE-Lead will have significant impacts on the environment of Egypt, thus the project is subject to an EA.

The EA is prepared to provide the USAID and the host country decision makers with a full discussion of significant environmental effects of a proposed action. For an EA process, the originator of the action commences the process of identifying the significant issues related to the proposed action and determining the scope of the issues to be addressed.

Persons with experience relevant to the environmental aspects of the proposed action participated in this scoping process. However, this process was not limited to these experts. A public scoping meeting was conducted on August 9, 2006 to introduce the project's

[1] Environmental Procedures, Title 22 of the U.S. Code of Federal Regulations, Part 216 (22 CFR 216).

stakeholders to project components as well as identify their concerns towards project activities. The scoping process resulted in a written document illustrating the scope and significance of issues to be analyzed in the EA, including direct and indirect effects of the project on the environment.

This was followed by the preparation of the EA. The EA will be reviewed as an integral part of the project. It will be reviewed and cleared by the Bureau Environment Officer. The Agency's Environmental Coordinator who will monitor the environmental assessment process may also review this document.

Egyptian Procedures--

According to the Egyptian Law of the Environment, Law 4/1994, and its Executive Regulations (ERs), an Environmental Impact Assessment (EIA) must be submitted for new projects and/or extension of existing facility licensing. Therefore, environmental requirements are integrated into the existing licensing system.

According to the law, the EIA must be submitted to the Competent Administrative Authority (CAA), under which project jurisdiction falls. The CAA should assess the environmental impacts of the project and submit the EIA to the Egyptian Environmental Affairs Agency (EEAA) to issue its response within 60 days. If no response is received beyond this period, the study is automatically approved. The proponent is informed of the decision, and in the event of an approval, the requiring conditions for both construction and operation phases. The proponent has the right to issue an appeal within 30 days from the receipt of the decision. The CAA for this project is the Governorate of Qalyoubia.

Proposed developments are classified into three categories according to the severity of potential environmental impacts. The three categories include the following:

- Category A: projects with minor environmental impacts.
- Category B: projects with substantial impacts.
- Category C: projects with high potential impacts.

The EIA should be prepared according to the Egyptian Guidelines for EIAs (EEAA, 1996), which describe in detail the procedures for the preparation of an EIA.

This project is of special nature since remediation and clean-up activities are not classified under EEAA's three categories. LIFE-Lead has therefore consulted with the EIA Unit of EEAA for guidance. Based on the fact that the remediation activities to be conducted are limited in duration, with minimum and negligible negative impacts, and involve the handling, transportation, and disposal of contaminated material and the project area includes a number of sensitive receptors such as residential areas, schools, and the Ismailia Canal, the activities to be carried out at the Medical Center were classified as requiring a Scoped Category B EIA. A full environmental impact assessment (Category C) was requested by EEAA for the activities to be carried out at the two closed smelter sites.

National environmental regulations relevant to the project are described below. They will be addressed as part of the EIA process.

Air Quality-- With respect to air quality, the Egyptian Law of the Environment (Law 4/1994) regulates the levels of different emissions released to the atmosphere. Article 40 of the Law and Article 42 of its Executive Regulations (amended by Decree 1741/2005) determine the maximum allowable limits for the concentrations of pollutants resulting from the burning of fuels.

In addition, Article 36 of Law 4/1994 and Article 37 of its Executive Regulations (amended by Decree 1741/2005) identify the maximum allowable limits for exhaust gases from machines, engines, and vehicles.

For ambient air pollutants, Article 35 of Law 4/1994 and Article 34 of its Executive Regulations (amended by Decree 1741/2005) determine the maximum allowable limits for those pollutants (Table 1).

Table 1: Maximum Limits of Outdoor Air Pollutants According to Annex 5 of Decree 1471/2005 Amending ERs of Law 4/1994

Pollutant	Maximum Limit	Exposure Period
Sulfur Dioxide (µg/m^3)	350 150 60	1 hr 24 hrs 1 year
Carbon Monoxide (mg/m^3)	30 10	1 hr 8 hrs
Nitrogen Dioxide (µg/m^3)	400 150	1 hr 24 hrs
Ozone (µg/m^3)	200 120	1 hr 8 hrs
Suspended Particles, measured as black smoke (µg/m^3)	150 60	24 hrs 1 year
Total Suspended Particles (µg/m^3)	230 90	24 hrs 1 year
PM_{10} (µg/m^3)	150 70	24 hrs 1 year

Solid Waste-- Similar to air quality, the Egyptian Law of the Environment regulates different activities associated with the management of solid waste. Articles 37 of Law 4/1994 and Articles 38 and 39 of the Executive Regulations regulate the collection and transportation of solid waste.

Article 39 of Law 4/1994 and Article 41 of its Executive Regulations set the precautions to be taken during excavation, construction, demolition, or transport of resulting waste and dust in order to avoid wafting.

Law 38/1967 is concerned with cleanliness and sanitation. Also, Law 38/1967's Executive Regulations (Decree 134/1968) regulates the collection, transportation, storage, and disposal of solid waste.

Noise-- Noise is one of the impacts, which is caused by equipment used for remediating the project site. Therefore, it is important to check the maximum allowable sound level permitted by the Egyptian Law of the Environment, Law 4/1994.

Article 42 of Law 4/1994 and Article 44 of its Executive Regulations determine the maximum allowable limits for sound intensity. Tables 2 and 3 show the maximum allowable sound levels for different activities and the period of exposure in case of increasing noise level intensity over 90 dB (A), respectively.

Table 2: Maximum Allowable Sound Levels for Different Activities According to Annex 7 of Decree 1471/2005 Amending ERs of Law 4/1994

No.	Type of Place/Activity	Maximum Allowable Sound Level (decibel (A))
1.	Work place with up to 8 hour shifts and aiming to limit noise hazards on sense of hearing	90
2.	Work place where acoustic signals and good audibility are required	80
3.	Work rooms for the follow up, measurement and adjustment of high performance operations	65
4.	Work rooms for computers, typewriters or similar equipment	70
5.	Work rooms for activities requiring routine mental concentration	60

Table 3: Period of Exposure in Case of Increasing Noise Level Intensity Over 90 dB (A) According to Article 44 of Law 4/1994

Noise intensity level dB (A)	95	100	105	110	115
Period of exposure (hour)	4	2	1	1/2	1/4

Hazardous Substances and Wastes-- Hazardous waste management is addressed by Law 4/1994 and its Executive Regulations, stipulating requirements to be implemented in order to ensure the safe handling of this type of waste. Hazardous waste transportation is primarily addressed by point 3 of Article 28 of the Executive Regulations and is presented below:

- Hazardous Waste Transport Permit (Article 28.3A – Executive Regulations). Hazardous waste is to only be transported by transport operators possessing a transport permit. In addition, hazardous waste is only to be transported in transport vehicles owned by entities/operators possessing a transport permit.

- Specifications of Transport Vehicles (Article 28.3A.1&2- Executive Regulations). Hazardous waste transport vehicles are to be equipped with the necessary safety equipment. The vehicles must be in good working condition and suitable for operation and of adequate capacity and have rotation frequency suitable for the quantities of hazardous waste intended for transport.

- Drivers of Hazardous Waste Transport Vehicles (Article 28.3A.3 – Executive Regulations). Drivers of hazardous waste transport vehicles must receive adequate training to be qualified and capable to act in cases of emergency.

- Labelling of Hazardous Waste Transport Vehicles (Article 28.3A.4 – Executive Regulations). Clear and visible labels must be placed on hazardous waste transport vehicles indicating the type of transported waste and the associated hazard as well as action to be taken in cases of emergency.

- Routing of Hazardous Waste Transport Vehicles (Article 28.3B&C – Executive Regulations). Hazardous waste transport routes are to be determined. Any changes in the routing plan require notification to the Authority for Civil Defence. The concerned competent authority should be notified of the garage address in which the vehicles park as well as the number and date of their licenses. Hazardous waste transport vehicles are not allowed to pass through residential and other populated areas and city centers during daytime.

- Maintenance and Cleaning of Hazardous Waste Transport Vehicles (Article 28.3E – Executive Regulations). Hazardous waste transport vehicles must be continuously washed and cleaned after each use according to the instructions set by the Ministry of Health in coordination with the concerned competent administrative authority.

The stipulations of Law 4/1994 and the Executive Regulations with regards to hazardous waste transportation do not detail the operational procedures to be followed during transport operations, nor the technical specifications for the means of transport for this type of waste. Hazardous waste transportation guidelines were developed by EEAA presenting the operational procedures to be followed for ensuring proper control of transport operations and effective tracking of transported waste; the necessary technical and safety specifications and equipment of the means of transport; as well as the general operational provisions ensuring the safe handling of the waste during the transportation operations.

Protection of Water Resources--Law 48/1982 and its Executive Regulations focus on protecting potable water and non-potable/agriculture use water from pollution. These waters include the Nile River, all irrigation canals, drains, and lakes. The water quality standards are shown in Table 4.

Work Environment-- Due to the importance of workers health and safety, both the Egyptian Law of the Environment (Law 4/1994) and the Labour Law (Law 137/1981) regulate different issues related to workers at work places. As indicated by Articles 43 to 45 of Law 4/1994, protective equipment must be provided to workers at the project site.

In addition, safety and occupational health issues are addressed by Chapter 5 of Law 137/1981.

Table 4: Water Quality Standards for Fresh Water Bodies

Parameter	Limits (mg/l)
Color	100 NTU
Temperature	5°C above normal temp.
Total Solids	500
Dissolved oxygen	Not less than 5
pH	Not less than 7 not more than 8.5
Biological Oxygen Demand (BOD)	6
Chemical Oxygen Demand (COD)	10
Organic Nitrogen	1
Ammonia	0.5
Oil and Grease	0.1
Total Alkalinity	Not less than 20 and not more than 150
Sulfates	200
Mercury compounds	0.001
Iron	1
Manganese	0.5

Parameter	Limits (mg/l)
Copper	1
Zinc	1
Detergents	0.5
Nitrates	45
Fluorides	0.5
Phenol	0.02
Arsenic	0.05
Cadmium	0.01
Chromium	0.05
Lead	0.05
Selenium	0.01

Site Specific Clean-up Levels--

Remediation and clean-up goals for heavy metals have not been established in Egypt. Several meetings were held between LIFE-Lead and the EEAA's Environmental Quality Sector, Hazardous Waste Department, and the Environmental Health Department to discuss and agree on procedures to establish clean-up levels. The consensus was reached that clean-up levels would be set on a site-specific basis determined by the results of baseline human health risk assessment.

Preliminary results of the Human Health Risk Assessment for metals in soil from recent soil sampling are provided in the following.

El Kablat Medical Center--

The Baseline Human Health Risk Assessment (BHHRA) conducted for the center assessed the potential human health risks associated with carcinogenic and non-carcinogenic heavy metals of concern in surface soil for three types of receptors, namely children and adults visiting the medical center as well as workers at the center.

For children visiting the El Kablat Medical Center, a non-carcinogenic hazard index (HI) of 0.9 was calculated. The hazard index is a ratio that, if greater than 1, may represent potential for non-carcinogenic health effects. The total carcinogenic risk to children visiting the El Kablat Medical Center is 2×10^{-6}. In general, U.S. standards require corrective action if the potential cancer risk exceeds one in ten thousand (1×10^{-4}) under the current or likely future land use.

For adults visiting the El Kablat Medical Center, a non-carcinogenic HI of 0.1 was calculated. The total carcinogenic risk to adults visiting the Kablat Medical Center is 1×10^{-6}.

For workers at the El Kablat Medical Center, a non-carcinogenic HI of 1.3 was calculated. Approximately 81% of this HI is attributed to antimony, 12% to cadmium, and 7% to arsenic. The total carcinogenic risk to workers at the medical center is 1×10^{-5} indicating that corrective action may be needed. This carcinogenic risk is due to exposure from arsenic in soil and dust.

Osama Zakaria Secondary Lead Smelter--

The non-carcinogenic HI for workers at the Osama Zakaria Secondary Lead Smelter is 20 indicating that a non-carcinogenic health hazard is expected. The carcinogenic risk to workers at this smelter is 3 x 10^{-3}. Cancer risks less than 1 x 10^{-4} but greater than 1 x 10^{-6} usually require a site management plan. These health risks are due to exposure from arsenic, lead, antimony, and cadmium in soils and dust. Blood lead modeling showed that 100 percent of the workers are expected to have blood lead levels greater than 10 µg/dl. These risk estimates indicate that corrective action is necessary.

Khaled Saad Secondary Lead Smelter--

The non-carcinogenic HI for workers at the Khaled Saad Secondary Lead Smelter is 3.1 indicating that a non-carcinogenic health hazard is expected. The carcinogenic risk to workers at this smelter is 4 x 10^{-4}. These health risks are due to exposure from arsenic, lead, antimony and cadmium in soils and dust. Blood lead modeling showed that 99 percent of the workers are expected to have blood lead levels greater than 10 µg/dl. These risk estimates indicate that corrective action is necessary.

There are currently no cleanup standards for heavy metals in soil, dust, or wipe samples in Egypt. Therefore the objective is to identify preliminary risk-based remediation goals (RBRG) for heavy metals in soil and/or dust and benchmarks for wipes for the different sites. Table 5 provides the RBRG for heavy metals in surface soil and wipe samples for the sites.

Table 5: RBRG/Benchmarks for Surface Soil and Wipe Samples

RBRG and/or Benchmark	Lead (Pb)	Arsenic (As)	Cadmium (Cd)	Antimony (Sb)	Chromium (Cr VI)	Mercury (Hg)
RBRG in surface soil-industrial (mg/kg)	1,500	1.6	450	410	450	--
Dust wipe levels*-industrial	500	--	--	--	--	--
RBRG in surface soil-medical center (mg/kg)	400	1	477	260	210	--
Dust wipe levels*-medical center	40	36	145	58	437	15

* **Health Based Benchmark by EPA- µg/ft^2**

Facilities and Conditions

Sampling and Site Characterization--

The following provides a detailed description of the sampling and site characterization activities conducted at the sites.

Sampling and Analysis Plan--

El Kablat Medical Center--Three different sampling methods were used during the sampling program at the medical center site. The first method included bulk surface soil and dust sampling. Bulk surface soils samples where collected from bare soil areas outside the center buildings at the various landscaped areas. Dust sampling was used where dust has accumulated in piles or in layers on the floors within the interior buildings of the center.

The second method included digging boreholes and collecting soil samples at depths up to 1.5 meters, from bare soil areas outside the buildings, at the various landscaped areas.

The third method included dust wipe sampling which is used on walls, floors, and doors where there are minor accumulations of dust.

Osama Zakaria Secondary Lead Smelter--Four different sampling methods were used during the sampling program at the smelter site. The first method included bulk surface dust sampling. Dust sampling was used where dust has accumulated in piles or in layers on the floors within the smelter.

The second method included digging boreholes and collecting soil samples at depths up to 2.0 meters from areas inside the smelter.

The third method included dust wipe sampling which is used on walls where there are minor accumulations of dust.

The fourth method included dust sampling after removing 5.0 cm from the painted layer of the walls.

Khaled Saad Secondary Lead Smelter--Two different sampling methods were used during the sampling program at the smelter site. The first method was bulk surface dust sampling. Dust sampling was used where dust had accumulated in piles or in layers on the floors within the smelter.

The second method included dust wipe sampling which is used on walls where there are minor accumulations of dust.

<u>Types of Samples</u>--

Table 6 provides the types and locations of samples for each of these three sites. The total samples collected from the three sites included:

- Forty-three (43) dust samples.
- Five (5) bulk surface samples.
- Forty (40) subsurface samples.
- Thirty-three (33) wipe samples. .

Table 6: Types and Locations of Samples from the Sites

Type of Sample	Locations	Quantity	Total	Remarks
El Kablat Medical Center				
Bulk Surface Soil	Landscaped areas	5	72	5 locations
Bulk Subsurface Soil (Boreholes)	Landscaped areas	25		Up to 1.5 m depth in 7 locations
Bulk Dust	In rooms and corridors	21		19 locations
Wipes (floors, doors, walls)	Inside and outside rooms	21		21 locations
Osama Zakaria Secondary Lead Smelter				
Bulk Subsurface Soil (Boreholes)	Inside facility	15	37	Up to 2.0 m depth in 3 locations
Bulk Dust	Inside facility	4		4 locations
Dust (after removing 5.0 cms from the painted layer of the walls)	Off walls	12		12 locations

Type of Sample	Locations	Quantity	Total	Remarks
Wipes (walls)	Off the walls of the smelter	6		6 locations
Khaled Saad Secondary Lead Smelter				
Bulk Dust	Inside smelter	6	12	6 locations
Wipes (walls)	Off the walls of the smelter	6		6 locations

Site Characterization--

Site characterization encompasses efforts to define the nature, and extent of contamination and to collect information needed to select and carry out the appropriate site remediation. The collected samples were analyzed using the field portable X-ray Fluorescence (XRF) purchased at an earlier stage by the project. Difference in contamination levels between interior dust and exterior soil is attributed to variance in particle size of the samples. Tables 7 through 9 provide the results of the analysis of the heavy metals in the different media at the sites and compared to the proposed remediation goals.

El Kablat Medical Center--Table 7 provides the results of the analysis of the heavy metals in the different media at the sites and compared to the proposed remediation goals.

Table 7: Results of Analysis of Samples for El Kablat Medical Center

Type of Sample	Lead (Pb)	Arsenic (As)	Cadmium (Cd)	Antimony (Sb)	Chromium (Cr)	Mercury (Hg)
Bulk Soil/Dust RPRG (mg/kg)	**400**	**1**	**477**	**260**	**210**	**--**
Average Surface Soil (mg/kg)	83.59	08.79	33.76	66.18	70.22	--
Average Sub-surface soil (mg/kg)	32.66	05.40	36.92	76.22	59.40	--
Average Dust (mg/kg)	148.18	08.90	59.09	120.51	61.98	--
Average Dust (mg/kg)-administration buildings	222.67	01.50	30.68	55.10	88.93	--
Wipes*	**40**	**36**	**145**	**58**	**437**	**15**
Average Wipes - µg/ft^2	268.14	32	84	8,379	209	21
Average Wipes µg/ft^2-administration buildings	11.74	17.45	130.00	35.09	218.10	10.34

* Health Based Benchmark by EPA- µg/ft^2

The following provides an explanation of the activities that should be taken at the medical center to remediate the contamination identified during the sampling and site characterization.

- Elevated arsenic levels detected in the surface and subsurface soil on the center property should be remediated to levels in soil below the RBRG.
- Elevated lead, antimony, and mercury levels detected inside the center should be remediated by thoroughly decontaminating floors, doors, and walls followed by painting.
- Contamination levels of both bulk and wipe samples collected from the Administration buildings are of minor concern.

Osama Zakaria Secondary Lead Smelter--Table 8 provides the results of the analysis of the heavy metals in the different media at the smelter and compared to the proposed remediation goals.

Table 8: Results of Analysis of Samples for Osama Zakaria Secondary Lead Smelter

Type of Sample	Lead (Pb)	Arsenic (As)	Cadmium (Cd)	Antimony (Sb)	Chromium (Cr)
Bulk Soil/Dust RPRG (mg/kg)	**1,500**	**1.60**	**450**	**410**	**450**
Average Surface Dust (mg/kg)	125,563	4,522	163.68	139.48	199.93
Average Sub-surface soil (mg/kg)	125.34	7.38	31.23	55.89	80.46
Average Dust collected off the walls (mg/kg)	73.00	07.72	57.24	75.91	123.60
Wipes*	**500**	**--**	**--**	**--**	**--**
Average Wipes - µg/ft^2	15,748	3,024	2,337	8,838	438.15

* Health Based Benchmark by EPA- µg/ft^2

The following provides an explanation of the activities that should be taken at the smelter to remediate the contamination identified during the sampling and site characterization.

- Elevated lead and arsenic levels detected in the surface of the smelter property should be remediated to levels in soil below the RBRG.
- Elevated lead, antimony, cadmium, and arsenic levels detected inside the smelter should be remediated to reduce exposure to heavy metals on walls.

Khaled Saad Secondary Lead Smelter--Table 9 provides the results of the analysis of the heavy metals in the different media at the smelter and compared to the proposed remediation goals.

Table 9: Results of Analysis of Samples for Khlaed Saad Secondary Lead Smelter

Type of Sample	Lead (Pb)	Arsenic (As)	Cadmium (Cd)	Antimony (Sb)	Chromium (Cr)
Bulk Soil/Dust RPRG (mg/kg)	**1,500**	**1.60**	**450**	**410**	**450**
Average Surface Dust (mg/kg)	24,455.34	159.09	85.73	121.86	43.32
Wipes *	**500**	**--**	**--**	**--**	**--**
Average Wipes - µg/ft^2	548.47	119.10	1,320	6,410	197.07

* Health Based Benchmark by EPA- µg/ft^2

The following provides an explanation of the activities that should be taken at the smelter to remediate the contamination identified during the sampling and site characterization.

- Elevated lead and arsenic levels detected in the surface of the smelter property should be remediated to levels in soil below the RBRG.
- Elevated lead, antimony, cadmium, and arsenic levels detected inside the smelter should be remediated to reduce exposure to heavy metals on walls.

Proposed Action

Based on the collected baseline information; site characterization; laws and regulations; future use of the site; and within a national and international policy context (i.e., Law 4/1994 and USAID requirements); a list of remediation alternatives was proposed to remediate the sites.

The following clean-up or remediation alternative was proposed for each site. The construction activities associated with the proposed alternative and the expected operation and maintenance are included in the description of the remediation action.

El Kablat Medical Center--

Construction Activities--

Three remediation alternatives were developed for the Medical Center. Alternative 3 is the recommended alternative and consists of the following major activities:

Building Remediation--Consists of the following:

- Interior surfaces cleaning and painting in buildings which includes:
  - Constructing temporary containment.
  - Installing a dust extraction system.
  - Removing existing paint on interior walls of the two buildings, cleaning surfaces using a HEPA vacuum and damp mops, and then applying primer and paint.
  - Cleaning and re-grouting the tiled walls inside the rooms.
  - Cleaning the ceiling using a HEPA vacuum, preparing for paint, and then applying paint.
  - Polishing mosaic of corridor walls.
- Floor tile and ceramic tile placement which includes:
  - Removing and placing non slip ceramic tiles on room floors including the administration building.
  - Removing existing vinyl and placing mosaic tiles on corridor floors including the administration building.
  - Removing existing bathroom floor and wall tiles and placing ceramic tiles.
- Remove and replace windows (Aluminium Windows), window frames, doors, doors jams, window and door mouldings, and paint as necessary.
- Wet mopping windows and doors and cleaning equipment and furniture.

- Modifying the building layout, building a wall at the end of the main corridor, amending the corridor walls, and amending the ceiling and placing the skylight fixtures.
- Polishing the stair steps and mosaic walls.
- Loading and hauling decontaminated debris to the Abu Zaabal Landfill.
- Loading and hauling contaminated debris to Alexandria Hazardous Waste Landfill.

Ground Area Remediation--Consists of the following:

- Capping of the ground area around the buildings which includes:
  - Placing stamped plain concrete including preparation, sand placement, and compaction around the buildings.
  - Landscaping the side area using interlocking tiles.
  - Covering the area in front of the main gate with an asphalt layer.
  - Covering the area behind the administration building with interlocking tiles.
- Fence restoration which includes cleaning (dry), repairing, preparing, and painting brick fence and gate.

Sanitary and Electrical Works--Consists of the following:

- Excavation, removal, and replacement of the external sewer network.
- Excavation, removal, and replacement of the internal sewer network.
- Compressed air arrangement in the dental clinic.
- Cable and wire placement.

The main characteristics of this alternative include the following:

- Effectiveness: Short-term effectiveness is very good when building surfaces are properly prepared; long-term effectiveness is also very good providing that coating maintenance and dust (source) control at exterior and/or occupants education/training.
- Implementability: Technically simple to implement with conventional equipment and trained workers. Low risk from potential exposure of public during remediation with proper engineering controls.
- Cost: The cost is medium. Long-term maintenance costs may marginally increase cost of conventional janitorial services and recurring painting costs; as for the hard cap the long term maintenance cost is minimum.

The remediation activities at the center are scheduled for the period between November 8, 2006 and February 15, 2007.

Operation and Maintenance--

The proposed remediation action posses good short-term effectiveness when building surfaces are properly prepared. Long-term effectiveness will depend on coating maintenance and the ability to control dust from outside sources and/or education/training of doctors, and administrators. Long-term maintenance costs may marginally increase the cost of conventional janitorial services and recurring painting costs. As for capping of the ground area around the buildings, the expected life of the Alternative 3 hard cap is twenty years, with minimum maintenance cost. These alternatives are presented in Table 10.

Table 10: Remediation Alternatives for El Kablat Medical Center

Criteria	Alternative 1 No Action	Alternative 2 Cleaning of interior and exterior walls, Cleaning of furniture, Implementing building improvements, Testing of cleaning residuals and disposal, Conventional site management practices	Alternative 3 Cleaning of interior and exterior walls, Cleaning of furniture, Implementing building improvements, Hard capping of the exterior area, Rehabilitation of fence, Upgrading sewer and domestic water system, Testing of residuals and disposal, Site management
Effectiveness	Poor-to-fair. Awareness of exposure risks.	Fair to good. Some technology limitations to removing dust may occur. Dust and offsite source controls important.	Very Good. Coatings and dust controls must be maintained. Maintenance of hard cap is minimum.
Implementability	Not Applicable	Technically simple to implement. Work scheduling required.	Technically simple to implement. Work scheduling required.
Cost	None	Low	Medium

Osama Zakaria Secondary Lead Smelter--

Construction Activities--

Four remediation alternatives were developed for the smelter as presented in Table 11. Alternative 3 is the recommended alternative and consists of the following major activities.

Structure Demolition--Consists of the following:

- Placing compacted crushed stone.
- Demolishing the building structure.
- Loading and hauling debris to Alexandria Hazardous Waste Landfill.

Smelter Floor Decontamination--Consists of the following:

- Decontaminating the smelter floor including the area where the decontamination station was constructed using HEPA Vacuum and Water Jet Machines.

- Loading and hauling debris and wash water to Alexandria Hazardous Waste Landfill.

Construction of Footing and Placement of Plain Concrete Cap on the Smelter Floor--In accordance with drawings provided by the owner it consists of the following:

- Excavating footing.
- Load and hauling to Alexandria Hazardous Waste Landfill.
- Placing plain and reinforced concrete.
- Placing concrete floor capping including sand filling and compaction and placement of joints.

The main characteristics of this alternative are:

- Effectiveness: Long-term effectiveness is excellent.
- Implementability: Technically achievable with the implementation of the Demolition Code Practice measures. Low risk from potential exposure of public during remediation with proper engineering controls.
- Cost: The cost is medium.

The remediation activities at Osama Zakaria smelter site will commence on November 5, 2006 and will require five weeks to complete.

Operation and Maintenance--

There will be no operation or maintenance associated with this alternative.

Table 11: Remediation Alternatives for Osama Zakaria Secondary Lead Smelter

Criteria	**Alternative 1 No Action**	**Alternative 2 Controlled dry cleaning followed by wet-cleaning of the building structure, Testing of cleaning residuals and disposal, Conventional site management**	**Alternative 3 Demolishing smelter structure under dust control, Loading and hauling wreckage to the Hazardous Waste Landfill, Cleaning the smelter floor, Construction of footings, Placement of plain concrete cap. Conventional site management**	**Alternative 4 Demolishing smelter structure under dust control, Compaction of the wreckage onto the smelter area, Loading and hauling the wreckage surplus to the Hazardous Waste Landfill, Capping the smelter floor. Conventional site management**
Effectiveness	Poor-to-fair.	Fair to good.	Very Good.	Very Good. Dust

	Awareness of exposure risks.	Some technology limitations to removing dust may occur. Dust and offsite source controls important.	Dust controls must be maintained to eliminate impact on the surrounding.	controls must be maintained to eliminate impact on the surrounding.
Implement-ability	Not Applicable	Technically simple to implement. Work scheduling required.	Technically achievable. Work scheduling required.	Technically not applicable because compaction of the debris onto the smelter area will not be stable.
Cost	None	Low	Medium	No cost estimation was calculated.

Khaled Saad Secondary Lead Smelter--

<u>Construction Activities</u>--

Two remediation alternatives were developed for the smelter as presented in Table 12. Alternative 2 is the recommended alternative and consists of the following major activities.

Building Decontamination-- Consists of the following:

- Placing compacted crushed stone.
- Removing paint, decontaminating interior and exterior walls using a HEPA vacuum and water jet machine, and placing a plaster coat.
- Decontaminating the smelter floor and roof using a HEPA vacuum and water jet machine.

Building Renovation-- Consists of the following:

- Painting smelter interior walls.
- Painting smelter exterior wall (façade) using padded plaster paint (Tartasha Mamsousa).
- Loading and hauling decontaminated debris to Abu Zaabal Landfill.
- Loading and hauling debris and wash water to Alexandria Hazardous Waste Landfill.

The main characteristics of this alternative include the following:

- Effectiveness: Short-term effectiveness can be fair to good depending on types of building surfaces that will be cleaned; long-term effectiveness will depend on dust (source) control at exterior and/or occupants education/training.
- Implementability: Technically simple to implement with conventional equipment and trained workers. Low risk from potential exposure of public during remediation.

- Cost: Medium cost. Long-term maintenance costs may marginally increase cost of conventional janitorial services and recurring painting costs.

The remediation activities at the Khaled Saad Smelter site will commence on or around November 5, 2006 and will require seven weeks to complete.

Operation and Maintenance--

The proposed remediation action posses good short-term effectiveness when building surfaces are properly prepared. Long-term effectiveness will depend on coating maintenance and the ability to control dust from outside sources and/or education/training of workers. Long-term maintenance costs may marginally increase the cost of conventional janitorial services and recurring painting costs.

Table 12: Remediation Alternatives for Khaled Saad Secondary Lead Smelter

Criteria	Alternative 1 No Action	Alternative 2 Controlled dry cleaning using HEPA vacuum cleaner followed by wet-cleaning of the interior and exterior walls and floor, Implementing building improvement by painting interior and exterior walls, Testing of cleaning residuals and disposal, Conventional site management practices minimize exposure
Effectiveness	Poor-to-fair. Awareness of exposure risks.	Good. Dust and offsite source controls important.
Implementability	Not Applicable	Technically simple to implement. Work scheduling required.
Cost	None	Medium

Project Alternatives

All proposed alternatives (except the No-action Alternative) are capable of meeting the health based clean-up goals of the project. The No-action Alternative is proposed to provide a comparison of the benefits provided by the remediation alternatives. The USEPA Evaluation Criteria (USEPA, 1994) were used as a base for the remediation method selection process. These criteria are compliant with applicable or relevant and appropriate requirements, long-term effectiveness and performance; reduction of toxicity; mobility or volume; short-term effectiveness; implementability, and cost as was presented in Tables 10 through 12 above, describing all of the other alternatives evaluated.

ENVIRONMENTAL SETTING

Field Study Methodology

The following activities were performed in order to obtain data and information on the environmental setting of the project area and its surroundings. The data obtained were then used to prepare for the site visits and identify environmental conditions to be further investigated.

Literature Review--

Data on the environmental characteristics of the region and the project area were first gathered through desk studies. The literature review was then supported by the analysis of recent topographic maps and satellite images.

Field Visits--

Field visits were carried out to get familiarized with the project area and to obtain information on the site-specific environmental conditions identified earlier from the literature review. During these visits baseline data were collected, and the main environmental characteristics and components of the area were identified.

Consultation with Local and Governmental Authorities--

Meetings and coordination with governmental agencies, NGO's, smelter owners, and others were held to facilitate the sampling and site characterization phase of the project and to collect primary data for the Environmental Assessment.

Life of Project

The Lead Pollution Clean-up in Qalyoubia project was initiated on August 18, 2004 with a closing date of August 17, 2006. The project was extended to March 31, 2007 in a contract modification signed in late March 2006. The project extension will allow for the remediation of the Delta Solb Preparatory School, the El Kablat Medical Center, and the closed Osama Zakaria and Khaled Saad Secondary Lead Smelters.

Definition of Study Area

The Study Area includes those areas that will be subject to direct and indirect impacts of the project and the implemented alternatives. The area that will be directly impacted by remediation and clean-up activities includes properties adjacent to the contaminated sites.

Previous characterization activities in Shoubra El Kheima, Qalyoubia have focused on an area within a one-kilometer radius of the Awadallah Secondary Lead Smelter No.1. For purposes of this EA, the Study Area is defined as the area within a one-kilometre radius circle centerd on the sites as shown in Figure 1. The various land uses and associated potential receptors within this Study Area are considered in this EA and include the following:

- On site receptors such as soil and workers.
- Receptors impacted by ambient air, noise, and public health surrounding the site.
- Final sinks/receptors such as surface and groundwater.

The primary focus of this EA is on the environmental and health effects due to exposure to heavy metals suspected to originate during the different clean-up activities.

Current Land Use

Remediation Sites--

The El Kablat Medical Center is located near the El Kablat Sporting Center, the Osama Zakaria Smelter is located on Ibrahim Lotfy street near the Ismailia Canal Road, and Khaled Saad Smelter is located on El Khalil Ibrahim Mousa street.

Waste Transportation Routes--

Contractors will be responsible for transportation of waste generated from the remediation activities. The non-hazardous waste generated from remediation will be disposed in the Abu Zabaal Landfill. The waste will travel from Shoubra El Kheima to Abu Zaabal along the Ismailia Canal Road for approximately 25 km. The route passes through agricultural land and next to industrial sites and the Abu Zabaal Prison near the landfill (Figure 5).

The hazardous waste will be disposed in the Alexandria Hazardous Waste Landfill in Nasereya. The waste will travel from Shoubra El Kheima to Nasereya along the Ring Road and then the Alexandria Desert Road for approximately 250 km. The route crosses the Nile River and passes through agricultural land in route to the landfill (Figure 5).

Socio-Economic Conditions

Demography--

The population in Hai Shark (East District) of Shoubra El Kheima increased from 454,000 in 1996 to 536,900 in 2001 with an annual population growth rate of 3.7 percent. This annual growth rate is higher than in the city, governorate, or in Egypt as a whole.

The population of concern is 182,096 residents in the original Study Area, which is defined as a circle with a radius of one kilometer around Awadallah Secondary Lead Smelter No. 1.

Economic Activities and Employment--

The major economic activities in Hai Shark are industry and services (UNDP HDR, 2003). Nearly 45 percent of the labor force in the Hai Shark is in the industrial sector, 43 percent in the services sector, and 12 percent in the agricultural sector. One third of the total labor force and one half of the women in the labor force work for the government or in the public sector (which cuts across the other three sectors). The labor force comprised 25.2 percent of the total population in the Hai Shark in 2001. Men comprise 88.7 percent of the labor force and most people in the labor force are primary wage earners (78.8 percent).

Overall unemployment in the Hai Shark is relatively low (5.6 percent of the labor force), but is twice as high for women (12 percent) and adults from ages 15 to 29 (11.2 percent). However, all of these unemployment rates are lower than the rates for the City of Shoubra El Kheima, the GOQ, and Egypt as a whole.

Quality of Life Indices--

Life Expectancy and Mortality Rates--

According to official data, life expectancy at birth for Hai Shark in 2001 is 68.0 years. Such average shows to be slightly higher than Shoubra El Kheima (67.6 yrs) and total of Egypt (67.1 yrs), but is still lower than the total for the GOQ (68.5 yrs). Infant mortality and maternal mortality rates for Hai Shark are12.7 per 1,000 and 22.0 per 100,000, respectively. Infant mortality and maternal mortality rates for Shoubra El Kheima are 12.7 per 1,000 and 23.0 per 100,000, respectively, and are significantly lower than the total GOQ figures of 17.7 per 1,000 and 30.3 per 100,000, respectively.

Infant mortality measures suffer from under-registration. Therefore, the registered and adjusted infant and below 5 mortality rates are calculated. Registered infant mortality rates in Hai Shark reached 12.3 per 1,000 births in 2001; this was adjusted to 12.7 in 2000. While registered below 5 mortality rates reached 19.5 per 1,000 births in 2001 and were adjusted to 20.0 in 2000.

<u>Maternal Care and Child Survival</u>--

As registered in 2001, more than half of pregnant women in Hai Shark and Shoubra El Kheima City get prenatal care (52.4 and 52.9 percent, respectively). Births in Hai Shark and Shoubra El Kheima were under the supervision of health personnel 56.3 and 56.9 percent of the time, respectively. Records indicate that approximately 87.1 and 87.9 percent of children born were breastfed in Hai Shark and Shoubra Al Kheima City. Such rates are lower than the total of the GOQ and Egypt. In contrast, data indicates that only 2.7 and 2.9 percent of children below 5 in Hai Shark and Shoubra Al Kheima City are underweight compared to 3.6 and 8.8 percent in the GOQ and Egypt, respectively.

Transportation and Support Services--

Data on the road infrastructure is only available from Shoubra El Kheima City. Available information illustrates that a total of 121 km of paved roads covers 12 km of highways, 17 km of main roads, 28 km of regional roads, and 64 km of internal roads. Unpaved roads cover a total of 178 km (IDSC, 1998).

In the area of Shoubra El Kheima, there is only one water plant. While total water production rate reaches 200,000 m^3/day, the total consumed amount is approximately 190,000 m^3/day. Domestic water consumption per capita is estimated to be 190.18 liters/day (IDSC, 1998).

With respect to sanitation, there are seven sanitation plants in the area of Shoubra El Kheima. Total capacity of these plants is estimated at 350,000 m^3/day, with a total per capita of 380 liters/day (IDSC, 1998). In 2001, households with access to sanitation reached 98.7 percent of the total population (EHDR, 2003).

Education, Health, and Social Services--

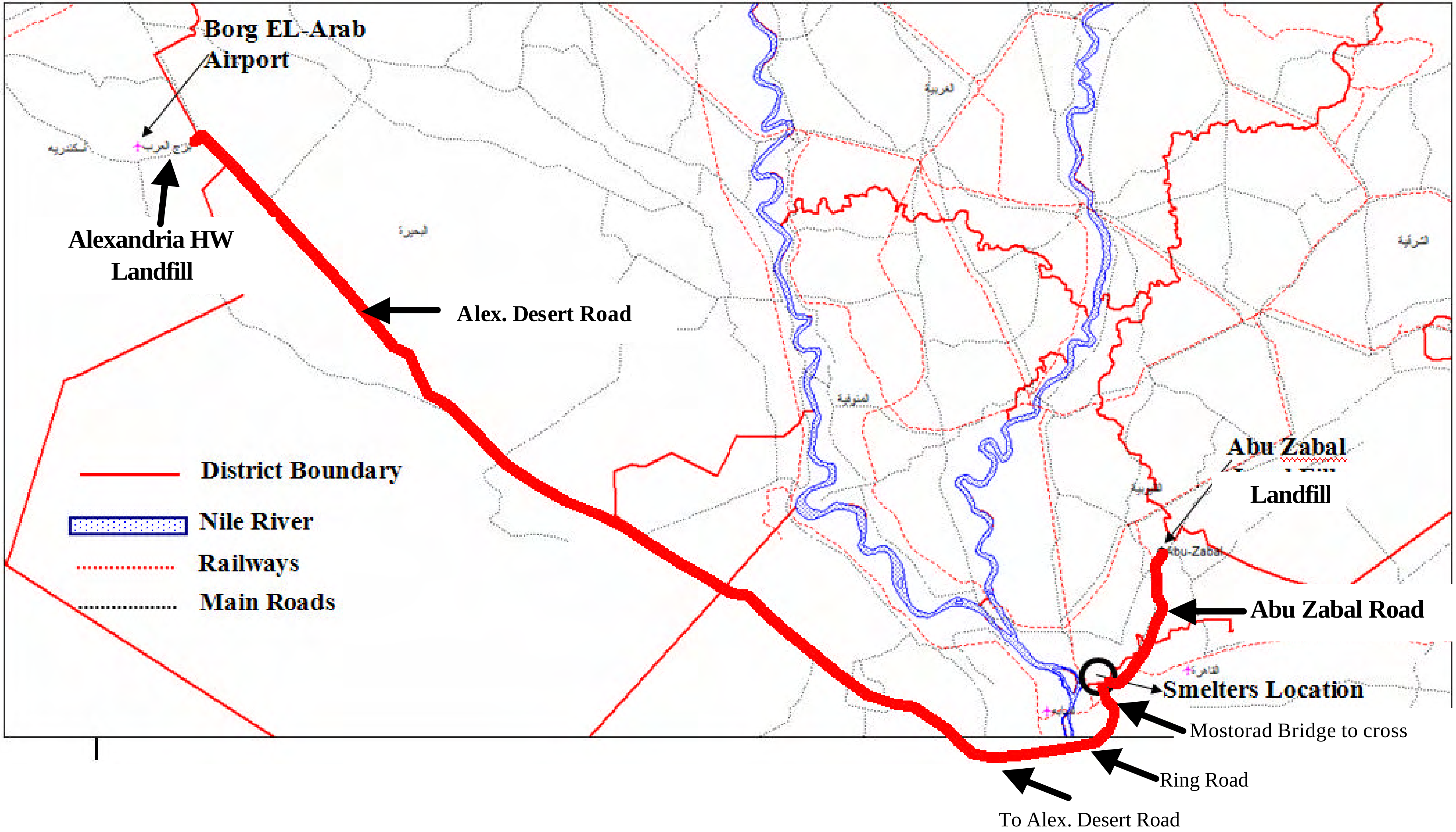
<u>Literacy and Education Levels</u>--

Total and female literacy rates (15+) in Hai Shark reached 72.6 and 62.8 percent, respectively. In Shoubra El Kheima City, the total and female literacy rates are 75.7 and 66.6 percent, respectively, and are relatively higher than the GOQ and Egypt in 2001. However, gross enrolment ratios in primary, preparatory, and secondary schools in Hai Shark remains lower than the average in the City, Governorate, and Egypt in 2000/2001. More than 23 percent of the Hai Shark population has secondary or higher education which is similar to the total in Egypt.

<u>School Enrolment</u>--

Official data for Hai Shark in 2000/2001 shows that gross enrolment ratio in 1st, 2nd, and 3rd level is 33.2 percent. The basic and secondary enrolment ratio is 72.6 percent for all students and 68.8 percent for females. With the absence of Azhar Schools in Hai Shark, 91.9 percent of the total pupils go to governmental schools and only 8.1 percent go to private schools. Secondary technical enrolment represents 74.1 percent of the total secondary enrolment (EHDR, 2003).

Figure 5: Transportation Routes to Waste Disposal Sites; Alexandria and Abu Zabaal



Education Imbalances--

According to the official data for Hai Shark in 2000/2001, class density is 39.9 pupils in primary schools with a rate of 21.6 pupils per teacher. Imbalances in preparatory schools are much higher as class density reaches 56.1 pupils with a total of 33.1 pupils per teacher. Moreover, a total of 7.3 percent of all school buildings are completely unfit and in need of repair (EHDR, 2003).

Education Services--

Data on education services in terms of number of schools, institutes, classes, pupils, and teachers is only available for Shoubra El Kheima City. There are approximately 78 public primary and 45 public preparatory schools in Shoubra Al Kheima City (IDSC, 1998). These schools include a total of 182,884 pupils enrolled in basic education. In addition, a total of 45,716 pupils are enrolled in secondary schools.

Health Services--

Health services in Hai Shark and Shoubra El Kheima City fall within the average of the total for the GOQ. The exception is the number of physicians and nurses per 10,000 people, which shows to be significantly higher in the GOQ and the total for Egypt. The nurse/ physician ratio in Hai Shark and Shoubra El Kheima City is 238.8 percent and is significantly lower than the ratio in total for the GOQ which is 287.6 percent. However, the ratio is significantly higher than the ratio for Egypt which was 224.4 percent in 2001.

The Information Decision Support Cabinet (IDSC), Statistical Book of 1998 indicates a wide range of health services in Shoubra El Kheima City. These include different public centers, units, offices, praxes, laboratories, and hospitals affiliated to the Ministry of Health with a total of 69 units. At the same time, 60 of the total are considered day care centers with no facilities for inpatients, while only 4 are equipped for inpatients (IDSC, 1998).

Social Services --

There are 10 social units in Shoubra El Kheima City, where the ratio of units per 1,000 people reached 92.02 in 1998. The total number of Non Governmental Organizations (NGOs) reached about 127 organizations, where the ratio of organizations per 1,000 people reached 7.25 in the same year. Activities undertaken by NGOs includes a total of 172 “productive family projects” (i.e., income generation enterprises for poor households), 4 women clubs, 47 nurseries, and 3 children clubs.

Youth centers in the Shoubra El Kheima City are estimated at 12 centers, 10 sport clubs, and one sport committee. The ratio of total youth organizations per 1,000 people reached 40.01 in 1998. These organizations provide various activities in the field of culture, religion, camping, arts, and public works.

Religious Services--

The IDSC data shows that there were 39 governmental mosques and 183 civil mosques in 1998. These figures indicate active involvement of the civil society in the area. The number of churches in the city was estimated at 7 institutions in 1998 (IDSC, 1998).

Physical Environment

Climate--

According to meteorological records, Table 13, and data from the Climatic Atlas of Egypt, EMA, (1996), the climatic features of the project area are characterized by the following:

- The annual mean air temperature is approximately 19.9 °C and the average monthly temperature reaches its maximum value in July and August (26.9 °C) and its minimum value in January (11.2 °C).
- The average annual relative humidity is about 68 percent, and the average monthly relative humidity reaches its maximum value in December (81 percent) and its minimum value in May (53 percent).
- Rainfall is very limited. The average annual rainfall is approximately 25.5 mm. The majority of the rainfall is limited to three months (December through February), with the highest in December. Annual rain days are very few and storms occur occasionally and are usually of short duration.
- The dominant winds over the year have a northern component with an annual mean velocity of 12.27 km/h. The dominant winds over the winter season trend SSW, S, and SW. The affecting dominant winds over the summer period are multidirectional and trend NNW, N, and NNE. In transitional periods (spring and autumn), the winds trend dominantly in N and NNE directions.

Table 13: Meteorological Records

Climatic Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec	Annual Average
Mean Daily Temperature (°C)	11.2	12.5	15.4	19.2	23.3	26	26.9	26.7	24.3	22	18	12.3	19.9
Mean Daily Relative Humidity (%)	79	72	67	60	53	56	62	68	72	73	78	81	68
Average Wind Speed (km/h)	7.6	8.6	9.8	9.9	10.5	10.5	9.7	9.6	9.4	8.2	7.4	6.8	9
Prevailing Wind Direction	SSW	SSW	NE	NE	NE	NNE NW	NW	NNW	N	NE	NE	SW	
Monthly Rainfall (mm)	4.5	4	3.5	2	1.5	0	0	0	0	2.5	2.5	5	Total: 25.5

Source: Egyptian Meteorological Authority, 1996

The wind roses, Figure 6, represent the percentage ratio of the frequencies of occurrence of wind (the length of the column) blowing from a certain direction. The different parts (with different colors and widths) of the column represent the wind speed range in knots. The number in the circle represents the percentage ratio of calm wind frequency multiplied by 10. Table 14 gives the distribution of wind direction throughout the year.

Table 14: Distribution of Wind Direction throughout the Year

Wind Direction	Velocity (Km/hr)	Percentage
Calm Wind	0	4.04
North	9.76	13.79
North-east	13.82	50.7
East	11.78	1.3
South-east	5.87	0.87
South	8.79	4.02
South west	12.8	7.82
West	14.52	5.26
North-west	13.05	12.2
Average Wind Velocity	**12.27**	

Geology and Hydrogeology Characteristics--

The area where the project is located is within the flood plain of the Nile River. The topography of the area is almost flat with an average altitude of 17 m above mean sea level.

The area, in general, is a part of the Northern tip of the Nile Delta and alluvial plain, which consists of silty and sandy clay deposits (Holocene-Q3) that overlay the graded sand and gravel Pleistocene aquifer (Pleistocene-Q1). The main aquifer belongs to the Quaternary formation that is a Nile River recharged formation. The Holocene (Q3) layer is about 15 m thick and the thickness of the Pleistocene (Q1) is not definitely known but extends beyond 200 m deep. The layers forming the aquifer can be classified into the following:

- A clay cap that is the surface layer over the aquifer, formed from clay precipitants that belong to the Holocene Era. The thickness of this layer ranges from 2 to 10 m. This semi-permeable layer allows for water penetration to the aquifer. The vertical permeability of this layer depends on several conditions including the following:

  - The permeability factor to the vertical direction.

  - The thickness of the surface layer and the layer sequence.

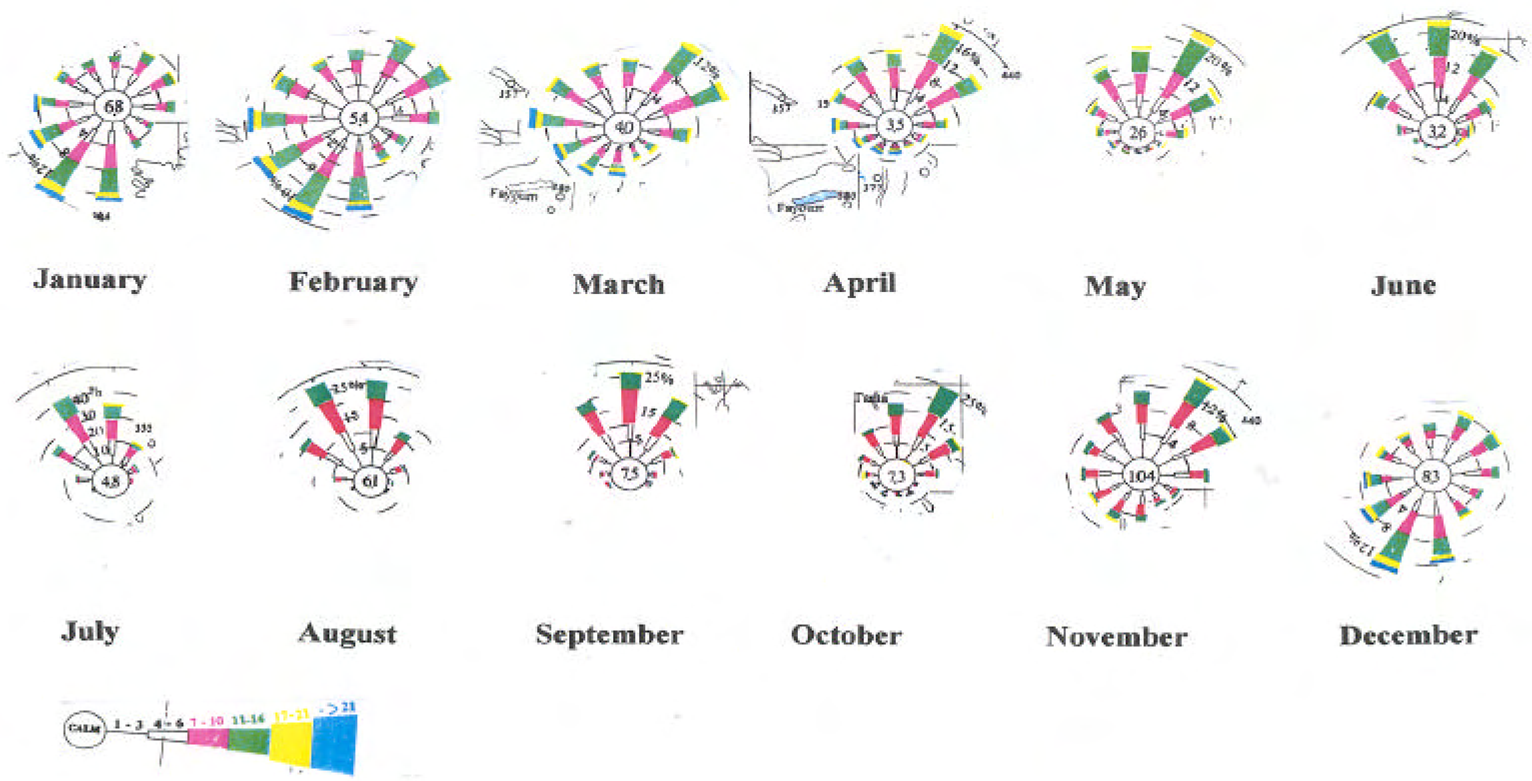
  - The piezometric pressure difference between the groundwater and the free water surface level in the clay layer.

- Sand and gravel layers of the aquifer follow the surface layer. The thickness of this layer ranges from 100 to 130 m. Previous studies indicated that the average hydraulic conductivity is 30 m/day and the average transmissivity is 1,000 m^2/day.

- The lower clay layer, where it exists, below the aquifer consists of very rigid clay and is considered to be impermeable.

The main groundwater flow is from the south to the north and from west to east. There are some secondary movements due to some depletion in the groundwater level due to excessive pumping. The main sources of groundwater recharge in the Study Area are the Nile River and the Ismailia Canal. Seepage from the sewage system and drainage networks is the secondary recharge source. The groundwater discharge is mainly from the groundwater wells. Underlying the sites there are two hydrogeologic units, an upper silt and clay layer, and a major alluvial aquifer. The water table is between 5 and 6 m below the ground surface. Eight hundred meters to the south of the site is the Ismailia Canal.

Figure 6: Mean Monthly Wind Roses Recorded at the Cairo Station (Egyptian Meteorological Authority, 1996)



Air Quality and Noise--

Air Quality--

During the period from October 1998 to July 1999, high particulate matter (PM)10, PM2.5, and lead were detected (CAIP,2002). PM and lead were monitored in 36 sites in Greater Cairo. The results indicated that, in the industrial area of Shoubra El Kheima, the highest mean inhalable PM was found to be 313 $\mu g/m^3$ exceeding the allowable limit of Law 4/1994 of 70 $\mu g/m^3$ by more than 4 fold. Lead concentrations of 26 $\mu g/m^3$ were recorded which also exceeded Law 4/1994 annual average of 1.0 $\mu g/m^3$.

In 2004, air quality in the Shoubra El Kheima industrial area was improved, where the mean PM10 levels dropped to 178 $\mu g/m^3$. In addition, lead levels dropped to 1.02 $\mu g/m^3$ which nearly meets the Law 4/1994 annual average of 1.0 $\mu g/m^3$ (EEPP, 2004). In 2005, mean inhalable particulate matter (PM10) levels dropped to 161 $\mu g/m^3$. As for the lead levels, 1.66 $\mu g/m^3$ were recorded which exceeds the Law 4 annual average of 1.0 $\mu g/m^3$ (EEPP, 2005).

Noise--

A survey was carried out to acquire baseline data for the ambient noise levels in the project area. Monitoring locations were chosen next to the main noise sources as well as the sensitive receptors as shown in Figures 7, 8, and 9.

Figure 7: Noise Monitoring Locations next to EL Kablat Medical Center

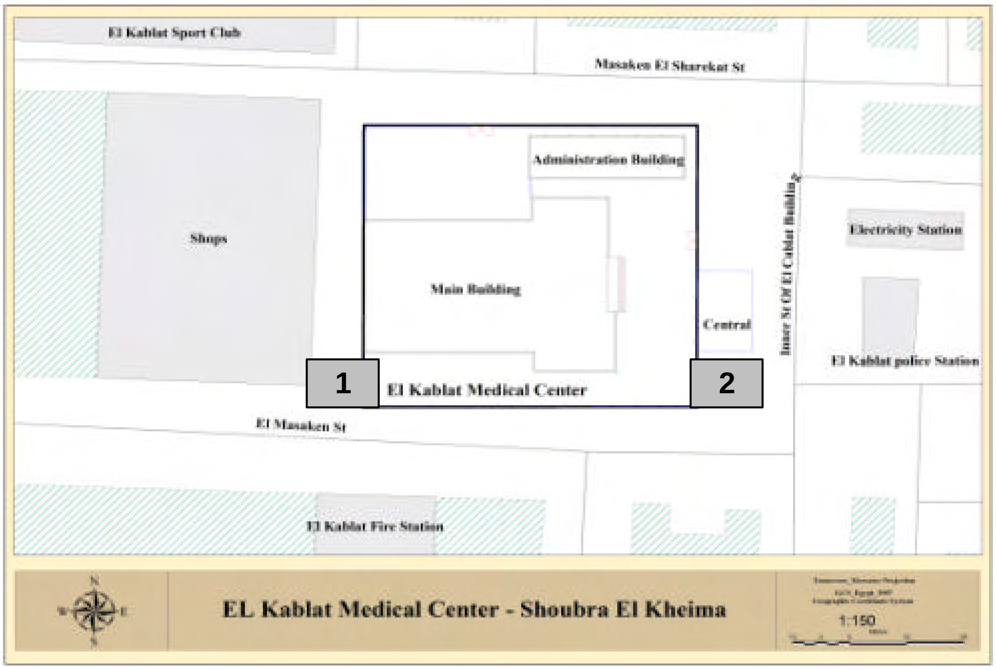


Figure 8: Noise Monitoring Locations next to Osama Zakaria Secondary Lead Smelter

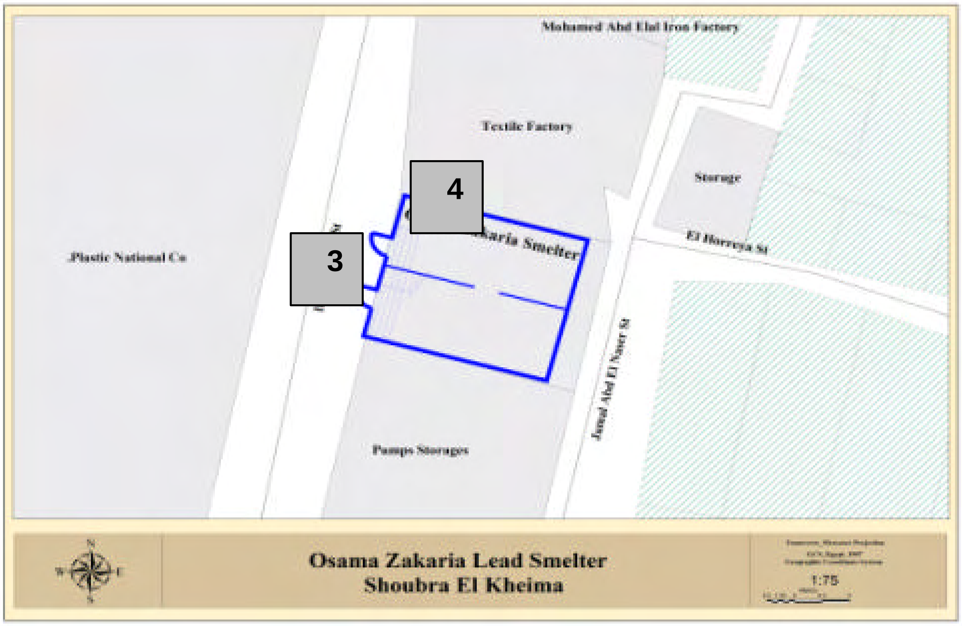
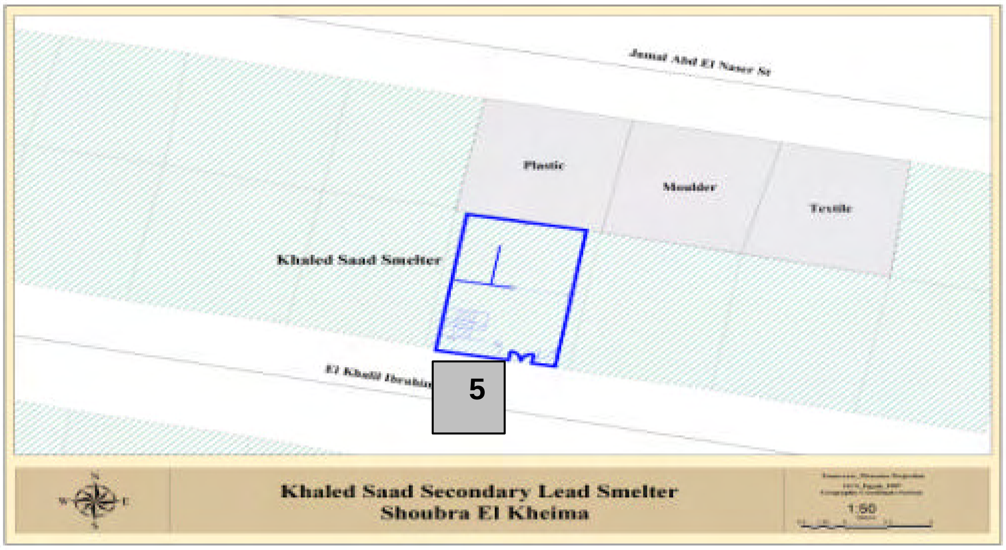


Figure 9: Noise Monitoring Locations next to Khaled Saad Secondary Lead Smelter



Measurements were taken during the day, evening, and night as per the requirements of Law 4/1994. Each reading was repeated 3 times to reflect different local conditions (e.g., no, light and heavy traffic). The results of the survey are presented in Table 15. The measured noise levels at locations 1 and 2 during day time, evening and night are in compliance with the limits of Law 4/94, except at location 1 during day time there are two readings higher than the law limits due to the market activities during daytime.

The measured noise levels next to the smelters (3, 4 and 5) during day time, evening and night are slightly higher than the limits of Law 4/94. This due to traffic and presence of workshops in this area.

Table 15: Results of Baseline Noise Monitoring Survey for Proposed Sites

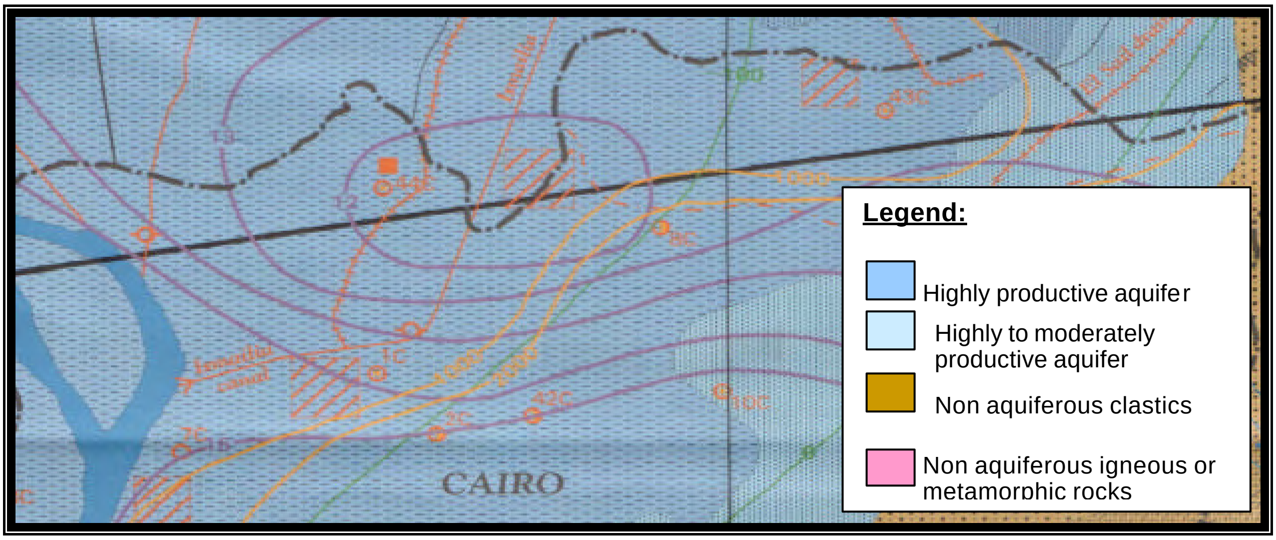
Location		Measured Noise Level, dB(A) and Noise Limit								
		Day time			Evening			Night		
		7 am – 6 pm			6 pm – 10 pm			10 pm – 7 am		
El Kablat Medical Center										
1	Southwest of Center in front of market	60	67	56	51	47	48	44	47	48
2	Southeast of Center in residential area	52	57	59	45	47	50	47	49	46
Osama Zakaria Smelter										
3	Main street	65	64	59	60	53	55	48	52	50
4	Side street	60	58	63	52	60	62	49	52	54
Khaled Saad Smelter										
5	In front of Smelter	58	63	65	55	60	56	48	51	52
Law Limit for Dwelling Zone Including Workshops or Public Road		**50-60**			**45-55**			**40-50**		

Water Supply and Quality--

__Groundwater Water Supply__--

Generally, the aquifer in Shoubra El Kheima is highly productive. The aquifer is continuously recharged from the Ismailia Canal and from the Nile River, the contribution of rainfall to aquifer recharge is minor. The groundwater is highly abstracted in this area. Figure 10 shows the hydrological map of Shoubra El Kheima. The industrial water wells are used for industrial purposes only and not a potable water source. Potable water is provided to all residents and industries by the GOQ.

Figure 10: Hydrological Map of Shoubra El Kheima



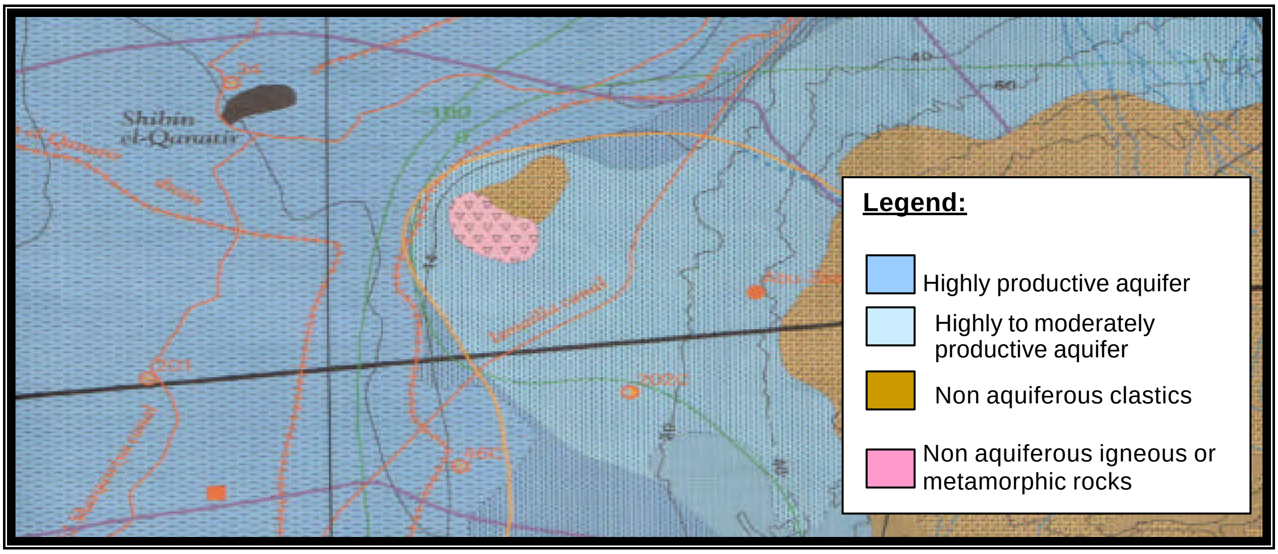
The aquifer in the Abu Zaabal area is highly to moderately productive consisting of quaternary graded sand and intercalated by clay lenses. The aquifer is occasionally recharged from rainfall, surface runoff, and/or irrigation water.

At the landfill, the area is formed of non-aquiferous igneous or metamorphic rocks and non aquiferous clastics consisting of tertiary clay and shale. Local groundwater occurs in fissured and weathered zones. The main lithology in the area of the landfill is coarse sands and gravel with limestone interbeded (Miocene "Tm") or basalt (Oligocene "To"). Figure 11 shows the hydrological map of Abu Zaabal.

Surface Water Supply--

The nearest surface water to the project site is the Ismailia Canal which is located approximately 800 meters south of the to be remediated sites. The Ismailia Canal is a source of recharge to the aquifer as well as a source of drinking water.

Figure 11: Hydrological Map of Abu Zabaal



Water Sampling and Analysis Program--A water and sediment sampling program was carried out at Shoubra El Kheima and Abu Zabaal. The main objective was to evaluate baseline groundwater and surface water conditions, primarily water quality and heavy metals contamination, in the vicinity of the proposed sites to be remediated in the original scope of work and around the Abu Zabaal Landfill. The program consists of two rounds of sampling following the baseline round for comparison of results at different stages after the remediation is completed at various sites. The purpose is to monitor and present evidence that remediation activities did not impact water resources in the study area. Groundwater samples were collected according to the USEPA low-flow groundwater sampling procedures (EPA/540/S-95/504). The sampling program was performed under the supervision of the LIFE-Lead Quality Assurance Manager. Samples collected included the following:

- Six samples were collected from five wells in Abu Zaabal area, four samples in addition to a duplicate and a cross reference.
- Four surface water samples were collected from two locations in Ismailia Canal, two samples in addition to two duplicate.
- Four sediment samples were collected from four locations along the Ismailia Canal.

- Twenty six samples were collected from twenty wells in the Shoubra El Kheima area, twenty samples in addition to four duplicates and two cross-references.

Forty samples were sent to the laboratory for analysis, 36 water samples and 4 sediment samples. Main samples in addition to duplicates spikes were delivered to the Ain Shams University-Reference Laboratory (ASU-RL) for analysis. Cross reference samples in addition to a spike were delivered to Egyptian Mineral Resources Authority (EMRA) for analysis. Locations of water samples are provided in Appendix A, Exhibit 3.

Water Sampling and Analysis Findings--The following provides a summary of the groundwater sampling from Shoubra El Kheima:

- pH in all samples were within the permissible limits set in Law 48 and its Executive Regulations.

- Nitrate concentrations in all samples (except one) were within the permissible limits set in Law 48 and its Executive Regulations.

- Ammonia concentrations in all samples were above the legal limits except one sample.

- Lead concentrations show that all samples, with the exception of Saad Thomas Monitoring well, are far below legal limits. The analysis results for the Saad Thomas monitoring well (0.5 mg/l) in both the main and cross reference samples are above the legal limit (0.05 mg/l).

The following provides a summary of the groundwater sampling conducted at Abu Zaabal:

- Lead, cadmium, chromium, copper, arsenic, selenium, and antimony concentrations in all samples were far below the legal limits.

- Ammonia concentrations in all samples were above the legal limits.

The following provides a summary of the surface water sampling from the Ismailia Canal:

- pH, TDS, and nitrate concentrations in all samples were within the permissible limits set in Law 48 and its Executive Regulations.

- Ammonia concentrations in all samples were above the legal limits.

- Zinc, lead, cadmium, chromium, copper, arsenic, selenium, and antimony concentrations in all samples were far below the legal limits.

Heavy metals concentrations in the sediment samples from the Ismailia Canal were very low and no legal limits are set for soil contamination.

<u>Terrestrial Ecology</u>--

The project site is located within the urban landscape matrix of Greater Cairo, parallel to the Ismailia Canal. In general, there are no significant habitats within the project area of influence. Vegetation, an important ecological indicator, is found far from this area. The only and most important ecological feature is the Ismailia Canal that runs as a corridor to the south of the project site. The Ismailia Canal bank near the project site is used as a plant nursery with many different species of plants. Some plant species grow along the bank slope.

The project area, which can be considered as a man made environment, appears to have little ecological significance and low biodiversity due to the immense alteration of the natural ecology. In these areas, only plants and animals that tolerate urban pressures and that can live close to man are found (EEAA, 1993). None of these appear to be of conservational or ecological importance.

Aquatic Ecology--

The following fish species are recorded in Ismailia Canal: Oreochromis spp, Tilapia zillii, Anguilla anguilla, Clarias gariepinus, Heterobranchus spp, Lates niloticus, and Synodontis clarias. In the vicinity of the project site, only recreational fishing is practiced. Interviews with the local community indicated that the catch is generally low and that no commercial fishing takes place near the site.

Solid and/or Hazardous Waste--

The project area is contaminated and polluted due to various past and current industrial activities in the project area. Site characterizations were conducted by the project to evaluate the level of heavy metal contamination present at the three sites. The results were used in the preparation of the Baseline Human Health Risk Assessment (BHHRA) and the development of remediation strategies.

Site characterization of El Kablat Medical Center indicated the following:

- Significant contamination levels of arsenic are the primary concern in bulk samples.
- Contamination levels of lead, antimony, cadmium, and chromium in bulk samples are insignificant.
- For wipe dust samples taken inside the buildings of the center, contamination levels of lead and antimony are significant and of primary concern.
- For wipe dust samples taken inside the buildings of the center, contamination levels of cadmium are insignificant.
- For wipe dust samples taken inside the buildings of the center, contamination levels of chromium and arsenic are of minor concern.
- Soil stratigraphy show that the center landscaped areas cover small amounts of residential waste, including small quantities of asbestos in the wide backyard.

As for Osama Zakaria, results of the analysis indicate the following:

- Contamination levels of lead in bulk samples are significantly high, above the risk based remediation goals (RBRGs) of 1,500 µg/g for industrial sites.
- Contamination levels of other heavy metals such as cadmium and antimony are of insignificant levels in dust samples.

- Contamination levels of arsenic in bulk samples are significantly high, above the Preliminary Remediation Goals (PRG) of USEPA Region 4 of 1.6 µg/g for industrial sites.

- Samples taken from the boreholes at depths up to 2.0 m show insignificant levels of heavy metals contamination such as lead, antimony, chromium, and cadmium. Bulk samples crushed off the walls show insignificant levels of these elements as well.

- Contamination levels of lead in wipe samples are above the clean-up level of 500 µg/ft^2 for industrial sites.

- Contamination levels of other heavy metals such as arsenic, antimony, and cadmium are of significant levels in wipe samples but there is no benchmark for comparison.

- Chromium levels, except for one dust sample, in dust samples are of insignificant levels in comparison to the Preliminary Remediation Goals (PRG) of USEPA Region 4 of 450 µg/g. Chromium levels in wipe dust samples are low, but there is no benchmark for comparison for wipe dust samples.

- Soil stratigraphy indicates that the smelter is built on mainly clay soil with a layer of concrete slap on top of a thickness up to 0.25 m.

Results of the analysis of Khaled Saad Smelter indicate the following:

- Contamination levels of lead in bulk samples are above the risk based remediation goals (RBRGs) level of 1,500 µg/g for industrial sites.

- Contamination levels of lead in wipe samples are above the proposed contamination assessment level of 500 µg/ft^2 for industrial sites.

- Contamination levels of other heavy metals such as arsenic, antimony, and cadmium are at high levels in wipe samples but there is no benchmark for comparison.

- Contamination levels of other heavy metals such as arsenic are of significant levels in dust samples when compared to the Preliminary Remediation Goals (PRG) of USEPA Region 4 of 1.6 µg/g.

- Contamination levels of other heavy metals such as antimony are of insignificant levels in dust samples compared with the Preliminary Remediation Goals (PRG) of USEPA Region 4 of 410 µg/g except for one sample.

- Contamination levels of other heavy metals such as chromium and cadmium in bulk samples are of insignificant levels in dust samples compared with the Preliminary Remediation Goals (PRG) of USEPA Region 4 of 450 µg/g.

- Contamination levels of chromium in wipe samples are of variable levels but there is no benchmark for comparison.

Disposal Sites--

Two disposal sites are available to be used by the project as indicated in the following:

- The Abu Zaabal Landfill located about 25 km northeast of Shoubra El Kheima will be used for the disposal of non-hazardous and/or decontaminated waste generated from remediation activities.

- The Alexandria Hazardous Waste Landfill located in Nasreya, Governorate of Alexandria, Egypt will be used for the disposal of hazardous waste generated from remediation activities.

Aesthetic and Cultural Conditions

The project area is presently a mixed industrial and residential area. There are no aesthetic or cultural elements or resources of importance in the area.

Future Conditions without the Project

Without the project, the polluted media (soil, and exterior and interior buildings) will act as potential sources of heavy metal contamination causing further deterioration of the environmental quality as well as the health quality of the workers and users of El Kablat Medical Center and residents living next to the closed secondary lead smelters. Exposure to the contaminants found in the three sites can cause the following adverse health effects:

- Chronic exposure to lead contamination may cause a wide variety of adverse health effects, ranging from reduction in the intelligence quotient of children to kidney cancer. Lead emissions are of particular concern for women of childbearing age and children under seven years of age. Children and young adults in areas that have been contaminated by smelter emissions can be exposed to lead through inhaling or ingesting dust and soil. Fugitive dust from the smelter and the surrounding area can be blown and deposited on uncovered food and water and subsequently ingested.

- Several studies have shown that Chromium (VI) compounds can increase the risk of lung cancer. The World Health Organization (WHO) has determined that Chromium (VI) is a human carcinogen. Non-carcinogenic health effects of Chromium (VI) range from irritation of the respiratory system to skin and stomach ulcers

- Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the lungs, bladder, liver, kidney and prostate. Inhalation of inorganic arsenic can cause an increased risk of lung cancer. The Department of Health and Human Services (DHHS) has determined that inorganic arsenic is a known carcinogen. Non-carcinogenic health effects of inorganic arsenic range from sore throats to death in case of ingesting very high levels.

- The DHHS has determined that Cadmium and Cadmium compounds may reasonably be anticipated to be carcinogens. Non-carcinogenic health effects of Cadmium range from severe damage to the lungs to kidney disease.

- Exposure to Antimony at high levels can result in a variety of adverse health effects. Breathing high levels for a long time can irritate the eyes and lungs and can cause heart and lung problems, stomach pain, diarrhoea, vomiting, and stomach ulcers. Ingesting large doses of antimony can cause vomiting

ENVIRONMENTAL IMPACTS

This EA focuses on the remediation activities that will take place at the El Kablat Medical Center and the two secondary lead smelters. The assessment covers the proposed on-site clean-up/remediation activities as well as the transportation of the generated waste to the waste disposal sites. The scope of the EA does not include assessment of final waste disposal activities since the hazardous waste will be disposed in a licensed hazardous waste landfill and the non-hazardous waste will be disposed in a licensed solid waste landfill. These landfills are designed and managed according to the type of waste that they are licensed to receive.

The EA also involved a public scoping process, where concerned stakeholders were consulted at the scoping stage of the EA process to identify their concerns pertaining to project implementation. All issues and concerns, relevant to the remediation activities, raised during public consultation were considered in the EA.

The methodology used for identification and assessment of the potential impacts associated with project activities is described in Appendix B. A summary of the Scoping Report and other public consultation meetings is provided in Appendix C.

Land Use and Regional Planning Impacts

Land Use--

Short Term Impact--

Since the medical center is currently offering its services to the residents, it cannot continue its operation during clean-up activities. It has been agreed between the LIFE project and the Health authorities to halt the services during the remediation period. Joint meetings were held and it was decided that the services will be moved to the nearby Masjid El Rahman Hospital which is operated by the El Kablat Local Community Development Society.

Long Term Impact--

There will be no change in the land use of the medical center after clean-up activities. However, the smelters will no longer be used in smelting activities. Osama Zakaria will build a structure for use as a storage facility. Khaled Saad will be operated as a non-smelting industrial facility.

Regional Planning--

Long Term Impact--

There is no conflict between the remediation project and the existing regional plans for the area. The GOQ is planning on relocating polluting industries existing in Shoubra El Kheima to the Abu Zaabal Industrial Area with the intention of improving the environmental and health quality of the area.

Socio-Economic Impacts

Demographic and Migration Impacts--

Impacts on demography and migration are expected to be negligible.

Economic and Employment--

Short Term Positive Impacts--

Remediation of the new sites will lead to new employment opportunities for the local community during the period of site remediation. Wages will be paid to local labor as the remediation activities are implemented. For example, remediation of the three sites is estimated to generate approximately 1,200 to 2,000 man-days of work for skilled laborers**.**

Long Term Positive Impacts--

This is one of the first site remediation projects in Egypt and it initiated new hazardous waste site remediation businesses. A cadre of specialized construction contractors and workers have been trained as part of the project to remediate contaminated sites. There have been seven companies qualified by the project to bid on the remediation projects. These companies will also be listed in a register at the EEAA that will allow companies needing remediation contractors in the future to identify those that have been trained in both health and safety and remediation procedures.

Quality of Life--

Long Term Positive Impacts--

The remediation of the new sites will lead to the elimination of heavy metal health exposure pathways. This will lead to improvements in the health of the medical center users and workers as well as the residents of the areas around the smelters.

Negligible Impacts--

All remediation activities carried out within the contaminated buildings will be contained within decontamination zones and areas of exclusion. Therefore, emissions will not reach the neighboring communities and there will be negligible impact on public health and safety.

Short Term Direct/Indirect Avoidable Negative Impacts--

The remediation activities could have short-term negative effects in the community. However, this is an industrial area where the residents live with noise and dust that may not occur in other residential areas. Methods will be employed including dust control and muffling on all equipment used in the remediation process to minimize these impacts.

Short Term Direct Avoidable Negative Impacts--

Workers health and safety could be affected during the remediation project through the following:

- Inhalation of heavy metal contaminated dust during facility remediation.
- Direct contact with contaminated soil, contaminated walls, floors, and ceilings.
- Inhalation of exhaust gases caused by transportation activities or equipment.
- Accidents.
- Spill of solvents or other harmful materials.

Transportation, Telecommunication, and Utilities--

Short Term Direct Avoidable Negative Impacts--

Heavy traffic during remediation activities will be experienced in the area around the medical center and smelters and at the intersection with the main road parallel to the Ismailia Canal during transportation to the disposal site. This could result in traffic congestion and increase the probability of accidents. However, because the duration of remediation activities at the site will be relatively short and the Ismailia Canal Road is already a busy road since it is an industrial area, the overall impact on traffic in the area should be minimal.

Water, wastewater, gas pipelines, and electricity cables would not be affected by remediation activities since there will be no soil excavation activities at the El Kablat Medical Center and the Khaled Saad Smelter. Minor soil excavation to allow for footings only will occur at the Osama Zakaria Smelter, but will not impact existing utilities.

Education, Health, and Social Service Impacts--

<u>Long Term Positive Impact</u>--

Remediation of the medical center will allow for the medical services to continue providing its services to the residents of the area without exposing them to the risk of contamination from the present heavy metal contamination.

<u>Physical Environment</u>

Climate--

The project has no effect on the climate.

Geology, Hydrogeology, and Soil Quality--

<u>Long Term Positive Impacts</u>--

Remediation of existing polluted sites will lead to long-term improvement in the soil quality within the remediated site and in the neighborhood due to the covering of the contaminated soil.

<u>No Direct Impacts</u>--

The project has no significant geological and hydrogeological features in the project area. There will be no direct contact between the remediation and clean-up activities carried out within the contaminated buildings and the groundwater. Therefore, there will be no direct impact from these activities on the groundwater.

<u>Short Term Direct Avoidable Negative Impacts</u>--

The impact on soil quality from clean-up and decontamination activities of the contaminated buildings can only occur if contaminated dust emissions or debris are allowed to deposit on the soil or through spills or leakage of fuel to the soil.

The soil quality along the transportation routes to the disposal sites could be negatively impacted if the transported material or waste is not properly contained. Containers used for the transportation of waste materials to the disposal sites will be water tight and must be properly covered to contain air borne emissions.

Air Quality and Noise--

<u>Long Term Positive Impacts</u>--

Remediation of existing polluted sites will lead to improvement in the air quality of the area due to the removal, containment, and/or treatment of the contaminated dust.

Short Term Direct Avoidable Negative Impacts--

The ambient air quality at the project site may be impacted by gaseous emissions and fugitive dusts from remediation activities. The main sources of emissions at the remediation sites include the following:

- Decontamination activities.
- Vacuum cleaning.
- Removal of old paint and plaster.
- Wind erosion of exposed waste material or soil.
- Construction equipment and machinery.

Transportation of raw material, labor, and equipment to the contaminated sites and transportation of the contaminated waste from the sites to its final disposal site will have impacts on the air quality and noise levels along the transportation route.

During the implementation of the remediation activity, noise will occur from the equipment used for dry building cleaning. The use of earth compaction equipment may generate localized noise pollution. Table16 shows the average noise level, in decibels, at a distance of 20 m between an observer and the source of noise.

Table 16: Average Noise Levels from Construction Equipment (in decibels) at a Distance of 20 m between Observer and Machinery

Equipment Type	Average Noise Level (decibels) at 20 m
Loader	78
Vibration Roller	74
Sprayer	75
Generator	86
Impact Drill	75
Concreter Mixer	79
Pneumatic Hammer	86

The remediation activities will result in an increase in the traffic load, especially heavy traffic such as buses and trucks used for the transportation of workers and material to and from the site, and transportation of waste to the disposal sites. This will lead to increased neighbor-hood noise levels.

Water Supply and Quality--

No Direct Impacts--

Remediation activities within the sites' boundaries will have no direct impact on the Ismailia Canal water quality since it is approximately 800 meters from the Canal.

Short Term Direct/Indirect Avoidable Negative Impacts--

The water quality of surface water bodies such as the Ismailia Canal may be negatively impacted during transportation of raw material to the remediated sites and especially during transportation of contaminated waste from these sites to the disposal site. This could be as a result of the deposition of wind blown dust on the surface water or direct spills into the canal in case of traffic accidents.

Terrestrial Ecology--

<u>No Direct Impacts</u>--

The contaminated sites lie within an industrial area that is devoid of sensitive terrestrial fauna and flora expect for some common trees and plants. Remediation activities will therefore have no direct impacts on terrestrial life.

Aquatic Ecology--

<u>No Direct Impacts</u>--

All remediation activities that will be carried out within the site boundaries will be far from the Ismailia Canal and thus there will be no direct impact on the Ismailia Canal or its aquatic life.

<u>Short Term Indirect Avoidable Negative Impacts</u>--

Aquatic life of the Ismailia Canal may be negatively impacted during transportation of raw material to the remediated site and especially transportation of contaminated waste or soil from the sites to the disposal site. This could be as a result of the deposition of wind blown dust on the surface water or direct spills into the canal in case of traffic accidents.

Solid and/or Hazardous Wastes--

Non-hazardous solid waste arising from remediation activities will include the following:

- Demolition waste of decontaminated walls, paint, and plaster.
- Wastes resulting from cement mixing.
- Packing and packaging material.

Hazardous waste resulting from remediation activities will include the following:

- Contaminated debris.
- Cleaning mops and materials.
- Dust control residues.
- Washing/cleaning water.

If the above-mentioned solid, liquid, and hazardous waste are not properly stored and handled on site before they are transported to the final disposal site, they could affect the environmental attributes of the physical and socio-economic environment as previously mentioned.

Disposal Sites--

Contractors will be responsible for transportation of waste generated from the remediation actions. Hazardous waste will be disposed at the Alexandria Hazardous Waste Landfill in Nasreya, Egypt and the non-hazardous waste will be disposed in the Abu Zaabal Landfill. Both landfills are designed and managed in a manner suitable for the type of waste they are allowed to accept.

Aesthetic and Cultural Conditions--

There are no aesthetic or cultural issues of concern in the project area.

Assessment of Overall Impacts

Short and Long Term Impacts on Resources and Environmental Productivity--

Minimal short term impacts on the population and environment are to be expected due to the remediation activities. These impacts could be caused by dust, noise, worker health and safety, waste handling, and waste transportation. Minor increases in dust and noise can be expected. Traffic along the Ismailia Canal Road and on the routes to the Abu Zabaal and Alexandria Hazardous Waste Landfills would be affected, but these routes are the only access to the landfills.

Air quality in Shoubra El Kheima will be improved as a result of the removal of contaminated dust. Soil, surface water, and groundwater quality within the area will improve as a result of the remediation activities. Workplace health and safety for the workers at the remediated sites will be greatly enhanced due to the remediation activities.

Cumulative and Irreversible Impacts--

The cumulative effect will be improved public health and safety due to improved ambient air quality and the reduction of heavy metals as a potential source of surface water and groundwater contamination.

It could be concluded that the following receptors could be impacted by the project's remediation activities.

- Ambient air quality.
- Ambient noise levels.
- Soil.
- Public health and safety.
- Workplace health and safety.

Impact on the above receptors could be prevented and reduced through implementation of mitigation measures and through proper management and monitoring as discussed later in this document.

COMPARISON OF ALTERNATIVES AND RECOMMENDATIONS

No-Action Alternative (Alternative 1)

This alternative is not recommended. If remediation activities are not carried out, then the existing heavy metal pollution hazards will persist causing further deterioration of the environmental quality of the area. No-action will also impact the health of the workers and users of the medical center and the residents neighboring the smelters.

Comparison of Alternatives

From an environmental standpoint, Alternatives 2 and 3 are equally recommended for the medical center and Alternatives 3 and 4 for the closed Osama Zakaria Smelter. Alternative 2 is the recommended for the Khaled Saad Smelter. The proposed alternatives for the site were chosen among four potential alternatives that were identified during the remediation design process. The recommended alternative was selected in consultation with EEAA, Hai Shark, and USAID as being the best alternative that could be accomplished within available funding.

The detailed design is underway. It may be slightly modified prior to implementation. As such, Tables 17 and 18 provide an evaluation of potential impacts associated with the proposed remediation activities. The short and long term impacts of the alternatives are provided. The most feasible alternative is the one selected for implementation.

Recommendation

The choice of the proposed alternative depends on other factors which include effectiveness, implementability, and cost. The cost factor provides a decisive criterion for choosing among different alternatives. The objective of the financial analysis is to estimate the present value of expected cost of the alternatives under investigation, in order to propose the alternative with the most cost effectiveness.

The proposed alternative with appropriate mitigation and monitoring measures should be implemented.

For the purpose of preparing this EA, and prior to the beginning of remediation, baseline environmental conditions were defined for monitoring during the remediation activities. Baseline conditions were established for air quality, noise, and soil as has been described earlier in this document. The baseline conditions will be used to monitor the remediation activities impact to the environment and to insure that mitigation measures are implemented and functioning properly.

Table 17: Comparison of Alternatives for El Kablat Medical Center

Alternative?	Short Term Impacts	Long Term Impacts/Benefits
No-Action Alternative	Existing heavy metal contamination will persist causing further deterioration of the environmental quality of the area.	
Alternative 2 Cleaning of interior and exterior walls, Cleaning of furniture, Implementing building improvements, Testing of cleaning residuals and disposal, Conventional site management practices	Temporary negative impacts on air quality, ambient noise, workplace health and safety as well as traffic. No direct impact on soil quality, groundwater and surface water quality, biological life and public health and safety.	This alternative will result in the remediation of the buildings and its interior surfaces of the medical center, and will limit airborne pollutants from entering the building through the replacement of broken doors and windows. However, since no soil remediation actions will be carried out in the exterior areas, a major source of pollution will still persist, which is the contaminated soil. Dust from this soil could become air borne and deposit of the surfaces of the buildings, which will regenerate the health problems presently encountered. The workers will still be exposed to the contaminated soil which will lead to the inhalation, ingestion, or dermal intake of the contaminant. This alternative is considered a partial solution to the problem and is therefore not recommended.
Alternative 3 Cleaning of interior and exterior walls, Cleaning of furniture, Implementing building improvements, Hard capping of the exterior area, Rehabilitation of fence, Upgrading sewer and domestic water system, Testing of residuals and disposal, Site management	This will result in incremental short-term environmental impacts to the impacts already encountered in Alternative 2 due to the environmental aspects resulting from the following extra activities: • Hard capping of the soil. • Rehabilitation of fence. • Upgrading sewer and domestic water system. Environmental concerns associated with these activities include increased dust and fugitive emissions, noise, traffic, transportation accidents, and spills.	This alternative will result in the remediation of the buildings and its interior surfaces as well as the exterior areas through providing a hard cap over the contaminated soil. The hard capping has an expected life of 20 years. This alternative will result in long-term environmental benefits to the environmental quality of the area and the health of the public, users of the medical center, and workers. From an environmental standpoint, this alternative is recommended.

Table 18: Comparison of Alternatives for Osama Zakaria Secondary Lead Smelter

Alternative	Short Term Impacts	Long Term Impacts/Benefits
No-Action Alternative	Existing heavy metal contamination will persist causing further deterioration of the environmental quality of the area.	
Alternative 2 Controlled dry cleaning followed by wet-cleaning of the building structure, Testing of cleaning residuals and disposal, Conventional site management	Temporary negative impacts on air quality, ambient noise, workplace health and safety as well as traffic. No direct impact on soil quality, groundwater and surface water quality, biological life, and public health and safety.	This alternative will result in the remediation of the smelter buildings and its interior surfaces. Short-term effectiveness can be fair to good depending on types of building surfaces that will be cleaned; long-term effectiveness will depend on dust (source) control at exterior and/or occupants education/training. This alternative is considered a partial solution to the problem and is therefore not recommended.
Alternative 3 Demolishing smelter structure under dust control, Loading and hauling wreckage to the Hazardous Waste Landfill, Cleaning the smelter floor, Construction of footings, and Capping the smelter floor. Conventional site management	This will result in incremental short-term environmental impacts to the impacts already encountered in Alternative 2 due to the environmental aspects resulting from the following extra activities: • Demolition activities. • Transportation of wreckage. Environmental concerns associated with these activities include increased dust and fugitive emissions, noise, traffic, transportation accidents, and spills.	This alternative will result in long-term environmental benefits to the environmental quality of the area and the health of the public and workers. From an environmental standpoint, this alternative is recommended.
Alternative 4 Demolishing smelter structure under dust control, Compaction of the wreckage onto the smelter area, Loading and hauling the wreckage surplus to the Hazardous Waste Landfill, Capping the smelter floor. Conventional site management	This will result in incremental short-term environmental impacts in addition to those encountered in Alternative 2 due to the environmental concerns resulting from the following additional activities: • Demolition activities. • Compaction of wreckage. • Transportation of surplus wreckage. • Capping the smelter floor. Environmental concerns associated with these activities include increased dust and fugitive emissions, noise, traffic, transportation accidents, and spills.	This alternative will result in long-term environmental benefits to the environmental quality of the area and the health of the public and workers. However, reuse of wreckage in raising the smelter floor up to the street level may not be structurally viable. From an environmental standpoint, this alternative is recommended.

Table 19: Description of Alternative 2 for Khaled Saad Secondary Lead Smelter

Alternative?	Short Term Impacts	Long Term Impacts/Benefits
No-Action Alternative	Existing heavy metal contamination will persist causing further deterioration of the environmental quality of the area.	
Alternative 2 Controlled dry cleaning using HEPA vacuum cleaner followed by wet-cleaning of the interior and exterior walls and floor, Implementing building improvement by painting interior and exterior walls, Testing of cleaning residuals and disposal, Conventional site management practices minimize exposure	Temporary negative impacts on air quality, ambient noise, workplace health and safety as well as traffic. No direct impact on soil quality, groundwater and surface water quality, biological life and public health and safety.	This alternative will result in long-term environmental benefits to the environmental quality of the area and the health of the public and workers. From an environmental standpoint, this alternative is recommended.

MANAGEMENT, MITIGATION AND MONITORING

The project's Environmental Management Plan (EMP) consists of a set of mitigation, monitoring, and institutional measures to be taken into consideration during and after the implementation phase. The EMP's intent is to eliminate adverse environmental and social impacts and prevent or reduce them to acceptable levels. In addition, the EMP includes the actions needed to implement these measures.

The EMP measures and reports environmental performance as part of a continuous improvement process; creating a climate of transparency and strategic partnerships with key stakeholders and develops effective training in order to raise public environmental awareness.

The EMP will be regularly updated by the project team to reflect the ongoing activities at the site. For each of the project activities, the EMP will list the requirements to ensure effective mitigation of each relevant potential impact.

Mitigation and Monitoring of Physical Impacts

Air Quality--

Mitigation--

To contain dust generation during remediation and clean-up activities, a decontamination area will be established to isolate the activities and prevent heavy metal contaminated dust from being emitted to the atmosphere. The decontamination area will be equipped with a centralized dust collection systems to capture, transport, and separate dust emitted from the processing and materials handling areas through reverse pulse dust filters. Collected dust will be properly handled and stored in closed containers until it is transported with the waste to the appropriate disposal site. At the Osama Zakaria Smelter, water suppression for demolition dust will be the dust containment process.

LIFE-Lead will monitor the contractor's implementation of mitigation measures throughout the project. The mitigation measures will include dust suppression measures at the site by watering of haulage roads, and maintaining machinery and vehicles in good working condition to minimize fugitive emissions. All equipment will be frequently inspected and maintained to ensure no fugitive emissions are generated, such as volatile hydrocarbon or nitrogen oxides.

Monitoring--

Parameters that will be monitored in ambient air and the workplace include:

- Dust, including total suspended particles and inhalable particulate matter (PM10).
- Pb, Cd, Hg, and As particle concentrations (at the medical center) and Pb only (at the two smelters).

Noise--

Mitigation--

When construction equipment is used, such as during land grading, workers at distances less than 5 m from the construction equipment must wear ear protective equipment to minimize possible impacts from noise.

Equipment and transportation vehicles will be periodically maintained to minimize noise levels to design limits. Monitoring will ensure that the noise levels are kept below the legal limits set forth in Law 4/1994.

Monitoring--

Operational noise will be monitored during the remediation phase. The measurements will take place at the same points identified during the baseline information collection phase.

Soil and Groundwater Quality--

There will be no soil excavation at the El Kablat Medical Center and the Khaled Saad Smelter, and therefore, there will be no impact on the groundwater from soil excavation activities and there will be no need to monitor soil and groundwater quality.

Minimal soil excavation for footings will be carried out at the Osama Zakaria Smelter without any impact on existing utilities.

All liquid and solid waste as well as fuel and chemicals used, during site remediation will be properly stored above ground and contained to avoid spills and leaks to the soil. Washing water will be stored and directly transported to Alexandria Hazardous Waste Landfill. The storage tanks will be frequently inspected for leaks and damage.

Surface Water Quality and Marine Life--

The risk of polluting surface water bodies (i.e., Ismailia Canal) and affecting its marine life could be mitigated through the following:

- Provision of proper containment and cover for transported waste to prevent dust from becoming wind blown and depositing on the neighboring water body.
- Planning and emergency response measures to minimize the risk of accidental spills.

There will be no need to monitor surface water quality.

Mitigation and Monitoring of Socio-Economic Impacts

Public Health and Safety--

Impacts on the neighboring communities' public health will be mitigated through the provision of air pollution controls as previously mentioned. Establishment of decontamination areas during remediation activities as well as using dust suppression measures such as water spraying will greatly reduce the impact on neighboring communities.

In addition, the proper training of drivers on defensive driving and frequent inspection of the haul trucks will greatly reduce the risk of accidents.

Workers Health and Safety--

The LIFE-Lead Site Engineer will have a continuous presence on-site for close inspection and management of the remediation and construction activities. The contractors will apply a number of control measures including the following:

- Contractor's employees involved in any facility remediation of heavy metal contaminated sites must have received Health and Safety Training in the form provided by LIFE-Lead to the pre-qualified contractors. The Contractors must verify that the nominated Project Manager has provided Health and Safety of Hazardous Waste Operations Training to employees working on the project. The Contractor must, at a minimum, provide all required personnel protection equipment, personnel decontamination stations, personnel medical monitoring, air monitoring, and required record keeping.

- The General Health and Safety Plan will be required as part of the bid submittal whereas the Site Specific Heath Safety Plans will be required after Notice of Award.

- The contractor will provide documentation and results that all medical monitoring has been conducted prior, during, and after the project; and provide records of air monitoring results.

- Engineering control (e.g., design of the decontamination areas in which workers will operate to ensure proper ventilation and dust collection).

- Personal protective equipment (PPE) will be used by the workers at all times.

- Flammable material will be stored in an isolated, shaded, and labelled area. Fire extinguishers will be installed in designated places at the site and will be regularly inspected.

An Emergency Response Plan was developed to mitigate the occupational health and safety hazards of the workplace, as presented below.

Transportation Risks--

This category includes transportation of hazardous waste to the Alexandria Hazardous Waste Landfill, and transportation of contaminated materials and cleaning residues (non-hazardous waste) to the Abu Zabaal Landfill. Contractors will be responsible for transportation of waste generated from the remediation actions. Risks of vehicle accidents from the hauling of waste from the remediation site to the disposal facilities are included in the Emergency Response Plan. The vehicular risks are addressed by measures such as proper training of drivers on defensive driving and by regular inspection and maintenance of the haul trucks.

Mitigation and Monitoring of Cultural Impacts

There are no areas of cultural significance associated with the remediation activities. Therefore, no mitigation or monitoring is required.

Mitigation and Monitoring of Cumulative Impacts

No impacts of the project resulting from its interaction with other existing or proposed projects are anticipated. No mitigation and monitoring measures are proposed.

Environmental Plan of Action

The following elements comprise the Environmental Plan of Action for the site, as applicable to project activities.

Commissioning Phase--

The Commissioning Phase of the project is divided into Health and Safety Training and Capacity Building as described below.

Health and Safety--

The following health and safety issues will be incorporated into the Environmental Plan of Action:

- Assign a project Health and Safety Manager.
- Assign responsibilities within the contractor and project's supervision team.
- Surround specific hazardous areas of the installation site with a fence to prevent unauthorized access to the site.
- Inform local residents and other users of the area of the equipment installation and construction schedule.

Training and Capacity Building--

Training for contractors concentrated on the following main topics:

- Health and safety of workers and the public.
- Remediation technologies and methods to implement differing remediation options.

This training concentrated on the two main topics listed above. Areas that were included in the training included the following:

- Introduction to hazardous waste remediation requirements in Egypt.
- Evaluation of hazardous materials and wastes.
- Design/remediation of hazardous waste and contaminated properties.
- Specialized safety measures for hazardous waste site remediation.
- Environmental compliance monitoring.
- Hazardous waste remediation business opportunities in Egypt.

Implementation Phase--

The following topics will be included in the Implementation Phase of the Environmental Plan of Action.

Health and Safety--

The following health and safety topics will be included in the Implementation Phase:

- Regular control of health and safety measures by the designated contractor and project supervisors.
- Use of personal protective equipment and safety harness to prevent falling.
- Adherence to strict public health and safety standards.

- Proper storage of materials and the necessary provision of measures to prevent leaks and spills.

- Proper labelling of stockpiled material, proper access control measures to prevent accidental exposure, and the provision of protection equipment and first-aid kits.

- Storage of flammable materials (e.g., solvents), if any, in isolated, shaded, and well ventilated areas.

Emission Control--

The following emission control measures will be included in the Implementation Phase:

- Maintain machinery and vehicles in good working conditions to minimize fugitive emissions.

- Use of dust control measures such as water spraying for dust suppression.

Noise Control--

Machinery and vehicles will be maintained in good working condition during the Implementation Phase to minimize noise levels.

Inventory Control--

A “first-in, first-out” policy will be applied and auxiliary material, such as chemicals, will be properly labelled with their name, date of purchase, and date of expiration.

Housekeeping--

The following good housekeeping practices will be followed during the Implementation Phase:

- Minimization of the amount of wash water used.
- Minimization of spills during handling, transport, and use of products.

Waste Management--

Waste management is a very important consideration since contaminated material will be excavated. Responsibility for waste that is generated will be clearly specified and will follow the procedure listed below.

- Store waste piles, and other contaminated materials, prior to transportation to landfill sites in a designated location.

- Transport and dispose the waste produced in properly designated and approved disposal sites to minimize negative environmental and health impacts.

- Contain demolition material from the buildings and temporary construction facilities for disposal at the designated disposal location

Maintenance Program--

The following procedures will be included in the maintenance program for the Implementation Phase:

- Regular checks and cleaning of equipment to insure proper working order.
- Repair of damaged equipment immediately.
- Maintain records of equipment checks, repairs, cleaning, and equipment failure to minimize equipment breakdown and any associated pollution releases.
- Prepare a maintenance schedule for mechanical work as well as periodic replacement of parts before breakdown occurs.
- Regular control of the compliance of the measures by the designated supervisors.

Environmental Analyses

Table19 provides a detailed schedule for environmental analyses. The baseline data has already been collected and included in this EA. Additional data detailed in the above sections will be collected prior to and at the end of the remediation activities starting in November 2006.

Table 19: Schedule of Environmental Analyses

Media to be Analyzed	**Dates for Analyses**		
	Inclusion in the EA	**Prior to Remediation**	**Completion of Remediation**
Air Quality	September 2006	November 2006	Monitoring will be continuous during the remediation process using data provided by EEAA.
Noise	September 2006	November 2006	Monitoring will be continuous, if needed, during the remediation process.
Soil	Site characterization information are included in the EA for the sites.		Clearance sampling will be conducted following the completion of remediation activities. December 2006 and February 2007

Risk Prevention and Emergency Response

Objectives--

The Emergency Response Plan (ERP) was developed to provide the following control measures:

- Identification of potential sources of hazards that may be present during the remediation activities.
- Identification of the chain of events that may occur and result in environmental risk.
- Qualitative evaluation of the likelihood of the occurrence of each of these events.
- Qualitative assessment of the severity of the potential consequences.
- Ranking of the environmental risks in terms of severity.
- Recommendation of appropriate mitigation measures and emergency response procedures to properly manage the identified risks.

Applicability--

The ERP was developed for the remediation option which was deemed most favourable as a result of the multi-criteria analysis. It has been prepared as a guideline document to provide contractors with procedures that will allow them to identify risk situations and to respond appropriately to emergencies that may occur during project implementation. LIFE-Lead will require contractors to modify and update the plan periodically during the remediation process as needed. Table 20 provides a detailed summary of the environmental risks.

Table 20: Summary of Environmental Risks

Hazard Type	Prevention Measure	Hazard Rating	Response (Table 16)
Onsite Storage and Handling of Hazardous Materials			
Spills associated with liquids causing impacts to soil and the possibility of fire.	Worker training on chemical handling and storage and provision of proper containment mechanisms	Moderate	SP, ME, FE
Hazards associated with human contact with chemicals.	Workers training, strict operational procedures, and containment practices.	Moderate to high	SP, ME
Decontamination of Building and Building Improvements			
Accidents involving workers slipping, tripping, or falling; and resulting from the use of equipment.	Worker training, use of PPE at all times, exercising common sense, and using harnesses and wires when working on elevated surfaces.	Low to moderate	ME
Transportation Accidents (All Transportation Routes)			
Accidents during transportation causing personal injury and spills onsite or along the road to the final disposal site(s)	Strict safety procedures for drivers, regular vehicle maintenance, appropriate containment of waste while transporting, and vehicle	Moderate to high (human error is an important factor that needs to be	TR

Hazard Type	Prevention Measure	Hazard Rating	Response (Table 16)
	escort service as practicable.	managed)	

Specific emergency response procedures are developed for each type of emergency situation (e.g., transport accident, fire, etc.) based on the general principles outlined in Table 21.

Table 21: Guidelines for Response Procedures

Ref.	Risk Situation	Potential Substances or Facilities Involved	Hazard	Key Elements of the Emergency Response Plan
TR	Transportation	Transport within and near the remediated sites, and along long access roads to the Abu Zaabal (non hazardous waste) and the Alexandria Hazardous Waste Landfills.	Injury or fatality, and spill of transported materials.	Notification and containment of spills on-site or near-site as per procedures in Item SP. Medical emergencies will adopt procedures as per Item ME. For fires located along the transport route, the following will be applied: • Each truck will be equipped with a fire extinguisher that will vary depending on the material being shipped. • For small fires, dry chemical CO_2 extinguishers will be used. • For large fires, the fire area will be flooded with water from a distance. The water jet will not be projected over the spilled material. Water will not be used if the material is acidic. Vehicles will be equipped with proper fire extinguishing materials. • The truck will be removed from the fire area if possible without invoking further risk. • Water will be applied to the shipment to cool the sides exposed to flames until the container is within normal temperatures. • Workers will stay at a safe distance from the burning materials.

Ref.	Risk Situation	Potential Substances or Facilities Involved	Hazard	Key Elements of the Emergency Response Plan
SP	Spills	Solvents and chemicals used to remove paints. Paint materials for walls.	Potential health hazard due to ingestion, inhalation, or dermal contact. Possible flammability and corrosivity depending on chemical.	Notification of emergency to the Site Engineer and the Egyptian Environmental Affairs Agency.
ME	Medical Emergencies	On site, all activities.	Injuries to workers.	The contractor will have a specialized person (or a person of the team) on site and at all times who is trained in the disciplines of first aid, CPR, fire rescue, and evacuation. All workers will be trained in the proper response to specific injuries (e.g., not moving workers with potential spinal injuries). The injured workers will be transported to the local medical facility. The following procedure will be employed at the location of the incident: • Assess the location and severity of the situation. • Avoid taking health or safety risks by entering a dangerous or unstable area. • Restrict access to the area. • Notify the Health and Safety Manager. • Assist in extinguishing the fire and securing the area only under the direction of the Health and Safety Manager. • Contact the local fire fighting authority to start mobilizing.

Ref.	Risk Situation	Potential Substances or Facilities Involved	Hazard	Key Elements of the Emergency Response Plan
FE	Fire within project site.	Onsite, particularly chemical or fuel storage areas.	Fire with potential subsequent damage to property, injury, or explosion.	Fire fighting equipment will be maintained onsite during all site operations. Key procedures within the project site include the following: • Assess the location and severity of the situation. • Avoid taking health or safety risks by entering a dangerous or unstable area. • Address life threatening issues such as the lack of pulse, blocked air passages, or severe bleeding using basic first aid techniques. • Notify the Health and Safety manager/site manager according to established protocols. • Assist in securing the situation and transporting the victim under the direction of the Health and Safety Manager on site.

APPENDIX A

SOIL and WATER SAMPLING

Exhibit 1: Location of Boreholes Samples for El Kablat Medical Center

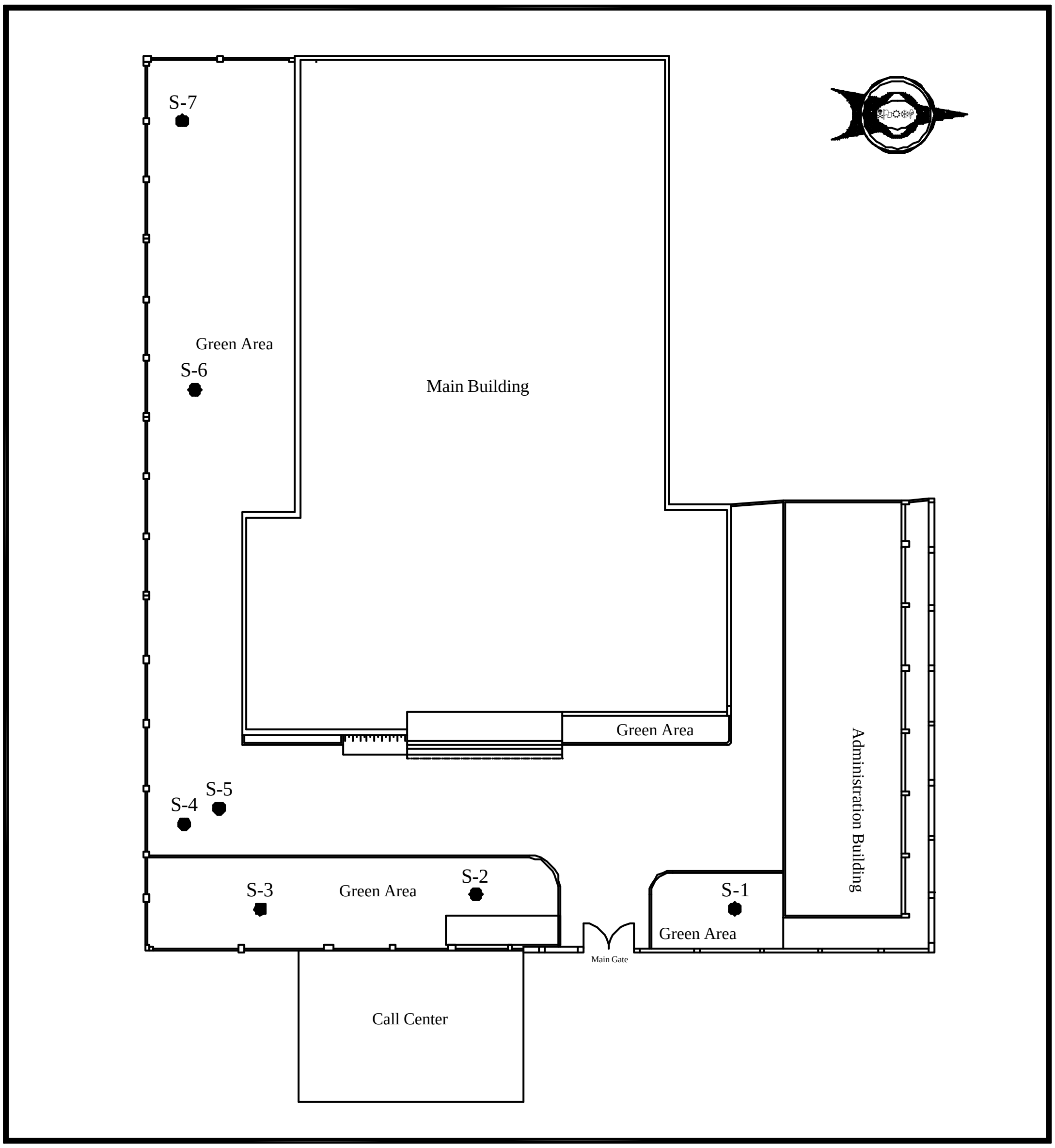


Exhibit 2: Lithology of Boreholes at El Kablat Medical Center

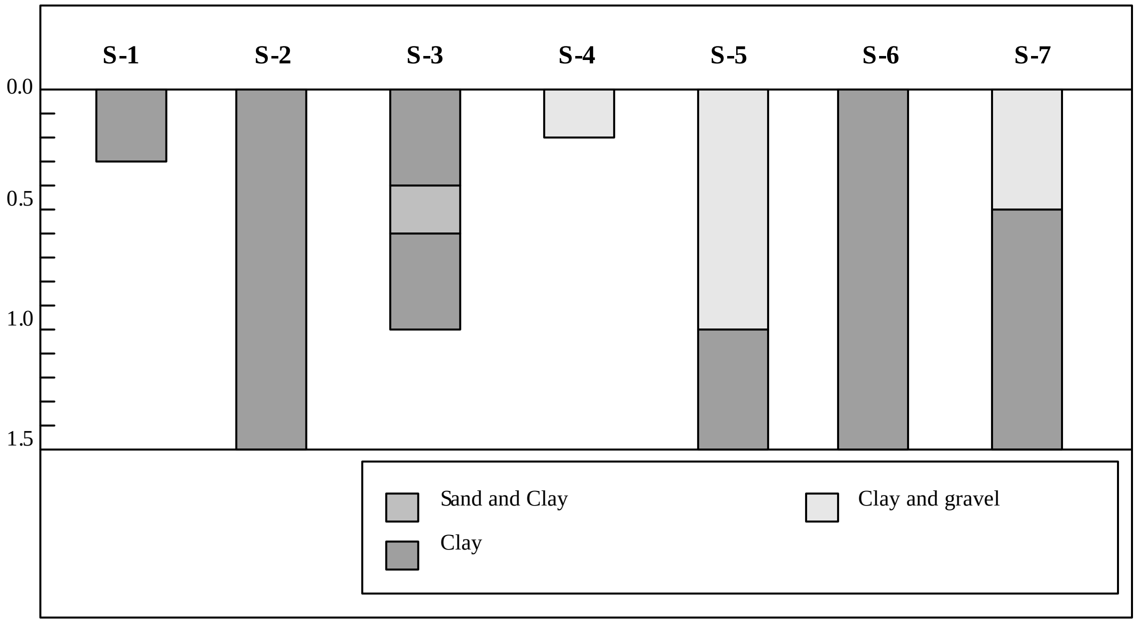


Exhibit 3: Location of Boreholes and Wipe Samples for Osama Zakaria Secondary Lead Smelter

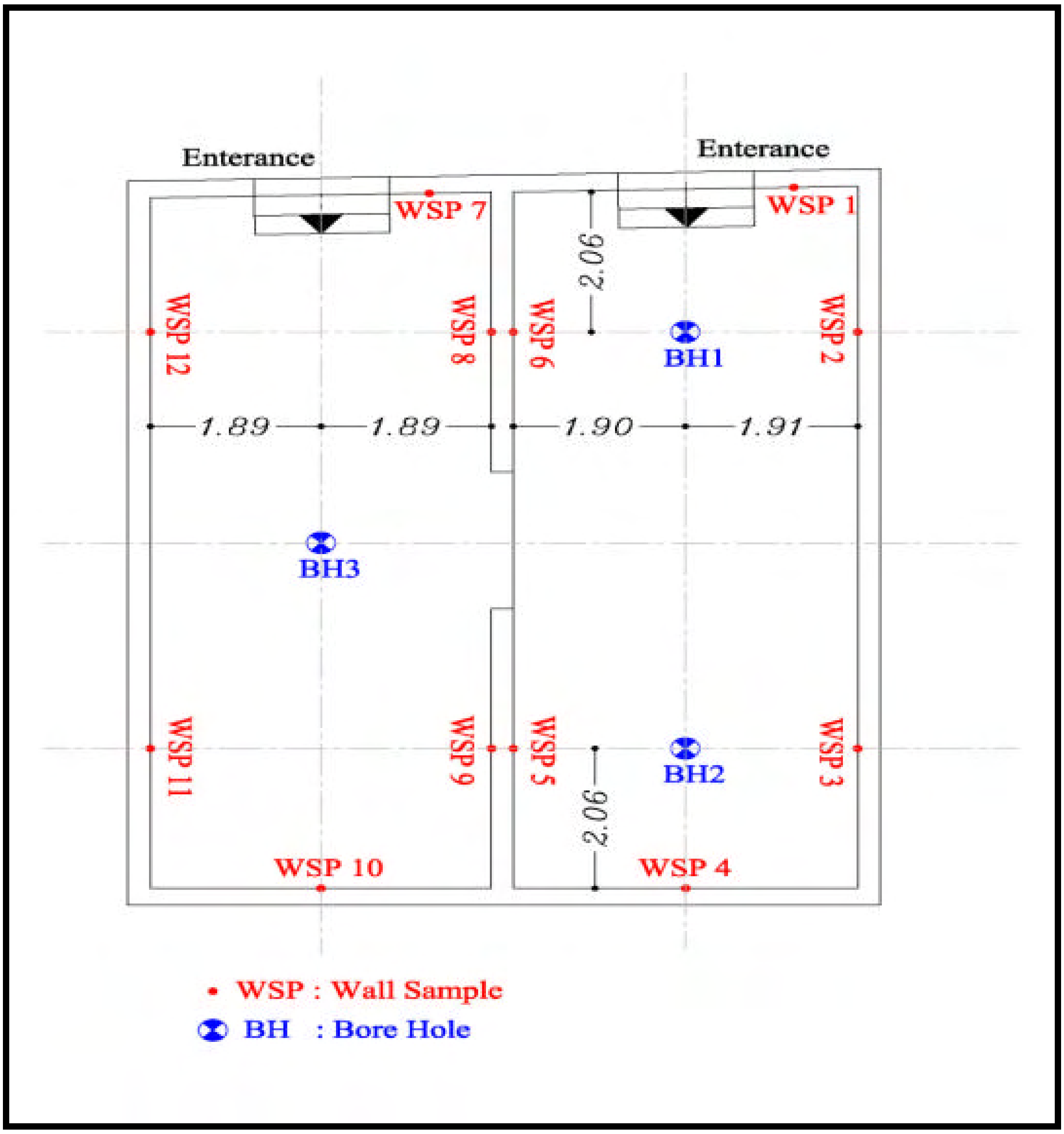


Exhibit 4: Lithology of Boreholes at Osama Zakaria Secondary Lead Smelter

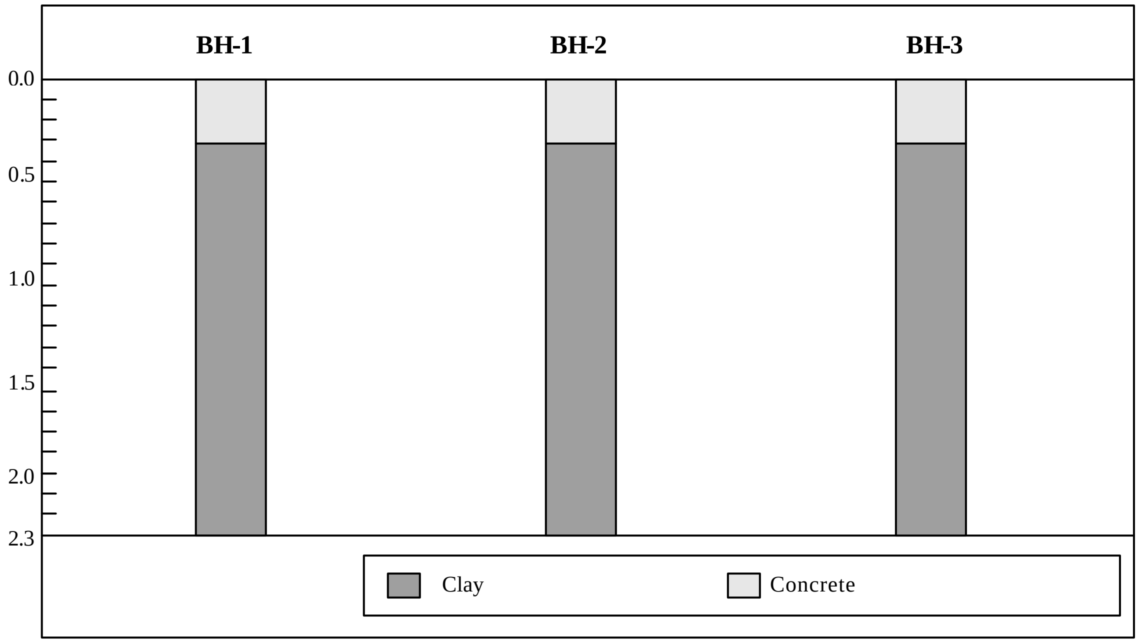


Exhibit 5: Location of Dust and Wipe Samples for Khaled Saad Secondary Lead Smelter

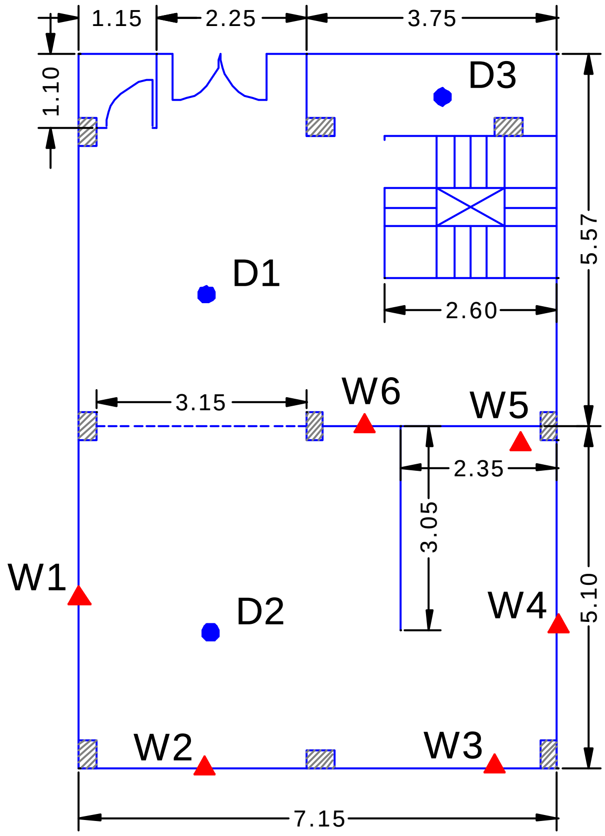
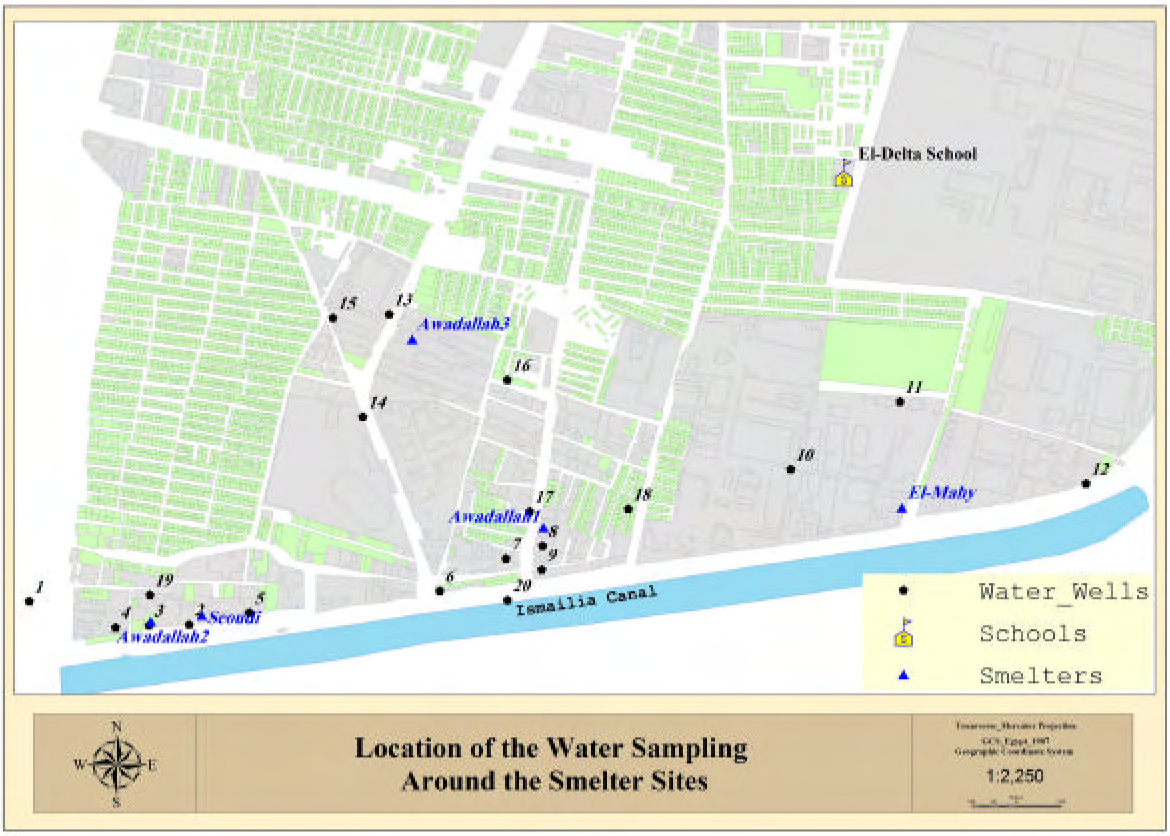


Exhibit 6: Locations of the Water Sampling Around the Sites



APPENDIX B
IDENTIFICATION AND ASSESSMENT METHODOLGY

Identification and Assessment Methodology

The impact identification and assessment methodology (Figure 1) starts with identifying potential primary environmental impacts caused by the proposed remediation alternatives. This is carried out using a modified version of the Leopold matrix (Table 1). Impact identification was based on the analysis of project specifications and baseline information collected in the field, literature review and internet search of similar projects, interviews with governmental and non-governmental stakeholders as well as information received from stakeholders during the Scoping Meeting (LIFE-Lead Scoping Report, August 2006).

The interactive scoping matrix was used to pinpoint areas where project activities would interact with components of the receiving environment (potential impacts). These could be both positive and negative interactions. The layout of the matrix is arranged as follows:

- The "y" axis of the matrix consists of a list of remediation activities. It also contains in a parallel column a list of aspects associated with each activity or group of activities.

- The "x" axis consists of the resources and receptors encountered in the receiving environment including its physical, biological, and socio-economic components. Resources and/or receptors of the receiving environment include the following:

  - Air quality.
  - Noise.
  - Soil quality.
  - Surface water quality.
  - Groundwater quality.
  - Terrestrial life.
  - Aquatic life.
  - Public health and safety.
  - Employment and training.
  - Work place health and safety.
  - Traffic.
  - Utilities.
  - Livelihood.

Using this matrix, interaction between project activities and environmental components were identified. The identified interactions are then subjected to further analysis to examine whether they produce direct effects on the environment (primary impacts) or they would trigger sequential events that would finally affect other environmental receptors (secondary and higher order impacts).

The identified impacts were then subjected to a process of impact evaluation. The Impact evaluation was based on pre-established criteria including:

- Magnitude of the impact.
- Impact duration.
- Reversibility of the effect on receptor.
- Spatial extent.
- Sensitivity or importance of the receptor.

The impact evaluation also takes into consideration the mitigation measures included in the Front End Engineering and Design (FEED) to which the project is committed. This is in addition to measures of good international practice.

A comparative analysis among the short list of remediation alternatives with respect to the identified significant impacts is carried out. Based on this analysis, the alternative(s) with the least significant impacts on the environment and which are easy to mitigate and/or mange are selected.

Significant environmental impacts of the selected alternative were subjected to further analysis for consideration of alternative mitigation measures, while insignificant impacts were not considered further. Mitigation measures were either incorporated as an integral part of the design or through management measures.

A monitoring plan was then formulated to ensure that project performance meets the standards and that the mitigation measures effectively achieve the desired level of impact minimization.

Key Sensitivities

A key input in the process of impact assessment is the identification of the sensitivities and constraints specific to the receiving environment and its vicinity. Potential impacts are usually evaluated in respect to their effects on specific receptors. Therefore, knowledge and information on the environment within which the proposed project will be located are essential.

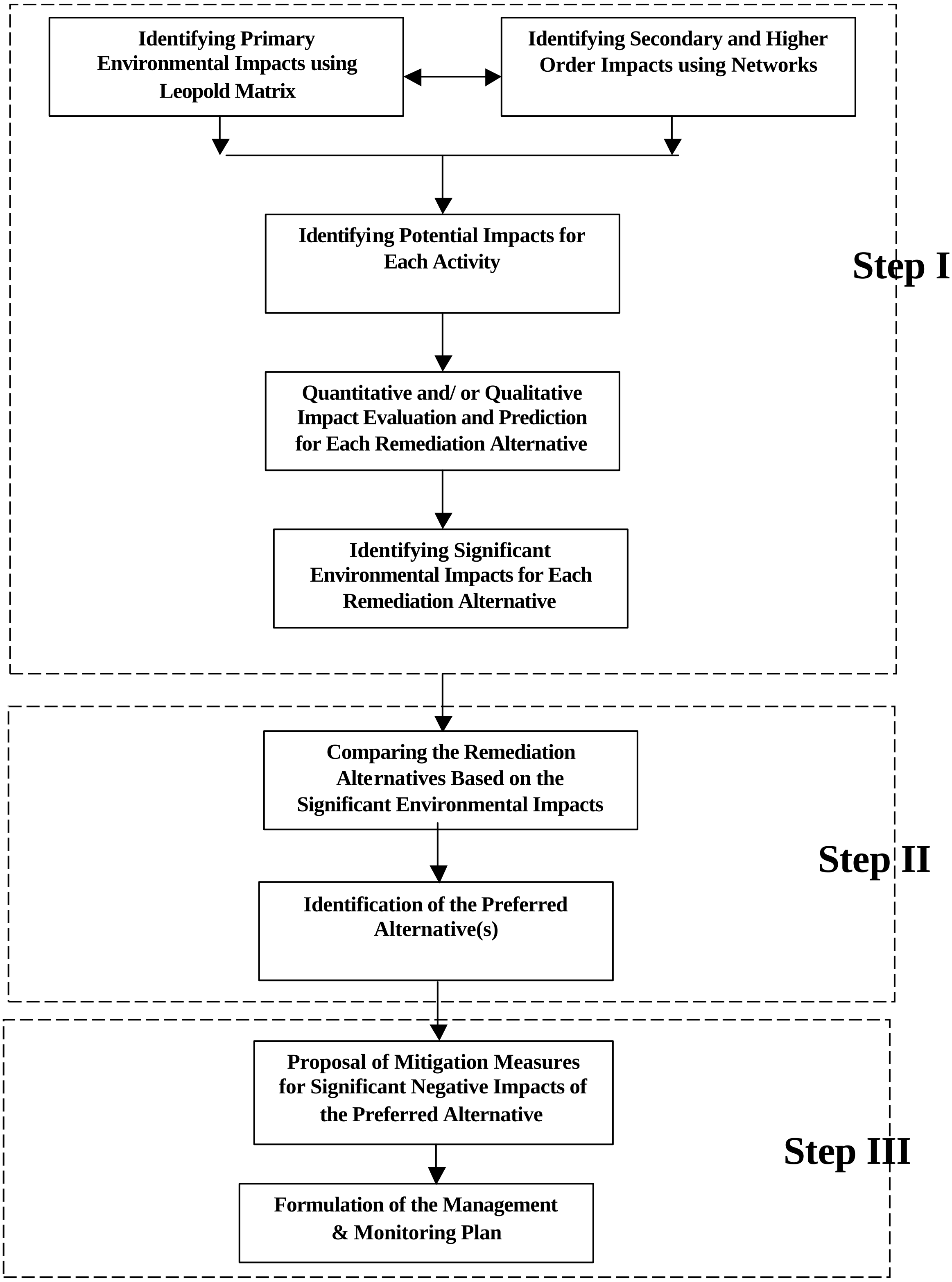
The EA team has gathered sufficient information on the project area and has analyzed their sensitivities as a crucial step in the assessment process. This information was gathered through literature reviews, interviews with officials and local residents, satellite image analysis, aerial photography analysis, and field surveys.

The sensitivity or importance of the receptors depends on its nature, value, scarcity, zone of effect, etc. They can be categorized as follows:

- On site receptors such as soil, workplace health.
- Receptors surrounding the site such as ambient air, noise, public health.
- Final sinks/receptors such as surface and groundwater qualities. Impacts on these receptors are usually indirect (secondary/tertiary).

The network diagram (Figure 2) shows that dust emissions caused by the act of wind will primarily affect the ambient air quality. It could then deposit on the soil and surface water and potentially leach to the groundwater. Contaminated dust deposited on the soil could also affect public and/or worker health through direct contact. Human health could also be impacted through the inhalation of contaminated dust or the ingestion of contaminated groundwater or surface water.

Figure 1: Impact Identification, Evaluation, and Mitigation Framework



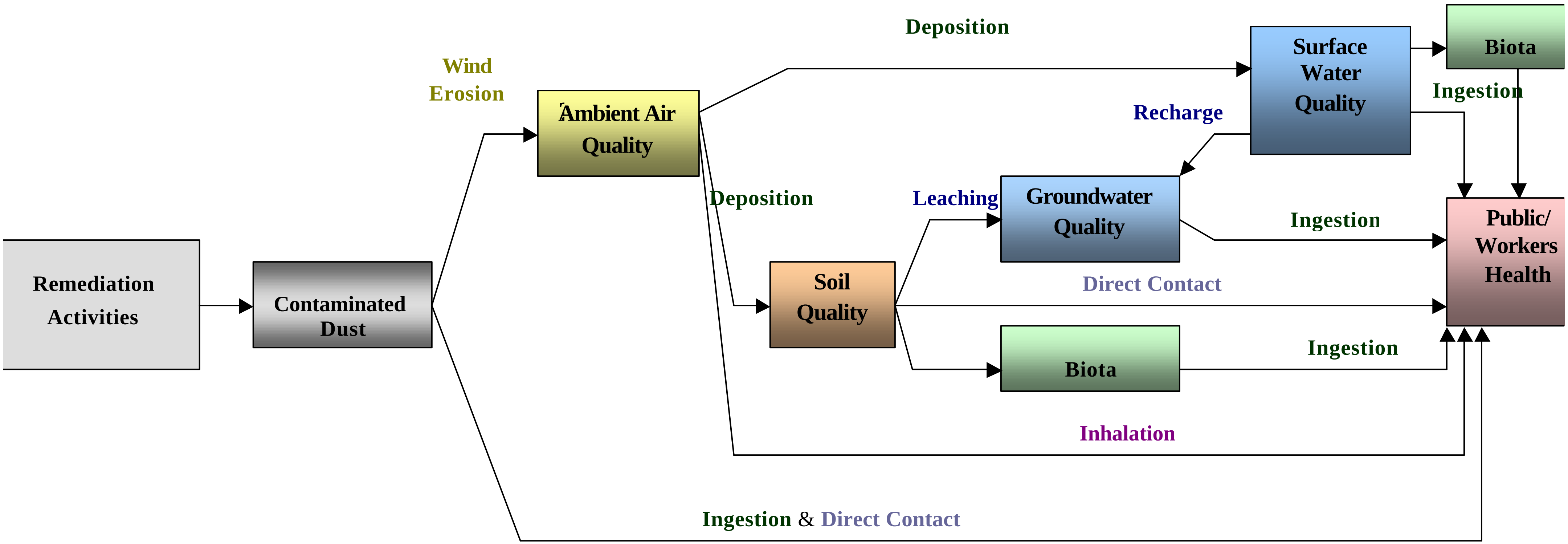


Figure 2: Ecological Pathways Leading to First and Higher Order Environmental Impacts (primarily due to lead and heavy metal dust)

Table 1: Summary of Potential Environmental Impacts During Remediation of El Kablat Medical Center

		Environmental Attributes											
		Physical Environment					Biological Environment		Socio-economic				
Activities (Sources of Impacts)	**Aspects**	**Air Quality**	**Noise**	**Soil Quality**	**Groundwater Quality**	**Surface Water Quality**	**Terrestrial Life**	**Aquatic life**	**Public Health & Safety**	**Employment**	**Work place Health &Safety**	**Traffic**	**Utilities**
Shoubra El Kheima													
Alternative 1: ? No action	• Pollution sources persist	-	NA	-	-	-	-	-	-	NA	NA	NA	NA
Alternatives 2,3: Dry Vacuum Cleaning with HEPA vacuum	• Dust Emissions • Emissions & Noise (vehicles & equipment) • Polluted Filters	-	-	NA	NA	NA	NA	NA	NA	+	+	NA	NA
Alternatives 2,3: Wet Cleaning and Surface Preparation Window and Furniture Washing	• Contaminated Cleaning Mops • Spills of detergents • Waste packing and packaging	NA	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	NA
Alternatives 2,3: Removal and Replacement of Windows and Doors	• Waste window and doors • Noise	NA	-	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternatives 2,3: Containment/Storage of Waste On Site	• Dust Emissions • Spills of Wastewater and solid waste (hazardous & non-hazardous)	-	NA	-	-	NA	NA	NA	-	+	-	NA	-
Alternatives 2,3: Transportation of Material, Labor and Equipment to Site	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents	-	-	NA	NA	-	-	-	-	+	-	-	NA
Alternatives 2,3: Washing of equipment and showering in decontamination chamber	• Contaminated wastewater	NA	NA	-	-	NA	NA	NA	NA	+	+	NA	NA
Alternative 3: Interior and Exterior Wall Painting	• Waste paint & solvents • Emission of volatile vapors	NA	NA	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternative 3: Capping exterior area with plain concrete cap	• Emissions & Noise (vehicles & equipment) • Waste concrete	-	-	+/-	NA	NA	NA	NA	NA	+	-	NA	NA
Alternative 3: Upgrading sewer and domestic water system	• Emissions & Noise (vehicles & equipment) • Waste pipes	-	-	+/-	NA	NA	NA	NA	NA	+	-	NA	+
Route from Remediated Site to Alexandria Hazardous Waste Landfill in Nasreya													
Alternatives 2,3: Transportation of Contaminated Soil, Hazardous Waste to Nasereya	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents • Spillage of hazardous waste or contaminated soil	-	-	-	NA	-	-	-	-	+	-	-	NA
Route from Remediated Site to Abu Zabaal Landfill													
Alternatives 2,3: Transportation of Non-hazardous Waste to Abu Zabaal	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents	-	-	-	NA	-	-	-	-	+	-	-	NA

- Negative Impact Positive Impact NA Not Applicable

Table 2: Summary of Potential Environmental Impacts During Remediation of Osama Zakaria smelter

		Environmental Attributes											
		Physical Environment					Biological Environment		Socio-economic				
Activities (Sources of Impacts)	**Aspects**	**Air Quality**	**Noise**	**Soil Quality**	**Groundwater Quality**	**Surface Water Quality**	**Terrestrial Life**	**Aquatic life**	**Public Health & Safety**	**Employment**	**Work place Health &Safety**	**Traffic**	**Utilities**
Shoubra El Kheima													
Alternative 1: ? No action	• Pollution sources persist	-	NA	-	-	-	-	-	-	NA	NA	NA	NA
Alternative 2: Dry Vacuum Cleaning with HEPA vacuum	• Dust Emissions • Emissions & Noise (vehicles & equipment) • Polluted Filters	-	-	NA	NA	NA	NA	NA	NA	+	+	NA	NA
Alternative 2: Wet Cleaning and Surface Preparation	• Contaminated Cleaning Mops • Spills of detergents	NA	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	NA
Alternatives 3,4: Demolition of smelter structure	• Demolition waste • Noise	NA	-	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternatives 3,4: Storage of Waste On Site	• Dust Emissions • Demolition waste	-	NA	-	-	NA	NA	NA	-	+	-	NA	-
Alternatives 2,3,4: Transportation of Material, Labor and Equipment to smelter Site	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents	-	-	NA	NA	-	-	-	-	+	-	-	NA
Alternatives 2,3,4: Washing of equipment and showering in decontamination chamber	• Contaminated wastewater	NA	NA	-	-	NA	NA	NA	NA	+	+	NA	NA
Alternative 4: Compaction of wreckage onto smelter area	• Dust Emissions • Noise and vibrations	-	-	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternatives 3,4: Capping smelter floor with plain concrete cap	• Emissions & Noise (vehicles & equipment) • Waste concrete	-	-	+/-	NA	NA	NA	NA	NA	+	-	NA	NA
Route from Smelter to Alexandria Hazardous Waste Landfill in Nasreya													
Alternatives 2,3,4: Transportation of Contaminated Soil, Hazardous Waste to Nasereya	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents • Spillage of hazardous waste or contaminated soil	-	-	-	NA	-	-	-	-	+	-	-	NA
Route from Smelter to Abu Zabaal Landfill													
Alternatives 2,3,4: Transportation of Non-hazardous Waste to Abu Zabaal	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents	-	-	-	NA	-	-	-	-	+	-	-	NA

- Negative Impact Positive Impact NA Not Applicable

Table 3: Summary of Potential Environmental Impacts During Remediation of Khaled Saad Smelter

		Environmental Attributes											
		Physical Environment					Biological Environment		Socio-economic				
Activities (Sources of Impacts)	Aspects	Air Quality	Noise	Soil Quality	Groundwater Quality	Surface Water Quality	Terrestrial Life	Aquatic life	Public Health & Safety	Employment	Work place Health &Safety	Traffic	Utilities
Shoubra El Kheima													
<u>Alternative 1:</u> ? No action	• Pollution sources persist	-	NA	-	-	-	-	-	-	NA	NA	NA	NA
<u>Alternative 2:</u> Dry Vacuum Cleaning with HEPA vacuum	• Dust Emissions • Emissions & Noise (vehicles & equipment) • Polluted Filters	-	-	NA	NA	NA	NA	NA	NA	+	+	NA	NA
<u>Alternatives 2,3,4:</u> Wet Cleaning and Surface Preparation	• Contaminated Cleaning Mops • Spills of detergents	NA	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	NA
<u>Alternative 2:</u> Containment/Storage of Waste On Site	• Dust Emissions • Spills of Wastewater and solid waste (hazardous & non-hazardous)	-	NA	-	-	NA	NA	NA	-	+	-	NA	-
<u>Alternative 2:</u> Transportation of Material, Labor and Equipment to Smelter Site	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents	-	-	NA	NA	-	-	-	-	+	-	-	NA
<u>Alternative 2:</u> Washing of equipment and showering in decontamination chamber	• Contaminated wastewater	NA	NA	-	-	NA	NA	NA	NA	+	+	NA	NA
<u>Alternative 2:</u> Interior and Exterior Wall Painting	• Waste paint & solvents • Emission of volatile vapors	NA	NA	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Route from Smelter to Alexandria Hazardous Waste Landfill in Nasreya													
<u>Alternative 2:</u> Transportation of Contaminated Soil, Hazardous Waste to Nasereya	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents • Spillage of hazardous waste or contaminated soil	-	-	-	NA	-	-	-	-	+	-	-	NA
Route from Smelter to Abu Zabaal Landfill													
<u>Alternative 2:</u> Transportation of Non-hazardous Waste to Abu Zabaal	• Dust Emissions • Vehicles Emissions & Noise • Traffic Accidents	-	-	-	NA	-	-	-	-	+	-	-	NA

- Negative Impact Positive Impact NA Not Applicable

APPENDIX C

SUMMARY OF SCOPING REPORT AND OTHER PUBLIC COMMENTS

LIFE-Lead was initiated on August 18, 2004. The expected completion date of the project was August 17, 2006, but has been extended through a contract modification that allows additional remediation activities until March 31, 2007. The project consists of two primary activities which are subsequently divided into tasks and subtasks that further define the work to be accomplished. Activity 1 includes the technical work required to complete site remediation activities. Activity 2 provides community awareness and communications support for the technical activities and is intended to raise the awareness of the community pertaining to environmental issues and concerns from industrial facilities.

Previous studies funded by the USAID have helped understand industrial pollution in Shoubra El Kheima. Background data collection activities associated with Activity 1 started in January 2006 to provide data relative to the present status of heavy metals contamination in the study area. Meetings and coordination with governmental agencies, NGO's, community representatives, smelter owners and others were held to facilitate the sampling and site characterization phase of the project and to collect primary data for the Environmental Assessment.

A Scoping Session was held in the Shoubra El Kheima City Council on August 9, 2006 in preparation for environmental assessments. The session focused on environmental issues related to the remediation activities at the three sites.

<u>Meetings with Governmental Agencies</u>

Meetings with EEAA--

<u>Working Group on EA/EIA</u>--

An EA/EIA Working Group was formed to facilitate the preparation of the EA. The working group consisted of staff from LIFE-Lead as well as the EEAA and GOQ. The EEAA staff included members from the EIA, Hazardous Waste, Hazardous Substances, Regional Branch, and Industrial Departments. The Working Group meets to prepare and discuss EA/EIA project components.

<u>Proposed Remediation Goals</u>--

Remediation clean-up goals have not been established in Egypt. Several meetings were held with the EEAA's Environmental Quality Sector, Hazardous Waste Department, and Environmental Health Department to discuss clean-up levels and to agree upon a procedure to establish clean-up levels.

The consensus was reached that clean-up levels would be set on a site specific case based on the results of a Human Health Risk Based Analysis. In addition, the EEAA agreed to set action levels that would trigger investigation of a potentially contaminated site.

Meetings with Governorate of Qalyoubia (GOQ)--

<u>GOQ-Shoubra El Kheima East District</u>--

Weekly meetings were convened with General Fawzy El Shamy, Head of Shoubra El Kheima East District. Although those regular weekly meetings were for the overall coordination of project activities; issues related to the EA/EIA tasks were also on the agenda at these meetings. The administration has also facilitated visits for the EA/EIA team to the three sites.

<u>Health Directorate</u>--

GOQ-Health Department--A meeting was held on Wednesday May 24, 2006 in Shoubra El Kheima City Council with the Health Department in Qalyoubia. The purpose of the meeting was to discuss the joint activities to be implemented by LIFE-Lead and Takamol projects including the remediation alternatives to be undertaken at the medical center.

GOQ-El Kablat Medical Center--The medical center employees and administration attended a planning session held by the project on Thursday August 3, 2006. The purpose of the meeting was to inform and coordinate with the center administration the upcoming site remediation activities.

Meetings with Community Representatives and NGO's--

Local NGO's attended the weekly meetings at Shoubra El Kheima East District. A meeting was held at the Shoubra El Kheima City Council with the Local Community Health Advisory Committee on Sunday March 26, 2006 in which the EA/EIA process was discussed and explained. Results of sampling at all sites to be remediated during the extension phase were presented and next steps were communicated with the attendees.

Meetings with the Smelter Owners--

The smelter owners/ representatives were invited to attend meetings with LIFE-Lead. This has been a significant factor in opening a forum with them on the different stages of the project. The process of the EA/EIA and the need for a defined future use for the sites were the primary issues discussed with the smelter owners and their representatives. An orientation session was held on Wednesday July 19, 2006 with Mr. Salah Saad (current occupant of Osama Zakaria smelter) and Tarek Amin and Atef Gad (current occupants of Khaled Saad smelter). This session was focusing on the negotiated agreements to be signed between the East District, EEAA, and smelters owners towards facilitating the remediation work of the project. In addition, owners/representatives were always involved and informed during site characterization and sampling activities undertaken by the project.

<u>Scoping Meeting</u>

The scoping meeting was held on August 9, 2006 in the Shoubra El Kheima City Council Main Hall. Presentations and comments at the meeting were in Arabic. Comments and statements by the participants were recorded. A scoping comments statement was provided to allow participants an opportunity to comment in writing if they were reluctant to provide verbal comments.

Ninety-nine invitations to stakeholders and individuals outside EEAA and the project team were circulated one week prior to the meeting. An announcement for the meeting was posted in the public announcements board at the Shoubra El Kheima City Council, Shoubra El Kheima East District five days before the meeting. Sixty-one participants registered at the meeting. A breakdown of the attendees is provided in the following:

- Four from the GOQ and Central Government Departments.
- Fifteen representatives from EEAA

- Five representatives of the Shoubra El Kheima East District.
- Eight representatives from the Education Directorate Agency for Educational Buildings and Schools.
- Five representatives from active local NGO's in the East District.
- Four representatives from the Youth Centers, and Cultural and Social Affairs organizations.
- Eleven representatives from the Health Directorate.
- Six representatives from universities, contractors, and consultancies.
- Three representatives from the local media and library.

In addition, two representatives from USAID, and nine members of the LIFE-Lead project team participated in the meeting.

The Head of Shoubra El Kheima City, Qalyoubia, General Mohamed Seif El Deen addressed the meeting in the opening session. Opening remarks by Eng. Ahmed Abou El-Soeud, Environmental Quality Sector, EEAA concluded the opening session.

Comments Received--

The comments session was moderated by Eng. Ahmed Abou El Seoud from EEAA. Seven participants outside the project team made statements. In addition, Dr. Fatheya Soliman, Mrs. Madiha Afifi, Dr. Heba Wafa and Eng. Dalia Nakhla from the project team, Eng. Ahmed Abou El-Seoud, EEAA, and Mr. Fawzy El Shamy, East District Head provided informational responses to comments or offered comments on behalf of EEAA and GOQ. A summary of the issues raised in these comments and to be addressed in the EA is presented below:

- Operation of the Medical Center during remediation
- Air Quality.
- Noise.
- Public Health and Safety.
- Workplace Health and Safety.
- Traffic.
- Additional Sampling of the Administration Building.

Written Statements Received--

During the meeting, participants were encouraged to provide written comments. A period of one week ending on Tuesday August 15, 2006 was announced as a deadline for submittal of written comments. One participant submitted written responses to the scoping comments statement.

<u>Scoping Statement</u>

The Scoping Statement for LIFE-Lead was submitted to the USAID Cairo Mission on August 22, 2006. The Scoping Statement was approved by USAID Washington in September 2006.

APPENDIX D

REFERENCES

Cairo Air Improvement Project (CAIP) (2003). Groundwater Investigation of a Secondary Lead Smelter In Shoubra El-Kheima Area. IWACO Egypt.

Cairo Air Improvement Project (CAIP). Preliminary Assessment (2002): Awadallah Secondary Lead Smelter in Shoubra El Kheima. Chemonics International, Inc. USAID/ Egypt, Office of Environment. USAID Contract No. 263-C-00-97-00090-00.

Chemonics International & Associates (1994). Comparing Heath Risks in Cairo, Egypt.

Egyptian Environmental Affairs Agency (2004). Air Monitoring Data for Shobra El Kheima.

Egyptian Environmental Affairs Agency (2005). Air Monitoring Data for Shobra El Kheima.

Egyptian Environmental Affairs Agency (2000): Air Quality in Egypt.

Egyptian Environmental Affairs Agency (1999). Freshwater molluscs of Egypt. Publications of the National Biodiversity Unit No. 10.

Egyptian Environmental Affairs Agency (1999). The study on water quality of the Nile River. Pp. 52.

Egyptian Environmental Affairs Agency (1997). Birds known to occur in Egypt. Publications of the National Biodiversity Unit No. 8.

Egyptian Environmental Affairs Agency (1997). Freshwater fishes of Egypt. Publications of the National Biodiversity Unit No. 9.

Egyptian Environmental Affairs Agency (1996): Guidelines for Egyptian Environmental Impact Assessment

Egyptian Environmental Affairs Agency (1995). Egypt country study on biological diversity. Publications of the National Biodiversity Unit No. 3.

Egyptian Environmental Affairs Agency (1993). Habitat diversity: Egypt. Publications of the National Biodiversity Unit No. 1.

Egyptian Environmental Policy Project (EEPP) (2003). Baseline Human Health Risk Assessment: Awadallah Secondary Lead Smelter. Cairo, Egypt.

Egyptian Meteorological Authority (1975) Climatic Atlas of Egypt, Arab Republic of Egypt, Ministry of Transport and communications.

IWAKO Egypt (2003) Groundwater Investigation of a Secondary Lead Smelter in Shoubra El Kheima Area. Draft Final report.

LIFE-Lead (2005) Baseline Human Health Risk Assessment. Millennium Science and Engineering, Inc. USAID/ Egypt, Office of Environment.

LIFE-Lead (2006) Evaluation of Remedial Alternatives. Final Draft. Millennium Science and Engineering, Inc. USAID/ Egypt, Office of Environment.

USEPA (2003) U.S. Environmental Protection Agency, Superfund Lead- Contaminated Residential Sites Handbook. OSWER 9285.7-35.

Usher, M.B.(1995). A world of change: Land-use patterns and arthropod communities. In: Insects in a changing environment; Harrington & Stork, Edts. AP, pp. 535.

US-EPA (1997). The Benefits and Costs of the Clean Air Act, Final Report to Congress on Benefits and Costs of the Clean Air Act, 1970 to 1990. EPA-410-R-97-002. US Environmental Protection Agency

U.S. Environmental Protection Agency (2003). Handbook for Non-cancer Health Effects Valuation. Non-Cancer Health Effects Valuation Subcommittee of the EPA Social Science Discussion Group. EPA Science Policy Council. US Environmental Protection Agency. Washington DC.

The World Bank (1996). The World Bank Policies and Guidelines.

World Health Organization (2000). Guidelines for Air Quality. Geneva, World Health Organization

World Health Organization (2003). Assessing the Environmental Burden of Disease at National and Local Levels. Environmental Burden of Disease. Series 2- Lead. WHO, Geneva.

APPENDIX E

LIST OF ASSESSMENT PREPARERS

NAME	DEGREE	POSITION
Kirk Ellis	Geological Engineering	LIFE-Lead COP
Fatheya Soliman	PhD. Mechanical Engineering	Technical Design Manager
Dalia Nakhla	MSc. Environmental Engineering	EIA Expert
Heba Wafa	Dr. Public Health	Health Risk Assessment Specialist
Magued Youssef	MSc. Environmental Science & Policy	Technical Planning Coordinator