Environmental Impact Assessment
Delta Solb Preparatory School

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

June 4, 2006

This publication was produced for review by the United States Agency for International Development. It was prepared by Millennium Science and Engineering Inc., in cooperation with Chemonics International.

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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.

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ACRONYMS

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
ER	Executive Regulations
ERP	Emergency Response Plan
FEED	Front End Engineering and Design
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
RBRG	Risk-Based Remediation Goal
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
XRF	X-Ray Fluorescence

Symbols for Metals

As	Arsenic
Cd	Cadmium
Cr	Chromium
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)

PROJECT DESCRIPTION

LIFE Lead Project

The Livelihood and Income from the Environment, Lead Pollution Clean-up in Qalyoubia project (LIFE-Lead) is funded by the United States Agency for International Development (USAID) and 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 completion date has been extended from August 17, 2006 to March 31, 2007 to allow for the remediation of the Delta Solb (Delta for Steel) Preparatory School, the El Kablat Medical Center, and the Osama Zakaria Secondary Lead Smelter. The Delta Solb Preparatory School remediation is scheduled to begin on or about June 15, 2006 during the school's summer recess.

The project extension will allow for the remediation of the Delta Solb Preparatory School, the El Kablat Medical Center, and the closed Osama Zakaria Secondary Lead Smelter. In addition to site remediation, the project includes activities in community involvement and public participation, communications, capacity building, and policy/legal support.

This EIA is a follow-up to the previous EIA studies conducted by the project during Phase I. Table 1 summarizes the dates for the submittal and approval of each EIA for sites previously remediated by the project during 2005 and 2006.

Table 1: EIA Studies for Remediation Sites in Shoubra El Kheima

Site	EIA Submittal Date	EEAA Response Date
El Shahid Ahmed Shaalan School	May 31, 2005	June 29, 2005
Awadallah Secondary Lead Smelter Sites (1,2 & 3)	November 14, 2005	December 25, 2005
Seoudi Secondary Lead Smelter	December 8, 2005	January 3, 2006
El Mahy Secondary Lead Smelter	December 18, 2005	January 29, 2006

Scope of the EIA

This Environmental Impact Assessment (EIA) focuses on the remediation activities that will take place in the Delta Solb Preparatory School. A number of proposed remediation alternatives are compared with respect to their environmental impact in order to select the option with the least impacts and maximum long term benefits. The selected option is subjected to more detailed analysis with the aim of evaluating its potential environmental impact. In addition, a set of mitigation and monitoring measures are recommended to minimize the impact of the selected remediation alternative on the environment.

The assessment covers the proposed on-site clean up activities (e.g., playground and building remediation); as well as the transportation of the generated waste to the appropriate waste disposal sites. The scope of the EIA does not include assessment of final waste disposal activities since the contaminated waste will be disposed in a licensed hazardous waste landfill and the non-contaminated waste will be disposed in a licensed sanitary landfill. These landfills are designed and managed according to the type of waste they are licensed to receive.

This EIA involved a public consultation process, where the concerned stakeholders were consulted at the scoping stage to identify their concerns towards project implementation. All

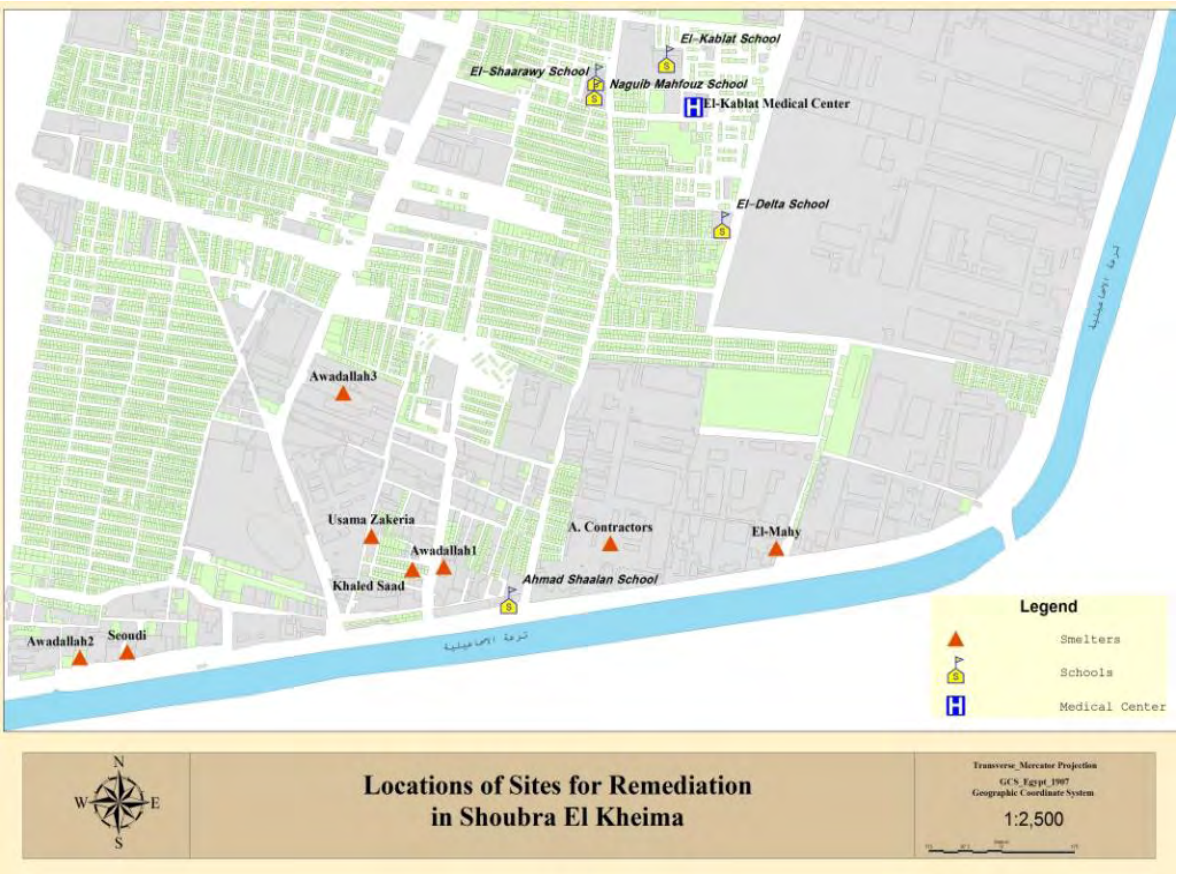
issues and concerns, relevant to the remediation activities, raised during public consultation were considered in this EIA.

Project Setting

Location--

All of the sites that will be 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 for both the original scope of work and the extension phase are presented in Figure 1.

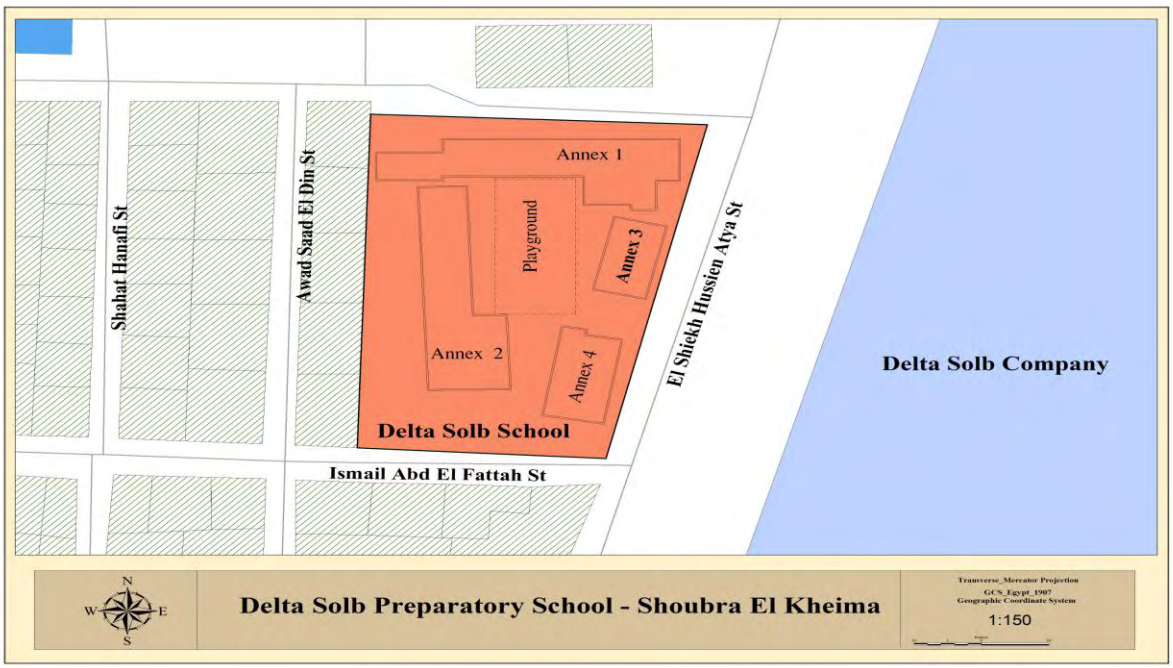
Figure 1: Locations of the Sites for Remediation



School Facilities and Conditions--

The Delta Solb Preparatory School is located on El Rashah Street, Shoubra El Kheima East District, GOQ. The school lies within a mixed residential/industrial area at the west side of the Delta Steel Company, the largest steel mill in the GOQ, and is bordered by unpaved streets as shown in Figure 2. The school property encompasses an area of 2,825 m^2. It consists of three old multi story buildings that were built in 1973 and a relatively new one that was built in 1997. These buildings occupy approximately 1,012 m^2 of the overall site footprint. The school accommodates approximately 1,182 students between the ages of 11 to 14 years.

Figure 2: Location of Delta Solb Preparatory School



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.

The Baseline Human Health Risk Assessment (BHHRA)conducted for the Delta Solb Preparatory School assessed the potential human health risks associated with carcinogenic and non-carcinogenic heavy metals of concern in surface soil. The non-carcinogenic hazard index (HI) is 1.6, indicating a potential health hazard may exist. Approximately 66% of this HI is attributed to antimony, 21% to arsenic, 11% to cadmium, and 2% is due to exposure to antimony in soil at the playground.

The carcinogenic risk to children at the school is 9×10^{-6} indicating that corrective action may be necessary. This cancer risk is due to exposure to arsenic in soil at the playground. The health protective remediation goal, given the site specific exposure, for arsenic in soil is 3.2 mg/kg.

Cadmium, chromium, and antimony concentrations in wipes collected from inside the school (i.e., walls, windows, desks and other hard surfaces) exceeded the USEPA health-based benchmarks for indoor environmental and residential clean-up efforts in lower Manhattan following the September 11 attacks on the World Trade Center.

There are currently no cleanup standards for heavy metals in soil, dust, or wipes in Egypt. Therefore the objective is to identify preliminary risk-based remediation goals (RBRG) for heavy metals in soil and/or dust and benchmark for wipes at the Delta Solb Preparatory School. Table 2 provides the RBRG for heavy metals in surface soil and wipes for the school.

Table 2: RBRG/Benchmarks for Surface Soil and Wipes

RBRG and/or Benchmark	Arsenic (As)	Cadmium (Cd)	Antimony (Sb)	Chromium (Cr VI)
RBRG in surface soil (mg/kg)	3.2	250	120	897
Dust wipe levels (Health Based Benchmark by USEPA - µg/ft^2)	36	145	58	437

Sampling and Site Characterization--

Sampling and Analysis Plan--

Three different sampling methods were used during the sampling program at the Delta Solb Preparatory School. The first method was bulk surface soil and dust sampling. Bulk surface soils samples where collected from bare soil areas outside the school buildings, mainly the school playground and two backyard areas (Appendix A, Exhibit 1). Dust sampling was used where dust has accumulated in piles or in layers on the floors within the interior buildings of the school such as classrooms and the building corridors.

The second method was digging boreholes and collecting soil samples at depths up to 1.5 meters, from bare soil areas outside the school buildings, mainly the school playground and two backyard areas (Appendix A, Exhibit 2). The third method was dust wipe sampling which is used on walls, windowsills, and student desks where there is a minor accumulation of dust.

The total samples collected were twenty-one (21) dust samples, twenty-seven (27) bulk surface samples, twenty-six (26) subsurface samples, and thirty-seven (37) wipe samples. Table 3 provides the types and locations of samples for each of these three methods.

Table 3: Types and Locations of Samples for Delta Solb Preparatory School

Type of Sample	Locations	Number	Total	Remarks
Bulk Surface Soil	Playground and backyard areas	27	74	27 locations
Bulk Subsurface Soil	Playground and backyard areas	26		Up to 1.5 m depth in 8 locations
Dust	Inside classrooms and corridors	21		
Wipes from Walls	Inside and outside classrooms	14	37	
Wipes from Windowsills	Inside Classrooms	11		
Wipes from Desks	Inside Classrooms	12		

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. Table 4 provides the results of the analysis of the heavy metals in the different school media and compared to the proposed remediation goals.

Table 4: Results of Analysis of Samples for Delta Solb Preparatory School

Type of Sample	Arsenic (As)	Cadmium (Cd)	Antimony (Sb)	Chromium (Cr)
Bulk Soil/Dust RPRG (mg/kg)	**3.2**	**250**	**120**	**897**
Average Surface Soil (mg/kg)	22	43	107	168
Average Subsurface soil (mg/kg)	10.5	105	157	95.7
Average Dust (mg/kg)	9.37	68.02	160.06	51.85
Wipes (Health Based Benchmark by EPA- µg/ft^2)	**36**	**145**	**58**	**437**
Average Wipes - µg/ft^2	9	2,708	12,618	885

The site characterization conducted as part of the LIFE-Lead activities revealed the following:

- Contamination levels of lead, chromium, and cadmium in bulk samples are insignificant.
- Significant contamination levels of arsenic and antimony are the primary concern in bulk and borehole samples and warrant remediation.
- For wipe dust samples taken inside the buildings of the school, contamination levels of lead and arsenic are insignificant.
- For wipe dust samples taken inside the buildings of the school, contamination levels of chromium, cadmium and antimony are significant and warrant remediation.

Given these results, LIFE-Lead has recommended the following:

- The main playground area and backyard areas should be remediated to reduce exposure to heavy metals in the soil.
- School buildings should be remediated to reduce exposure to heavy metals on walls, floors, and windows.

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 school.

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

Construction Activities--

Four remediation alternatives were developed for the Delta Solb Preparatory School. Alternative 4 is the recommended alternative and consists of the following major activities:

Playground Remediation--Capping of the playground area which includes:

- Placing hard tiles at the school entrance
- Building a wall between the main playground area and the ground floor corridors
- Placing a hard cap on the main playground using a plain concrete layer.
- Placing a hard cap over all backyards using interlocking tiles.

Remediating the school fence which involves:

- Cleaning the fence using a High Efficiency Particulate Air (HEPA) vacuum, performed until all visible materials are removed.
- Repairing and painting the fence.

Removing debris resulting from activities:

- The XRF shall be used in the field by LIFE-Lead staff to determine the level of contamination.
- Loading and hauling non-hazardous debris to the Abu Zaabal Landfill.
- Loading and hauling hazardous waste debris to the Alexandria Hazardous Waste Landfill.

Building Remediation Work--Cleaning interior surfaces includes:

- Cleaning interior surfaces of all rooms and corridors shall be performed using a HEPA filter equipped vacuum cleaner to remove fine particles from floors and walls.
- Removing existing paint layer only (no plaster removal is required). Manual methods may be used.
- Removing tiled floors from rooms and corridors of the old buildings.
- Re-cleaning walls shall be performed using a HEPA filter equipped vacuum cleaner to ensure that walls are dust free.
- Dismantling/removing existing windows, doors, and appurtenances.
- Decontaminating (wet mopping) dismantled windows, doors, and appurtenances.
- Loading and hauling hazardous waste debris to the Alexandria Hazardous Waste Landfill. The XRF shall be used in the field by LIFE-Lead staff to determine the level of contamination.

Cleaning exterior surfaces includes:

- Removing the paint layer from exterior surfaces (no plaster removal is required) for the old buildings. Pressurized washer or sand blasting is not allowed; manual methods may be used.

- Cleaning of exterior surfaces of all buildings using a HEPA filter equipped vacuum cleaner to ensure that walls are dust free and ready for painting.
- Cleaning the exterior surface of the new building (rosy brick) using a high pressure washing machine; water shall be collected using HEPA vacuum machine. The smooth surface of the new building (fitesa) shall be wet mopped.
- Used water shall be tested before disposal.
- Loading and hauling contaminated soil to the Alexandria Hazardous Waste Landfill. The XRF shall be used in the field by LIFE-Lead staff to determine the level of contamination.

Building improvements include the following:

- Replacing windows (aluminum glazed windows shall be used), window frames, and moldings. Forged iron meshes (crital) shall be installed with windows in the ground floor, computer room, and multi media rooms.
- Replacing doors, jams, and moldings.
- Painting the interior wall of all rooms with primer and finish coats.
- Painting exterior walls.
- Loading and hauling debris to the Abu Zaabal Landfill.

Since the school is currently in active use, remediation activities will need to be conducted during the school's summer break. The remediation activities at the Delta Solb Preparatory School are scheduled for the period of June through September 2006.

Operation and Maintenance--

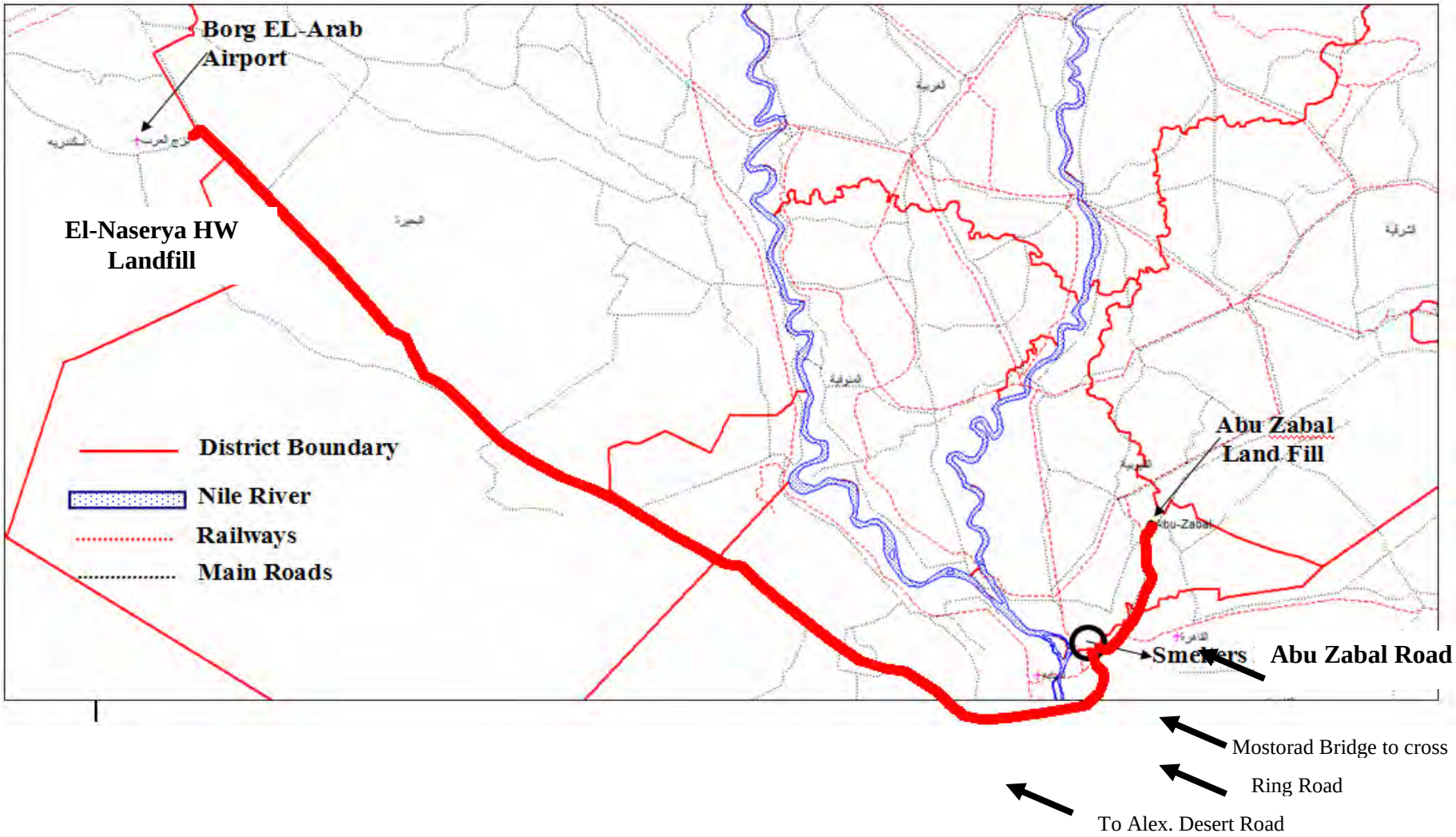
The proposed remediation action posses good short-term effectiveness when building surfaces are properly prepared. Long-term effectiveness will depend on coating maintenance and the ability to control dust from outside sources and/or education/training of students, teachers, and administrators. Long-term maintenance costs may marginally increase the cost of conventional janitorial services and recurring painting costs. As for capping of the playground area, the expected life of the Alternative 4 hard cap is twenty years, while the proposed Alternative 3 soft capping will need to be replaced annually.

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 3).

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 3).

Figure 3: Transportation Routes to Waste Disposal Sites; El Nasreya and Abu Zabaal



Future Conditions without the Project

Without the project, the polluted media (i.e., playground, back areas, 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 students and workers in the Delta Solb Preparatory School. Exposure to the contaminants found in the Delta Solb Preparatory School can cause the following adverse health effects:

- 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 US 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 throat 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 extended periods of 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

ALTERNATIVE REMEDIATION ACTIONS

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 selected remediation alternative is described in Alternative 4 below. The following provides a summary description of the other alternatives evaluated.

- Alternative 1: No-Action.

- Alternative 2: Interior School Cleaning and Site Management**.** Alternative 2 includes the same activities of proposed action described in alternative 4 except that it does not include soil remediation and wall painting.

- Alternative 3: Interior School Cleaning/Coating, Soft Capping, and Site Management. Alternative 3 includes the same activities of proposed action described in alternative 4 except that it includes soft capping and not concrete.

- Alternative 4: Interior School Cleaning/Coating, Soil Capping, Landscape, and Site Management. This is the proposed action described above. Covered areas will be re-developed consistent with school recreational uses.

Comparative Analysis of Remediation Alternatives

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 students and workers in the school.

Comparison of Alternatives--

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, the Education Directorate of Shoubra El Kheima and USAID as being the best alternative that could be accomplished within available funding.

The detailed design is underway for the School. It may be slightly modified prior to implementation. As such, Table 5 provides 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. The methodology used for identification and assessment of the potential impacts associated with project activities is described in detail in Appendix B.

Table 5: Comparison of Alternatives for the Delta Solb Preparatory School

Short Term Impacts	Long Term Impacts/Benefits
Alternative 2: Interior School Cleaning and 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 school buildings and its interior surfaces, 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 playground, 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 school buildings, which will regenerate the health problems presently encountered. The students will still be exposed to the contaminated soil in the playground 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: Interior School Cleaning/ Coating, Soft Capping, and Site Management	
This will result in incremental short-term environmental impacts to the impacts already encountered in Alternative 2 due to the environ-mental aspects resulting from the following extra activities: • Covering with compacted soil.	This alternative will result in the remediation of the school buildings and its interior surfaces as well as the playground through providing a soft cover over the contaminated soil. The covering must be replaced annually. This alternative will result in long-term

Short Term Impacts	Long Term Impacts/Benefits
• Transportation of waste. Environmental concerns associated with these activities include increased dust and fugitive emissions, noise, traffic, transportation accidents, and spills.	environmental benefits to the environmental quality of the area and the health of the public, school students, and workers. From an environmental standpoint, this alternative is recommended.
Alternative 4: Interior School Cleaning/ Coating, Soil Capping, Landscape, and 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: • Placement of concrete cap. • Transportation of waste. 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 school buildings and its interior surfaces as well as the playground through provision of 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, school students, and workers. From an environmental standpoint, this alternative is recommended.

From an environmental standpoint, Alternatives 3 and 4 are equally recommended for the site. The choice of the proposed alternative depends on other factors that 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 the expected cost of the four alternatives under investigation, in order to propose the alternative with the most cost effectiveness.

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

Prior to the beginning of remediation, baseline environmental conditions will be defined for monitoring during the remediation activities. Baseline conditions will be established for air quality, noise, and soil. The baseline conditions will be used to monitor the remediation activities impact to the environment and to insure that mitigation measures are established and functioning properly.

Baseline Conditions--

<u>Air Quality</u>--

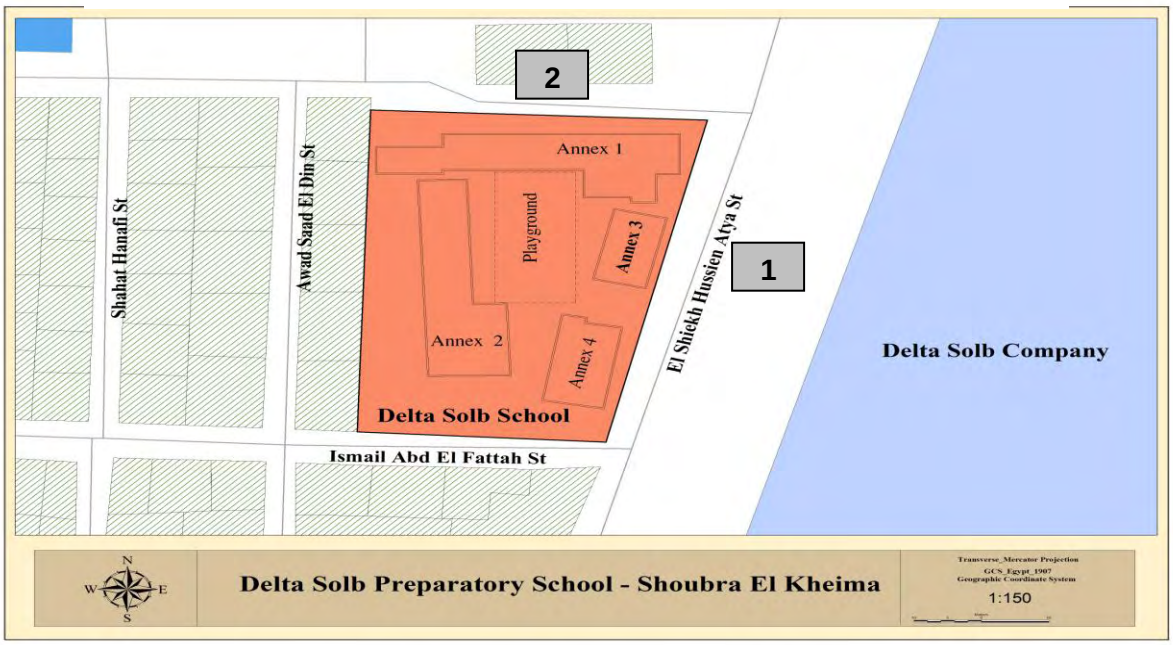
During the period from October 1998 to July 1999, high particulate matter PM10, PM2.5, and lead were detected (CAIP,2002). PM and lead were monitored in 36 sites in Greater Cairo. The results indicated that, in the industrial area of Shoubra El Kheima, the highest mean inhalable PM was found to be 313 $\mu g/m^3$ 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. Two monitoring locations were chosen next to the main noise sources as well as the sensitive receptors around the school as shown in Figure 4.

Figure 4: Noise Monitoring Locations



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 6. The measured noise levels at locations 1 and 2 during daytime, evening and night are in compliance with the limits of Law 4/94. However, noise readings taken during the daytime and evening was higher than night readings due to the presence of traffic.

Table 6: Results of Baseline Noise Monitoring Survey for Delta Solb Preparatory School

Location		Measured Noise Level, dB(A) and Noise Limit								
		Day			Evening			Night		
		7 am – 6 pm			6 pm – 10 pm			10 pm – 7 am		
1	Between Delta Steel Factory and School	54	56	61	47	46	50	44	45	48
2	Between School and Residential Area	57	60	55	51	53	50	49	48	46

ENVIRONMENTAL IMPACTS

This EIA focuses on the remediation activities that will take place at the Delta Solb Preparatory School. 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 EIA 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 EIA also involved a public scoping process, where concerned stakeholders were consulted at the scoping stage of the EIA 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 EIA.

The methodology used for identification and assessment of the potential impacts associated with project activities is described below.

Impact Evaluation

After considering the project interaction with the previously described receptors, certain interactions with other receptors still remain. These include primary and higher order impacts of the proposed project. Such impacts were then evaluated based on the following criteria:

- 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.

Positive Impacts--

Remediation of the existing site will lead to the following long-term positive impacts:

- Remediation of existing site will lead to long-term improvement in the soil within the remediated site and in the neighborhood due to the removal and/or treatment of the contaminated soil.

- Improvement of the health of the students, school workers and teachers through the removal/treatment of the persistent source of heavy metals hazard.

- Improvement of the quality of life due to improvement of the air quality in the project area.

- Remediation of school 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.

- This is one of the first site remediation projects in Egypt and it is anticipated to initiate new hazardous waste site remediation businesses. A cadre of specialized construction contractors and workers have been trained as part of the project to remediate heavy metals contaminated sites.

- Water, wastewater, gas pipelines, and electricity cables will not be renewed by GOQ. The contractors selected to perform the remediation will be responsible for working with the GOQ to upgrade the deteriorating underground utilities.

No Impacts--

Examination of the environmental setting of the area in which the project is located has shown that project activities will not interact with some of the receptors and so there will be no direct impact on these receptors including:

- Impact of On-site Remediation Activities on Terrestrial Life. The school site lies within an industrial area that is devoid of sensitive terrestrial fauna and flora except for some common trees and plants that already have lead dust deposited on their leaves. Remediation activities will not therefore have any additional direct impacts on terrestrial life.

- Impact of the On-site Remediation Activities on Surface Water Quality and Marine Life. All remediation activities that will be carried within the school boundaries will be contained within the site and thus there will be no direct impact on the Ismailia Canal or its aquatic life.

- Impact of Remediation Activities on Groundwater. There will be no direct contact between the remediation and clean-up activities carried out within the school buildings and the groundwater. Moreover, no excavation works will carried out at the site. Therefore, there will be no direct impact from these activities on the groundwater.

- Impact of Remediation Activities of Buildings and Surfaces on Public Health and Safety. All remediation activities carried out within the school buildings will be contained within decontamination zones and areas of exclusion. Therefore, their emissions will not reach the neighboring communities and thus there will be no impact on the public health and safety.

Negative Impacts--

A number of potential negative impacts associated with on site remediation activities and transportation of waste to final disposal are evaluated below. Insignificant impacts are disregarded while mitigation measures are proposed to prevent/minimize significant negative impacts.

Air quality (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 on site include the following:

- Decontamination activities.
- Vacuum cleaning and pressure washing.
- Removal of old paint.

- Wind erosion of exposed waste material or soil.
- Construction equipment and machinery.

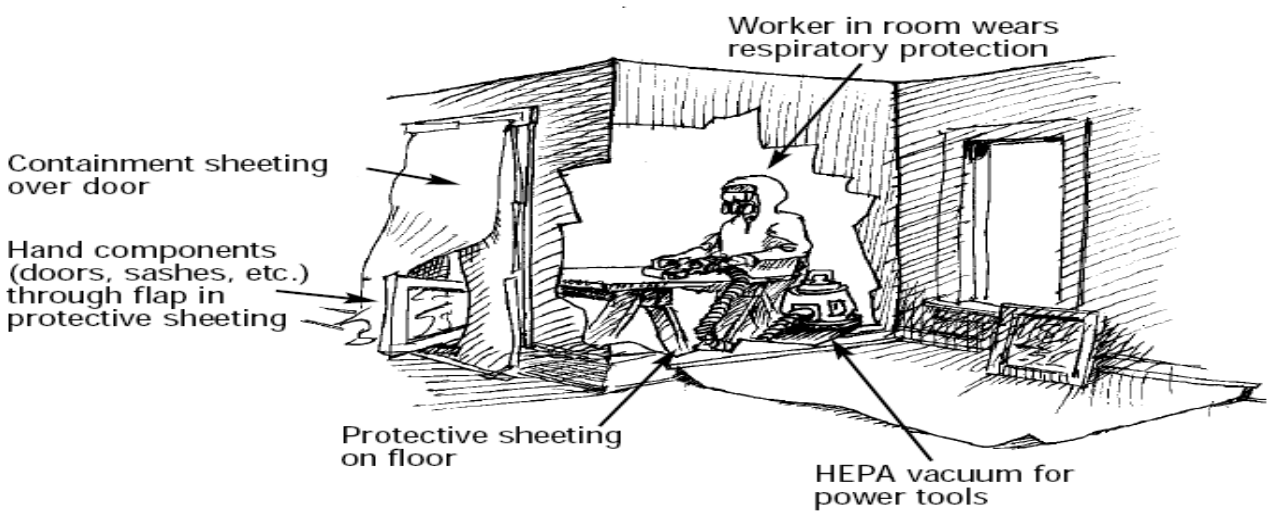
Transportation of raw material, labor, and equipment to the School site and transportation of the contaminated waste from the School site to its final disposal site will have impacts on the air quality and noise levels along the transportation route.

Mitigation Measures--To contain dust generation during remediation and clean-up activities, decontamination areas will be established to isolate the activities and prevent heavy metals contaminated dust from emitting to the atmosphere (Figure 5). The decontamination areas will be equipped with 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 to the appropriate disposal site. Dust generated during loading and transportation will be controlled with windscreens (plastic sheets) and water spraying to suppress dust as needed.

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.

Residual Impact-- Acceptable under normal operation conditions, however, regular periodic monitoring is done to ensure compliance to standards.

Figure 5: Containment of Indoor Remediation Activities



<u>Noise (Short Term Direct Avoidable Negative Impacts)</u>--

During the implementation of the remediation activity, noise will arise mainly from the equipment used for dry buildings cleanings (e.g., High Efficiency Particulate Air (HEPA)).

Table 7 shows the average noise level, in decibels, at a distance of 20 m between an observer and the source of noise.

Table 7: 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 activity 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 the generated waste to the disposal sites. This will lead to an increasing neighborhood noise levels.

Mitigation Measures--When construction equipment is used, such as during the site 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 are periodically maintained to minimize noise levels to design limits. Monitoring will ensure that the noise levels are kept below legal limits set forth in Law 4/1994.

Residual Impact-- Acceptable under normal operation conditions, however, regular periodic monitoring will be done to ensure compliance to standards.

Soil (Short Term Direct Avoidable Negative Impacts)--

The impacts on the soil within the school boundary from soil capping or replacement will have a positive, rather than a negative impact, on the soil quality that was treated. However, dust resulting from covering of soil may have negative impacts on the soil quality out of the school boundaries if it is not prevented from forming or not properly contained.

Moreover, the soil quality along the transportation routes to the school and from the school to the disposal sites could be negatively impacted if the transported material or waste was not properly contained or if contaminated emissions were wind blown and deposited on soil. This impact could be significant if the soil on which the contaminated dust deposit is of high economic value (e.g. agricultural land).

Mitigation Measures-- 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. The storage tanks will be frequently inspected for leaks and damage.

Residual Impacts-- Acceptable if mitigation measures are applied and site management practices are applied.

Public Health and Safety (Short Term Direct/Indirect Avoidable Negative Impacts)--

Remediation activities especially those done outside the contamination chambers such as concrete placement could disturb the neighboring residents and impact their health through

inhalation of released emissions or dust or through oral intake if the contaminant reaches the food chain.

Public health and safety could be jeopardized by the risk of accidents due to increased traffic in the school area and along the transportation routes to disposal sites.

Mitigation Measures--The project is located in an industrial area where the residents live with noise and dust that may not occur in other residential areas. In addition, air pollution controls will be provided as mentioned earlier. Containment of remediation activities and the establishment of decontamination chambers during school remediation and clean-up activities as well as dust suppression measures such as water spraying will greatly reduce the impact on neighboring communities.

Proper training of drivers on defensive driving and by frequent inspection of the haul trucks will greatly reduce the risk of accidents.

Residual Impacts-- Acceptable if mitigation measures are applied and site management practices are applied.

Work Place Health and Safety (Short Term Direct Avoidable Negative Impacts)--

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

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

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

- Contractor's employees involved in any remediation activities 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 contractor employees working on the project. The contractor must, at a minimum, provide all required personal protection equipment (PPE), personal decontamination stations, personal 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., the design of the decontamination areas in which the workers will operate will ensure proper ventilation and dust collection).

- Personal Protection 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 provided 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.

Residual Impacts--Acceptable, if mitigation measures are applied and site management practices are applied.

Traffic (Short Term Direct Avoidable Negative Impacts)--

Heavy traffic during remediation activities will be experienced in the area around the school 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 school 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.

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.

ENVIRONMENTAL MANAGEMENT PLAN

Components

The Environmental Management Plan (EMP) consists of the following components:

- Mitigation measures to identify feasible and cost effective measures that will reduce potentially significant adverse environmental impacts to acceptable levels.

- Monitoring and validation during and after project implementation to provide information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures.

- Emergency response plan to manage risks that might occur during the different project phases.

- Capacity development and training of the project workforce to support timely and effective implementation of environmental project components and mitigation measures.

Management Measures

Environmental management of the project started early in its life cycle with a “prevention” rather than “mitigation” approach. This proactive approach ensured that as many impacts as

possible are taken into consideration in the planning phase and therefore are already mitigated.

Other impacts were mitigated by the incorporation of mitigation measures in the project design and others through the incorporation of management measures. Management principles that will be integrated in the specific management plans during the different project stages include the following:

Commissioning Phase--

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

Health and Safety--

The following health and safety issues will be incorporated into the EMP:

- 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.

Implementation Phase--

The following topics will be included in the Implementation Phase of the EMP.

Emissions 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 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 to auxiliary material, such as chemicals. Chemicals will be properly labeled with their name, date of purchase, and date of expiration.

Waste Management--

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

- 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

Monitoring Plan

The monitoring program is an essential element of the environmental management scheme of the project. It provides information for periodic review and adjustment of the EMP as necessary. This ensures that environmental protection is achieved through early detection of negative environmental impacts.

Monitoring programs will be designed for the different parameters. The monitoring results will be fed into the decision making process as a trigger for the implementation of corrective actions, in order to maintain compliance with environmental laws and regulations, ensure environmental protection, and workplace safety, as well as to ensure appropriate operation of the mitigation measures and management plans. The monitoring results will be included in the environmental register of the project, as indicated by Law 4/1994.

Environmental Monitoring--

A monitoring program will be required during and after the implementation of the chosen alternative. Monitoring and analysis during the Implementation Phase will also provide important data for the validation phase of the contaminated land management process.

Within the monitoring program, instrumentation and its detection limits will be specified. Prior to commencement, the monitoring instruments will be checked and calibrated. Monitoring can be carried out by those implementing the chosen alternative or by an independent organization.

Monitoring of Air Quality--

As mentioned earlier, degradation of air quality negatively affects human health and the environment. Ambient air quality data in the vicinity of the school will be collected prior to the start of remediation, in collaboration between the contractor, LIFE-Lead, and EEAA. This data will be used to monitor air quality during remediation. Therefore, it is important to monitor the air quality parameters that might negatively affect different environmental elements. Parameters that will be monitored include:

- Dust, including inhalable particulate matter (PM10), Cd and As.

Monitoring of Noise--

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

Risk Prevention and Emergency Response Plan

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 lead 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.

The ERP was developed for the remediation option which was deemed most favorable 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 8 provides a detailed summary of the environmental risks.

Table 8: Summary of Environmental Risks

Hazard Type	Prevention Measure	Hazard Rating	Response (Table 9)
Onsite Storage and Handling of Hazardous Materials			
Spills associated with liquids, causing impact to soil, possibility of fire erupting	Worker's training on chemical handling and storage, provision of proper containment mechanisms	Moderate	SP, ME, FE
Hazards associated with human contact with chemicals	Workers' training, strict operational procedures, containment	Moderate to high	SP, ME
Cleaning of the School Interior Building and Building Improvements			
Accidents involving workers slipping, tripping, or falling; and resulting from the use of equipment	Worker's training, use of PPE at all times, exercising common sense, using harness and wires when working at elevated surfaces.	Low to moderate	ME

Hazard Type	Prevention Measure	Hazard Rating	Response (Table 9)
Transportation Accidents			
Accidents during transportation causing personal injury, 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, escort service as much as practicable, especially during risky reaches	Moderate to high (human error is an important factor that needs to be managed)	TR

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 9.

Table 9: 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 school site, 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.

INTERAGENCY COORDINATION AND PUBLIC CONSULTATION

Interagency Coordination

Interagency coordination is crucial for an effective EIA because environmental issues in their complexity and variety are often inter-sectoral and regional. The authority and responsibility to deal with them (to collect information, prepare plans, approve designs, issue permits, and regulate activities, etc) is spread over a number of agencies at all governmental levels.

Before project consultations, it was necessary to identify the project's stakeholders. This step was based on careful analysis of the institutional, legal, and administrative framework of this type of project. Preliminary site surveys have also assisted in the identification of the communities affected by the project and of local NGOs with environmental interests in the project. In addition, more stakeholders have been identified during meetings with key agencies and interviews with officials and the public. A list of the stakeholders identified during this process and their relevant interest in the project is given in Table 10.

During the course of the present EIA, interagency coordination has been achieved through interagency or individual agency meetings. These meetings aimed to provide the following:

- Inform all interested agencies about the project and the intention to prepare an EIA.
- Seek their views throughout the process regards identified pertinent issues.
- Discuss any special types of analysis required, data sources, management procedures, responsibilities, and schedules.

Table 10: Stakeholders and Their Relevant Role/Interest in the Project

Stakeholders	Role/Interest
Egyptian Environmental Affairs Agency (EEAA): • EIA Department • Hazardous Substances and Waste Departments • Industrial Departments • Environmental Health Department • Cairo Regional Branch Office	Overall coordinating body of monitoring, enforcement and regulating developments through setting the EIA system, the use of hazardous substances in coordination with concerned and responsible authorities, and determining clean-up levels.
Education Directorate and the Agency for Educational Buildings	Discussion of the school activities to be implemented by the project including the sampling activities to be undertaken for the site characterization.
Governorate of Qalyoubia (GOQ)	Legal/administrative role on the local level.
Environmental Management Unit, (GOQ)	Preliminary revision of the EIA to be send to the EEAA.
Shoubra El Kheima East District	Provide some services to the project while considering possible socioeconomic impacts.
NGOs and/or representatives of the public (city council members)	Safeguard the environment and influence decision making.
Scientific communities	Research in related topics and influence decision making through public channels.
Local residents	Affected community.

Outputs of the consultation/coordination meetings directly assisted in finalizing the scope and depths of the EIA. A summary of the meetings is presented below.

Meetings with Governmental Agencies

Meetings with EEAA--

Working Group on EA/EIA--

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.

Proposed Remediation Goals--

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)--

GOQ-Shoubra El Kheima East District--

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 Delta Solb School site.

Education Directorate and the Agency for Educational Buildings--

GOQ-Education Department--A meeting was held on Sunday April 2, 2006 in the office of the General Manager of the Education Department in Qalyoubia. The purpose of the meeting was to discuss the school activities to be implemented by the project including the remediation alternatives to be undertaken at the school.

GOQ-Delta Solb School--Delta School teachers and administration attends main community outreach session held by the project. A meeting was held with Delta Solb school teachers and management on Sunday March 26, 2006 and included representatives from the Qalyoubia Education Department. The purpose of the meeting was to inform and coordinate with the school administration the upcoming site remediation alternatives.

Meetings with Community Representatives and NGO's

Local NGO's attended the weekly meetings at Shoubra El Kheima East District. A meeting was held with the Community Advisory Committee on Sunday March 26, 2006 in which the EA/EIA process was discussed and explained. This served as a step prior the actual

scoping session to obtain their thoughts on the remediation process and to encourage them to attend the Scoping Meeting.

Public Consultation (Scoping Meeting)

The scoping meeting was held on April 5, 2006 in the Shoubra El Kheima City Council Chamber 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.

The participants were given until Tuesday April 11, 2006 to provide their written comments if not delivered during the scoping session. A detailed summary of the participants' remarks and scoping statement responses is provided in Appendix C.

The Governor of Qalyoubia, H.E. Adly Hussein addressed the meeting in the opening session. The Minister of State for Environmental Affairs Dr. Magued George nominated Dr. Mawaheb Abou El Azam, Head of Environmental Quality Sector in EEAA to represent the Ministry and address the attendees at the meeting. Opening remarks by Mrs. Amani Gamal El Din, USAID Environment Office concluded the opening session.

Eighty- one 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, and Delta Solb School five days before the meeting. Seventy-six participants registered at the meeting. A breakdown of the attendees is provided in the following:

- Five from the GOQ and Central Government Departments.
- One representative from the parliament.
- Eleven representatives from EEAA
- Nine representatives of the Shoubra El Kheima East District.
- One representative from the Shoubra El Kheima West District.
- Twelve representatives from the Education Directorate Agency for Educational Buildings and Schools.
- Five representatives from active local NGO's in the East District.
- Seven representatives from the Youth Centers, and Cultural and Social Affairs organizations
- Four representatives from the Health Directorate.
- Two representatives from the smelter and foundry owners.
- Three representatives from the General Authority for Industrial Development.
- Twelve representatives from universities, contractors, and consultancies.
- Four representatives from the local media and library.

In addition, two representatives from USAID, and 10 members of the LIFE-Lead project team participated in the meeting.

APPENDIX A

SOIL SAMPLING

Exhibit 1: Location of Surface and Boreholes Samples for Delta Solb Preparatory School

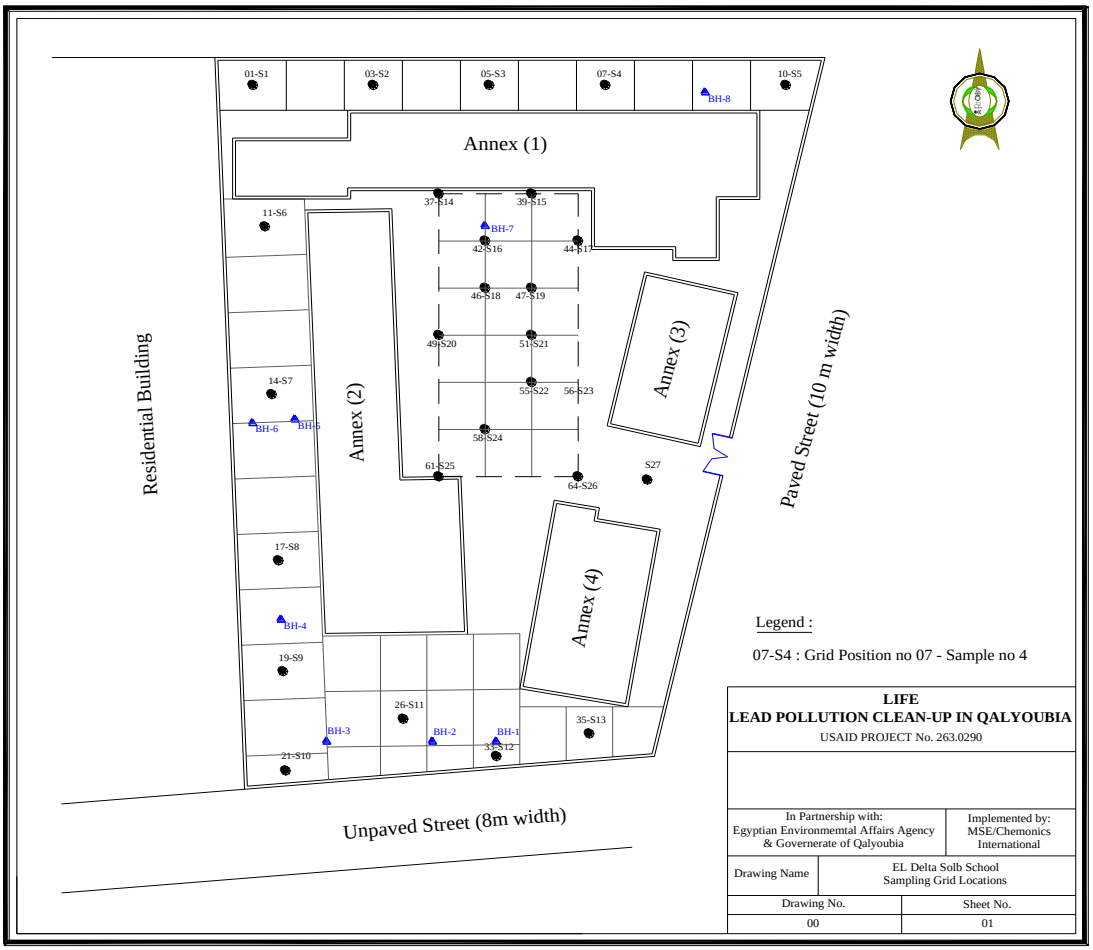
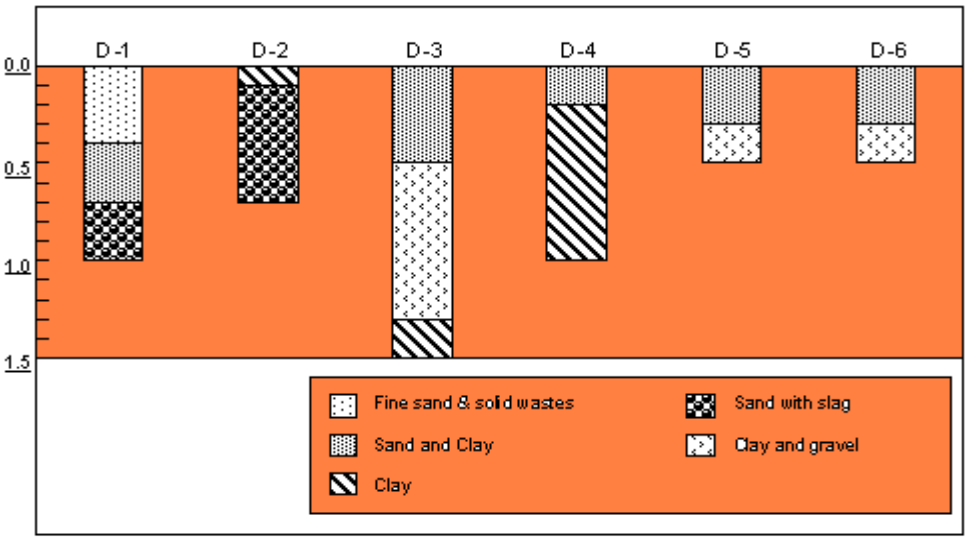
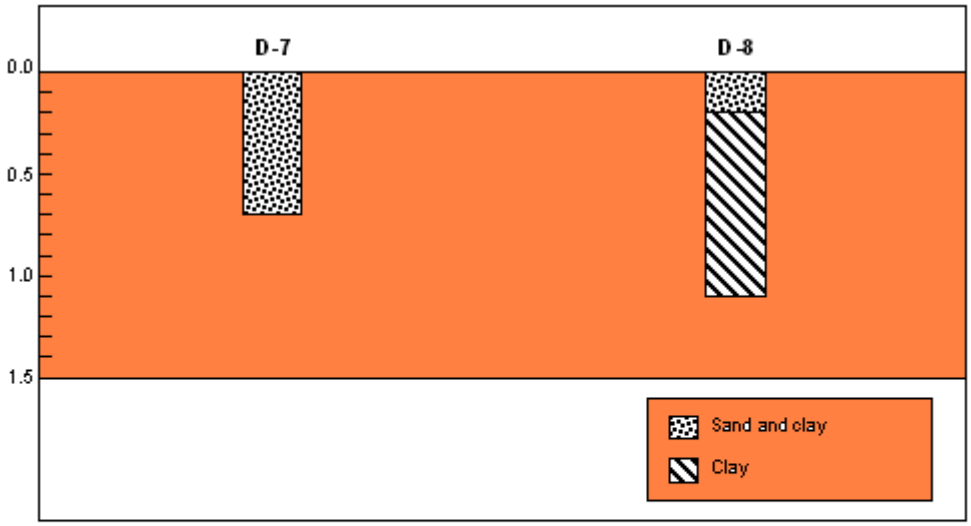


Exhibit 2: Boreholes at Delta Solb Preparatory School





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, 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. 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.

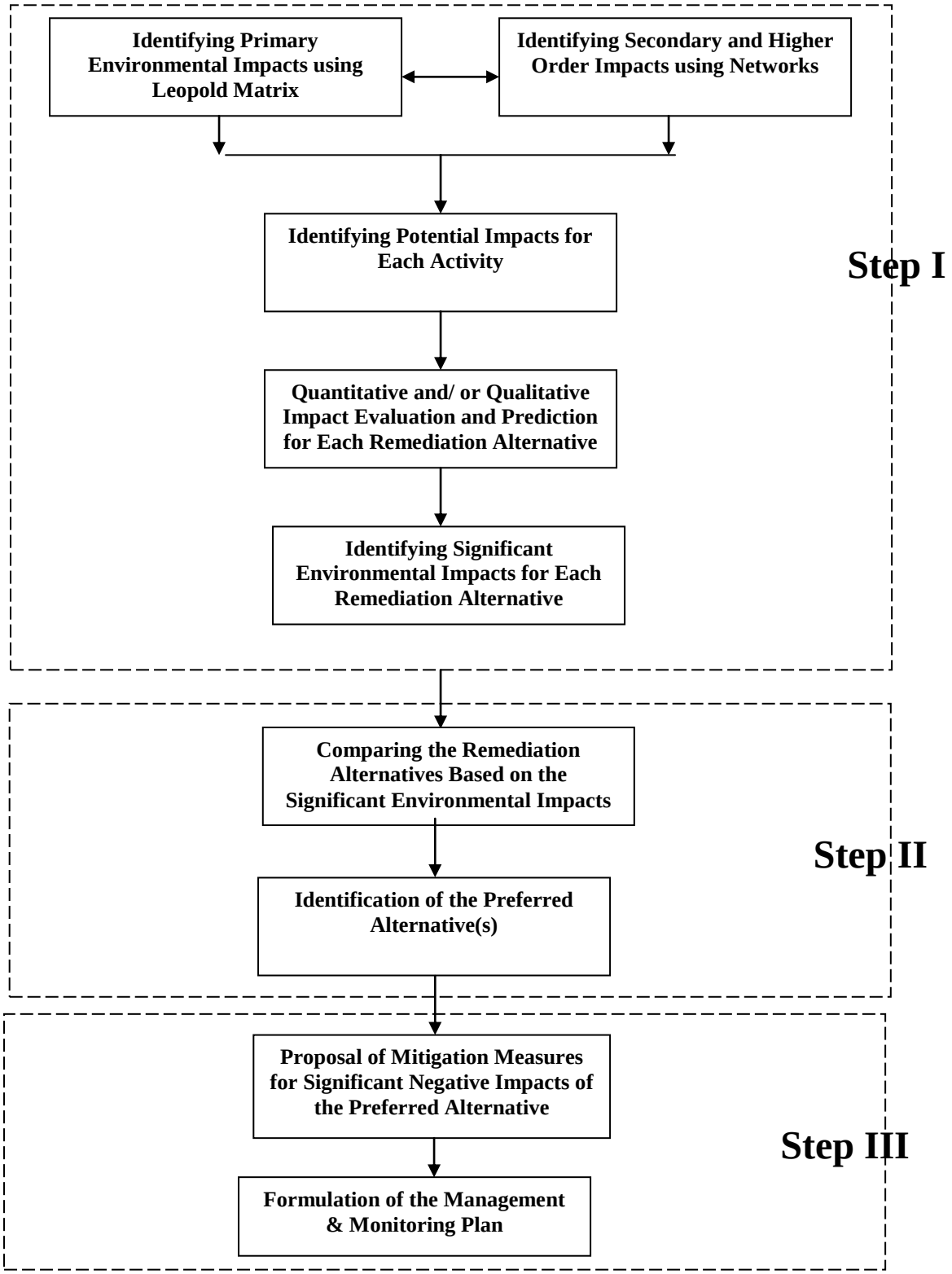
The EA team has gathered sufficient information on the project area and has analyzed their sensitivities as a crucial step in the assessment process. This information was gathered through literature reviews, interviews with officials and local residents, satellite image analysis, aerial photography analysis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



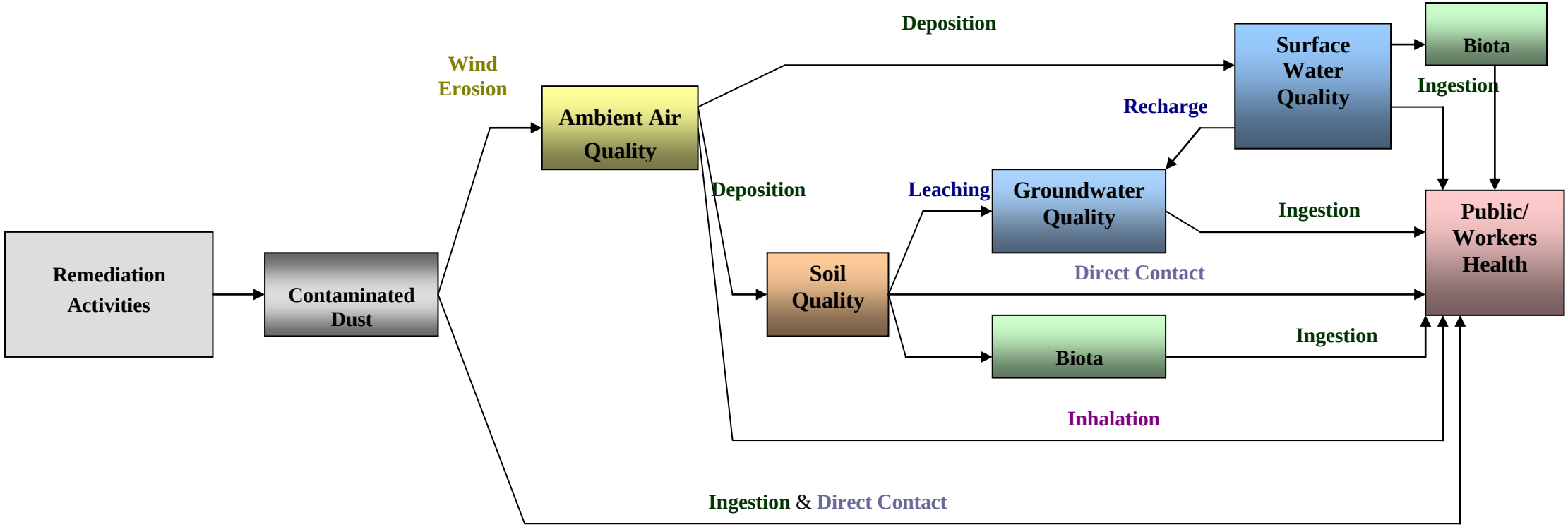


Figure 2: Ecological Pathways Leading to First and Higher Order Environmental Impacts (primarily due to lead dust)

Table 1. Summary of Potential Environmental Impacts During Remediation

Activities (Sources of Impacts)	Aspects	Environmental Attributes											
		Physical Environment					Biological Environment		Socio-economic				
		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 2,3,4: Dry Vacuum Cleaning with HEPA vacuum	• Dust Emissions • Emissions & Noise (vehicles & equipment) • Polluted Filters	-	-	NA	NA	NA	NA	NA	NA	+	+	NA	NA
Alternatives 2,3,4: 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 2,3,4: Removal and Replacement of Windows and Doors	• Waste window and doors • Noise	NA	-	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternatives 2,3,4: Containment/Storage of Waste On Site	• Dust Emissions • Spills of Wastewater and solid waste (hazardous & non-hazardous)	-	NA	-	-	NA	NA	NA	-	+	-	NA	-
Alternatives 2,3,4: Transportation of Material, Labor and Equipment to School 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
Alternatives 3,4: Interior and Exterior Wall Painting	• Waste paint & solvents • Emission of volatile vapors	NA	NA	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternatives 3: Covering playground with clean sand	• Dust Emissions • Emissions & Noise (vehicles & equipment)	-	-	+/-	-	NA	NA	NA	NA	+	-	NA	NA
Alternatives 4: Capping playground with plain concrete cap	• Emissions & Noise (vehicles & equipment) • Waste concrete	-	-	+/-	NA	NA	NA	NA	NA	+	-	NA	NA
Route from School to Alexandria Hazardous Waste Landfill in Nasereya													
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 School 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

APPENDIX C

SUMMARY OF COMMENTS AND SCOPING MEETING RESPONSES

The LIFE Lead Pollution Clean-Up in Qalyoubia Scoping Session for the Delta Solb School was held on Wednesday April 5, 2006 in the Shoubra El Kheima City Council Chambers Main Hall. The session was attended by approximately 76 participants from local government, executive agencies, and community representatives in addition to the project team. The following is a summary of comments either made by the participants during the session or submitted in writing during or within one week after the session in response to a scoping response form distributed at the beginning of the session.

Opening Speech by the Governor of Qalyoubia

The Governor of Qalyoubia, Council/Adly Hussien thanked the USAID and EEAA for the efforts they have contributed through this project to upgrading the environmental conditions of Shoubra El Kheima, especially with regards to the area where the lead smelters where located. He added that great effort was made in remediation of El Shahid Ahmed Shaalan School and the five lead smelters. He added that the extension of the LIFE-Lead project to remediate more schools such as the Delta Solb School and the El Kablat Medical Center as well as two more smelters was not a haphazard decision and choice. Schools and medical centers are areas which provide services to the community and maintaining their status would reflect on the health and welfare of the society as a whole.

He also requested USAID to consider setting a budget for two more projects which he sees as an integral part of the sustainability of the LIFE-Lead project. The first contribution is needed in eliminating the other sources of pollution in Shoubra El Kheima besides lead. He said that besides the health and well being of the general public, the operation of many sensitive and economically important establishments like the Shoubra El Kheima Power Plant are being impacted by the different sources of pollution in the area. This initiative would require cooperation of the Ministry of Power, the Governorate of Qalyoubia, EEAA, and USAID.

The second project which could be integrated in the extension of the LIFE-Lead project is relocation of the smelters of Shoubra El Kheima and those presently located in the Governorates of Cairo and Giza to the designated area in EL Safa in Abu Zabaal. However, these smelters should be relocated with "clean" technologies so as not to transfer pollution from their present locations to Abu Zabaal. The objective is not to create a new pollution hot spot. The new industrial area of Abu Zabaal should also be planned properly to accommodate these industries. Meteorological conditions need to be assessed in terms of wind direction to ensure that emissions from the industries to be located in Abu Zabaal do not impact neighboring areas.

Summary of Comments Made during the Session[1]

Mohamed Ismail, Hazardous Waste Management Unit, EEAA--

Dr. Ismail asked why the establishment of a hazardous waste cell in Qalyoubia to accommodate the waste generated from the decontamination activities was not considered rather than transfer of the waste all the way to the El Nasereya Hazardous Waste Facility in Alexandria. This will reduce any possible impacts during transportation of the waste. He also asked if any liquid waste was going to El Nasereya and if wet washing used in

[1] Recorded in sequence of speaking during the session

decontamination transfers pollution from solid form to liquid form which may contaminate the soil and groundwater. He was also concerned with the water quality of the Ismailia Canal and if it is periodically monitored and if pollution sources still persist in the project area and if so will the remediated sites be contaminated again in the future.

He also inquired if the project will produce guidelines for remediation activities to keep record and disseminate the experience of remediation of polluted sites.

Ahmed Abu El Seoud, Head of Air Quality Unit, EEAA--

Eng. Abu El Seoud responded that continuous monitoring takes place in the project area and in Ahmed Shaalan School. As for the lead pollution sources, they do not exist any more since the lead smelters have ceased operation. EEAA inspection units are also working with the Governorate to ensure compliance of the other smelters in the area. There is also an integrated plan for relocation of the smelters that is being implemented by EEAA, Governorate of Qalyoubia, Environmental Police, and the local community.

As for the establishment of a hazardous waste secured cell within the Abu Zaabal landfill, it was investigated by the project but was not further considered due to the high cost of establishment of the cell. The soil conditions in Abu Zabaal landfill entailed the need for special lining which would have raised the cost and there was no budget for that.

Fatheya Soliman, Technical Design Manager, LIFE Lead Project--

Dr. Soliman responded that water in the Delta Solb School would not be used in considerable quantities. Wet cleaning would be done with damp cloth rather than washing. However, in previous sites where water was used for cleaning, it was collected in sedimentation tanks and sediments separated before the water is disposed.

As for the Remediation Guidelines, Cairo Air Improvement Project (CAIP) have issued remediation guidelines and the LIFE-Lead project will update these guidelines to include remediation of polluted sites from lead and other heavy metals.

Madiha Afifi , Training and Communication Manager, LIFE Lead Project--

Ms. Afifi added that besides the guidelines that will be issued by the project, the concerned departments in EEAA are receiving training and capacity building in remediation technologies.

Mohamed Ghoneim, Bahteem Culture Center--

Mr. Ghoneim started with thanking the project their outstanding efforts in phase I and in the elimination of the sources of lead contamination in Shoubra El Kheima. He added that although there is no source of lead contamination existing now, the Delta Solb School is presently contaminated and will remain to be contaminated by the Delta Solb Company which is still operating. He thus inquired what will be the role of EEAA in applying environmental restrictions on the Company to stop or minimize its pollution.

Ahmed Abu El Seoud, Head of Air Quality Unit, EEAA--

Dr. Abu El Seoud agreed that the Delta Solb Company has its environmental problems and needs to work on upgrading its systems to achieve environmental compliance. He said that he is aware that initially the Company will shift from using mazot for fuel to using natural gas. He also added that the Company will be periodically inspected and monitored and in cases

of non-compliance, legal measures will be taken. He then asked if a representative from Delta Solb Company was present and would like to respond to these accusations.

Fawzi El Shami , Head of Shoubra El Kheima East District--

General El Shami added that the District is coordinating with the Delta Solb Company in an attempt to achieve compliance.

Mohamed Abdel Magid, HSE Manager, Delta Solb Company--

Mr. Abdel Magid said that Shoubra El Kheima in general is one of the most polluted areas in Greater Cairo. Regarding the environmental status of the Company, the Company is presently working with only 30% of its capacity. As for its emissions, dust collection units will be installed on stacks and will start operating in a couple of months. Moreover, natural gas will replace mazot as fuel by July 2006.

Khaled Abdel Aziz, Deputy Chief of Party, LIFE Lead Project--

Dr. Abdel Aziz added that the project with the aid of the Governorate and EEAA will arrange for a series of meetings with the Delta Solb Company to discuss technical details that might contribute to minimization of their pollution.

Asmaa Hamouda, Inspection Unit, EEAA--

Eng. Hamouda assured the audience that EEAA is aware of the compliance action plan of the Delta Solb Company and is following its execution.

As for the remediation options proposed by the project for the Delta Solb school, she asked if an economic study was conducted for each alternative to determine the most feasible one. She also inquired if remediation activities have taken into consideration penetration of the pollution to the walls or will only superficial remediation take place.

Ahmed Abu El Seoud, Head of Air Quality Unit, EEAA--

Eng. Abu El Seoud asked Dr. Soliman to provide Eng. Hamouda with project details.

Tharwat Nageh, Physician of Delta Solb School and Ahmed Shaalan School--

Dr. Nageh complained that the medical room in Ahmed Shaalan School did not receive the same attention in terms of rehabilitation as the rest of the school facilities.

Khaled Abdel Aziz, Deputy Chief of Party, LIFE Lead Project--

Dr. Abdel Aziz assured that in terms of remediation from lead pollution, the medical center was treated. However, refinishing it was outside the scope of the LIFE-Lead project.

Amr Abdel Salam, Head of Shoubra El Kheima Library--

Mr. Abdel Salam commented that the LIFE-Lead project introduced new non traditional technologies and asked all attendees to respond and cooperate with the project to maximize its benefits.

Ahmed Abu El Seoud, Head of Air Quality Unit, EEAA--

Eng. Abu El Soud said that contribution of the local community is very important. He also stressed on the importance of dissemination of experience to other parts of the country. He added that EEAA can now carry on with the remediation activities since they gained the know how in identification of pollution and in proposing remediation activities. It is the role of the local community to report on the environmental problems so EEAA can act.

Fotnat Mahmoud Tolba, National Council of Women, Qalyoubia--

Ms. Tolba proposed to establish a department in the Governorate of Qalyoubia specialized in remediation of polluted sites from heavy metals and lead to replicate the methodology of the LIFE-Lead project.

Madiha Afifi, Training and Communication Manager, LIFE Lead Project--

Ms. Afifi commented that a main component of the project was setting a strategy for awareness raising of the local community. This lead to participation from the local community and it is sensed in the behavior of the people of Ahmed Shalaan who appreciated the work done in their school and are trying to maintain its condition.

The project is also working with a number of NGOs like Hayati, Association of Protection of the Environment, El Reaya el Motakamla, and Kablat Association. These NGOs will be able to dedicate the efforts in other schools such as Metwally Sharawi School and Naguib Mahfouz School.

Abdel Rahman Abdel Fatah, Director of Kablat School

Mr. Abdel Fatah said that since the Delta Solb School was established by the Delta Solb Company it was initially built on the waste of the company and that is why its soil is highly polluted with the heavy metals. He added that the same situation applies for Abdel Monem Reyad Primary School which is also built on smelters waste.

Nadia Abdel Azim, Head of Department, Organization for Industrial Development--

Ms. Abdel Azim asked if the economic study of remediation alternatives took into consideration the expected life time of the project in terms of the expected time the remediated sites are expected to stay clean from pollution.

Ahmed Abu El Seoud, Head of Air Quality Unit, EEAA

Eng. Abu El Seoud assured that since there are no more lead sources in the area, the remediated sites will not be contaminated again with lead. As for the Delta Solb School the remediation process will go in parallel with the improvements of the Delta Solb Company.

Mahmoud Gad, Teacher, Ahmed Shalaan School

Mr. Gad invited the audience to come and see how the school is still clean. He said that the students with the help of the project are also aware of the health risks associated with lead and how to handle their everyday activity such as eating and playing without ingesting lead. However, he was worried that lead is still present in the streets outside the school and could be transferred again to the school and pupils home from the street.

Fawzi El Shami, Head of Shoubra El Kheima East District--

General El Shami said the District would like to pave all streets in the area but it has a limited budget.

Ahmed Abu El Seoud, Head of Air Quality Unit, EEAA--

Eng. Abu El Seoud proposed to use kiln lime or by-pass dust generated from cement manufacturing as a waste product to pave the streets. He said that the Prime Minister issued a decree allowing the use of this material in paving. This material proved to be hard and durable and costs much less than asphalt paving.

Elham Refaat, Head of Hazardous Substances Department, EEAA--

Ms. Refaat wanted to know more about the number of samples taken from the Delta Solb School. She advised that every group of industries could establish a secured cell to dispose their hazardous waste under the supervision of EEAA.

Ezzat Abdel Hamid Gaber, Director of Delta Solb School–

Mr. Gaber complained that the school lacks proper water and sanitation connections. The potable water supply is weak and the sanitary drainage network is not properly functioning.

Fawzi El Shami, Head of Shoubra El Kheima East District--

General El Shami promised to solve these problems faced by the School in the near future.

Fatma El Zahraa, Head Metallurgical Department, Organization for Industrial Development--

Ms. Zahraa commented that the price of land in Abu Zabaal where the smelters should be relocated is high compared to other locations. She said it costs about 175 L.E per square meter. She added that the owners of these smelters need financial incentives to relocate.

Fawzi El Shami, Head of Shoubra El Kheima East District--

General Fawzi replied that this is the price of land including the infrastructural services. This price is fixed but the Governorate can afford to decrease the down payment and plan for long-term installments.

Tarek Zahran, EAMIC Engineering International--

Eng. Zaharan commented that it would be feasible to establish a number of secured landfills all over the country instead of having only one centralized hazardous waste facility in El Nasereya.

Fawzi Morsi, Head of Planning Department, East District Shoubra El Kheima--

Mr. Morsi said that besides the Delta Solb School there is a baking stove (forn baladi). He advised EEAA to make its owner replace the mazot presently used as fuel to a “cleaner” type of fuel such as solar.

Summary of Comments Submitted in Writing (during and within one week of the session)[2]

Rokia Abdel Khalek, Teacher Delta Solb School--

Mrs. Abdel Khalek comments dealt with the health impacts of the dust contaminated with heavy metals. She requested that the remediation process should maintain control of fugitive dusts to minimize the health impacts.

Azza Mohamed Hussein, Teacher Delta Solb School--

Mrs. Hussien stressed the need to clean the buildings with water and to dispose of any wastes outside the school in order to reach the remediation goals.

Wagiih Ali Sharaf, Teacher Delta Solb School--

Mr. Sharaf stressed the importance of minimizing the fugitive dusts contaminated with heavy metals. Optimizing the health care for protecting the health of students and population at large.

Mahmoud Mohamed Ali, Teacher Delta Solb School--

Mr. Ali pointed out the need to guide the behaviors of the students inside the school so as to prevent their exposure to contaminates. In his view, awareness is crucial.

Fayza Ragab Mohamed Ali, Education Directorate in East District Shoubra El Kheima--

Mrs. Ali summarized her views regarding the health impacts of the current situation to be due to the following:

- The baking stove (forn baldi) next to the school uses mazot as a fuel leading to pulmonary diseases.
- Reduction of students IQ due to these emissions including lead.
- Lungs failure due to the burning of solid waste around the school including the plastic bags.
- The operations at the Delta Solb Company.

Her suggestions are summarized as follows:

Using natural gas in the baking stove, awareness campaign to stop the negative behaviors of the population adjacent to the school and continuous monitoring for Delta Solb Company.

Mrs. Ali thanked the LIFE-Lead project for performing so well with remediation activities as was the case in Ahmed Shaalan School. In her opinion, it was very good to know how many studies are performed before the project takes actions. She highlighted that the project is conducting awareness and community participation activities and to those who receive these activities she recommends that they in turn should disseminate this knowledge.

[2] Received until Tuesday April 11th 2006.

Naglaa Abdel Aal, Journalist El Ray Newspaper--

Mrs. Abdel Aal recommends screening the students to find their health status and whether they are carrying any diseases and if so this would be published to the public in order to start actions to stop the pollution. As for the EIA, she stressed the need to conduct an assessment after the activities are finalized to ensure that the remediation is maintained.

Nadia Abdel Azeem, Head of Department, Organization for Industrial Development--

Mrs. Abdel Azeem stressed the need to avoid any water used in cleaning of hard surfaces dissipating to the subsurface ground water. She added, in case alternative 4 was implemented, what would be the fate of the buried smelter and construction and demolition waste buried on site. Her suggestion was whether it would be more effective to relocate the school entirely. She stressed the need for maintaining the remediation activities at the school in all cases.

Ahmed Ahmed Hashish, Head of Department, Organization for Industrial Development--

Mr. Hashish was assuring that the remediation activities undertaken by the project is clear to the audiences and had to support the continuation of these efforts to other sites. He expressed his concern that the relocation plan for industries in Shoubra El Kheima should take momentum faster than the remediation activities towards declaring Shoubra El Kheima as a city free of pollution.

As for the remediation alternatives, he suggested to avoid cleaning the doors, windows and desks of the school and dispose them at a landfill while replacing them with new ones.

Ezzat Abdel Hamid Gaber, Director of Delta Solb School--

Mr. Gaber called for the CAP for Delta Solb to be fast and monitored to avoid the contamination of the school after remediation. Solving the problems of the water and sanitation infrastructure at the school is of high priority.

As regards to the EIA, he stressed the need to pave the surrounding streets around the remediated sites.

APPENDIX D

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