

**Global Environment Facility
China Contaminated Site Management Project**

Environmental and Social Management Framework

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1. Introduction

1.1. Project Objective

The project development objective (also the global environmental objective) is to improve the country's capacity for managing contaminated sites, and demonstrate identification and cleanup of sites contaminated with POPs and other hazardous chemicals in an environmentally sound manner.

1.2. Project Components

The Project will include activities at both national and provincial levels. Chongqing municipality and Liaoning province as pioneers with strong commitment and ownership for managing contaminated sites have been selected as the two demonstration areas among four municipalities or provinces (Requests of Expression of Interest were sent to 11 provinces and municipalities), which expressed interest to participate in the Project.

The Project will support investment, technical assistance (TA) and administration measures and technical guidelines development for the cleanup of contaminated sites (control of contaminated sites). Sites for pilot cleanups will be POPs (and other hazardous chemical) contaminated sites. The Project will also include TA and administration measures and technical guidelines development for prevention of industrial contaminated sites and agricultural contaminated land.

From contamination identification to cleanup closeout, risk assessment helps form management decisions made at each stage of a site or land's life cycle. The goal of the human health and environmental evaluation process is the development of risk information to determine whether a removal action and/or remedial action is necessary, or conversely, whether the site may be closed out with no further action. The Project will introduce and transfer knowledge on human health risk-based remediation approach.

The Project consists of three components described below.

Component 1: Capacity Development for Prevention and Control of Site Contamination

Sub-component 1.1: Development of Administrative Measures, Technical Guidelines and Financing Options for Contaminated Site Cleanup. As MEP is working on the Soil Pollution Prevention and Control Law and its Implementation Rules and has issued four Technical Guidelines¹ on cleanup of contaminated sites, this sub-component will focus on development of other necessary technical guidelines for both prevention and control of site contamination. These will include: (i) technical guidelines for pollution risk prevention and control at the producing industries; (ii) technical guidelines for prevention and control of environmental pollution during industrial enterprise relocation; and (iii) Best Available Techniques (BAT) list of remediation for POPs contamination. This sub-component will also include development of administrative measures on professional qualifications of site cleanup companies, information disclosure and public participation at the national level. In Chongqing and Liaoning, this sub-component will include development and issuance of administrative measures for management of contaminated sites and environmental supervision for site remediation, and environmental risk screening levels for contaminated sites. This sub-component will also support studies on possible financing options (including public and private partnership - PPP) and market incentives for contaminated site cleanup.

Sub-component 1.2: Knowledge Management and Awareness Raising in Support of Prevention and Control of Site Contamination. This sub-component will develop and provide systematic training courses for nation-wide government officials and cleanup practitioners on laws, regulations, technical guidelines/standards, and environmental and social safeguard requirements for contaminated site cleanup (including occupational and community health and safety), and for polluting industries in Chongqing and Liaoning on establishment of

¹China has issued four technical guidelines on contaminated sites (in Feb. 2014, effective since July 1, 2014) for environmental site investigation, environmental site monitoring, risk assessment, and soil remediation.

environmental and social management systems (ESMS) to prevent soil and groundwater pollution. Knowledge exchange and experience sharing events or workshops will be organized. It is expected that a national training system for prevention and control of site contamination established under the Project will continue beyond the project life through the issuance of administrative measures for training.

This sub-component will also conduct public awareness activities for prevention and control of site contamination, and community involvement (public consultation) activities for cleanup demonstrations under Component 2.

Sub-component 1.3: Management Tools for Prevention and Control of Site Contamination. This sub-component will develop a national database for POPs contaminated sites by carrying out initial site investigation and risk assessment of POPs sites in China: mainly POPs pesticides, e-waste and PFOS contaminated sites, as well as mercury contaminated sites (as relevant) and developing a national database. The national database is expected to be expanded and used by MEP and other ministries after the project life for monitoring and managing contaminated sites in China. A national priority list of these POPs sites will be produced based on environmental and health risks and other factors.

This sub-component will also support feasibility study for constructing a knowledge and remediation center in Chongqing by collecting information on all potential contaminated sites in Chongqing, assessing currently available in-situ and ex-situ remediation approaches and technologies, and presenting the business potential for such a center. Based on these results, a business plan will be prepared considering possible PPP to make sure that the center will be able to operate efficiently and competitively. It is expected that the center in Chongqing will provide advisory services and contamination treatment services resulting from future cleanup of many of municipalities contaminated sites.

This sub-component will also, for the purpose of demonstration, support establishing regional soil and groundwater contamination prevention and warning system at the Changshou Industrial Park in Chongqing. This will include identification and investigation of the soil and groundwater contamination risks (including POPs) of the Park and assessment of these risks to determine risk-acceptable, risk-warning, and risk-mitigation areas, which can provide a risk source layout for the Park. Based on the risk source identification and assessment, an integrated environmental management system, including hazardous material tracking and information reporting system, environmental safety planning, early risk warning, emergency management, and impacts and remediation option assessment after pollution incidents will be developed. Experience learned will be shared with other industrial parks in China for potential replication.

Anxiety is growing in China about contaminated soil in the country's agricultural centers (such as Hunan province) and the potential effects on the food chain. Some farmland soil in suburbs of most cities is polluted with heavy metals and organic pollutants (mainly POPs) as indicated by the national soil survey results. Hunan has requested a loan from the World Bank (to be delivered in FY 2017) to support its efforts on improving agriculture production base safety and quality by cleaning up heavy metal (such as cadmium, lead and arsenic) and organic pesticide contaminated farmland, cutting off polluted water irrigation, reforming cropping system, and applying integrated pest management for reducing chemical use. This sub-component will also support screening cost-effective remediation technologies through small-scale field pilots and reviewing the policy gaps for prevention and control of agricultural land contamination in Hunan. These outputs will support the technical design of the lending project in Hunan and will be shared with other provinces. This activity will be managed by FECO with technical support from the Hunan Provincial Agriculture Department.

Sub-component 1.4: Technical Expert Team and Project Monitoring and Evaluation. This sub-component will support hiring of international and national technical experts with both site cleanup knowledge and remediation engineering experience, to support FECO and the two Project Management Units' (PMU) daily management of the project. This sub-component will also support monitoring and evaluation of the project outcome indicators and results by collecting evidence-based information and data, as well as organizing the project launch and completion workshops.

Component 2: Cleanup Demonstrations of Sites Contaminated with POPs (and Other Hazardous Chemicals)

This component will demonstrate the cleanup of several sites (estimated 5-6 in total) contaminated with POPs (and other chemicals). Before a site is ready for remediation action, site investigation, risk assessment to determine remediation goals, remediation program, environmental and social management plan (ESMP), and public consultation and information disclosure will be carried out, prepared, approved and documented. The first demonstration site, which used to be a pesticides warehouse in Chongqing (Ganshui site), has been identified and confirmed during project preparation. According to the construction planning 2003-2020 for Guanshui Town Qijiang County, the site is planned for residential land in future. A site-specific cleanup Environmental Assessment (EA) report has been prepared for this site with detailed contamination scope and proposed remediation plan (see Annex 2). The remediation process will include site clearing, protection of building structure, wall surface peeling, excavation, packaging of contaminated materials, transportation to and storage at the treatment site, treatment/disposal and remediation completion. No aftercare of the site is needed because it will be fully cleaned up with the removal of contaminated materials. Remediation of this site will be initiated as soon as the Project is approved.

The other sites will be confirmed during project implementation. A preliminary site selection has been carried out, and identified another seven potential candidate sites from a total of 160 potential POPs contaminated sites (mainly chemical and industrial production sites and some warehouse sites and e-waste sites)². The sites were screened using such criteria as impact on human health and environment, site contamination characteristics, location, size, redevelopment potential etc. The site cleanup EA reports will be prepared for each site selected under this component and approved by the Bank before initiating the bidding process for remediation. The EA report for the Ganshui site will be used as a model EA for the other sites.

Component 3: Project Management

This component will support incremental operating costs associated with project management, including day-to-day project implementation, procurement and financial management, and environmental and social safeguards functions carried out by FECO, the Chongqing PMU and the Liaoning PMU, including coordination and collaboration among national and local government agencies, non-government agencies and the private sector (land owner, polluter or land redeveloper).

1.3. Environmental and Social Safeguard Approach

For the project Component 2, during project preparation, the Chongqing Ganshui site has been identified and confirmed to participate in the project for site cleanup demonstration. A site-specific Environmental Assessment (Chongqing Ganshui Site Cleanup EA report) has been prepared for the site, which covers site investigation, risk assessment, remediation program with soil excavation, package, transportation, storage, and remediation plans, Environmental and Social Management Plan (ESMP), and public consultation and information disclosure.

A few more sites (about 4-5) will be confirmed, during the project implementation stage, largely from the candidate list of 8 sites in the Site Selection Report prepared during project preparation. To address safeguards issues of the other sites, this Environmental and Social Management Framework (ESMF) will be followed. The ESMF specifies procedures and technical requirements for environmental and social safeguards documents preparation as per requirement of World Bank safeguards policies and national laws/regulations. For any sub-project / remediation site under Component 2 the intended investment will be screened for all Bank safeguard policies. Site-specific EA reports (or ESA reports) for the other sites will be prepared during project implementation stage following this ESMF. The Ganshui EA report will be serving as a model for the EA (or ESA) reports of the other sites.

Activities under the project Component 1 are TA and capacity building activities. Environmental and social safeguard issues will be integrated into the TA activities as needed following the Bank's Interim Guidelines on the Application of Safeguard Policies to Technical Assistance Activities in Bank-Financed Projects and Trust

²Information on storage, dump or disposal sites possibly contaminated by the 10 new POPs is very limited by now. China has investigated obsolete waste of the first 12 POPs in 47 sites, 22 of which are considered as contaminated sites. Details are provided in the Site Selection Report prepared during project preparation.

Funds Administered by the Bank. For example, when TORs and reports for sub-components 1.3 are prepared, safeguard issues will be considered and discussed with the Bank prior to any final reporting, technology piloting, system building, and/or purchase of equipment (monitoring equipment, etc.).

2. Legal and Regulatory Framework

This session lists the legal and administrative framework within which the EA and SA on site cleanup demonstrations under the Project Component 2 will be carried out during project implementation, which include: 1) the existing Chinese laws and regulations related to environmental protection and land management, technical guidelines and standards related to contaminated site investigation, monitoring, risk assessment, remediation action, remediation supervision, and remediation completion and verification, the relative environmental quality standards; 2) World Bank safeguards policies, and World Bank Group's Environmental Health and Safety Guidelines.

a) Relevant China's laws, regulations and policies

- *Environmental Protection Law of the People's Republic of China* (implemented on Dec. 26, 1989);
- *Law of the People's Republic of China on the Prevention and Control of Water Pollution* (implemented on Jun. 1, 2008);
- *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* (implemented on Sept. 1, 2000);
- *Law of the People's Republic of China on Prevention and Control of Environmental Pollution by Solid Wastes* (implemented on Apr. 1, 2005);
- *Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise* (implemented on Mar. 1, 1997);
- *Law of the People's Republic of China on Promotion of Cleaner Production*(implemented on Sept. 1, 2003);
- *Water Law of the People's Republic of China* (implemented on Oct. 1, 2002);
- *Law of the People's Republic of China on Water and Soil Conservation* (implemented on Mar. 1, 2011);
- *Land Administration Law of the People's Republic of China* (implemented on Aug. 28, 2004);
- *Law of the People's Republic of China on the Protection of Wild Life*(implemented on Aug. 28, 2004);
- *Law of the People's Republic of China on the Protection of Cultural Relics*(implemented on Dec. 19, 2007);
- *Technical Measures on Preventive Control of Hazardous Wastes* (State Environmental Protection Agency, HF [2001] No. 199);
- *Law of the People enforcement regulations of China on Property* (implemented on Oct. 1, 2007);
- *Law of the People's Republic of China on Land Management* (implemented on Aug. 28, 2004);
- *Enforcement Regulations of Law of the People's Republic of China on Land Management* (State council order no. 256) (implemented on Dec. 27, 1998);
- *Decisions of the State Council on Deepening Reform and Strict Land Management*(State Council issued [2004] no. 28) (implemented on Oct. 21, 2004);
- *Guidance of Improving System of Land Requisition Compensation and Resettlement*(Ministry of Land and Resources issued [2004] no.28) (implemented on Nov. 3, 2004);
- *Notification of the State Council on Related Issues about Strengthening Land Regulation* (State Council issued [2006] no. 31) (implemented on Aug. 31, 2006);
- *Notification of the Ministry of Land and Resources on Carrying out the works on Formulating Uniform Annual Output Value Standard for Land Acquisition and District Comprehensive Land Price* (Ministry of Land and Resources issued [2005] no.114) (implemented on Jul. 23, 2005);
- *Announcement Measure for Land Requisition* (Ministry of Land and Resources order no. 10) (implemented on Jan. 1, 2002);
- *Notification of the Ministry of Land and Resources and Ministry of Agriculture on Related Issues about Perfecting Facilities of Farmland Management*(Ministry of Land and Resources issued [2010] no.155) (implemented on Sep. 30, 2010).

- b) Relevant China's Technical guidelines and specifications
- *Technical Guidelines for Investigation of Site Environment* (HJ 25.1-2014);
 - *Technical Specification for Monitoring of Site Environment* (HJ 25.2-2014);
 - *Technical Guidelines for Risk Assessment of Contaminated Site* (HJ 25.3-2014)
 - *Technical Guidelines for Soil Restoration of Contaminated Site* (HJ 25.4-2014)
 - *Guidelines for Evaluation of Site Environment* (DB11/T 656-2009);
 - *Technical Specification for Restoration Acceptance of Contaminated Site in Beijing* (DB11/T 783-2011).
- c) Relevant China's Environmental quality standards
- *Environmental Quality Standard for Soils* (GB 15618-1995);
 - *Environmental Quality Standard for Surface Water* (GB3838-2002)
 - *Ground Water Quality Standard* (GB/T14848-1993);
 - *Ambient Air Quality Standard* (GB3095-2012)
 - *Environmental Quality Standard for Noise* (GB3096-2008);
 - *Integrated Emission Standard of Air Pollutants* (GB12697-1996)
 - *Emission Standard of Environment Noise for Boundary of Construction Site* (GB 12523-2011);
 - *Emission Standard for Industrial Enterprises Noise* (GB 12348-2008);
 - *Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes* (GB 18599-2001);
 - *Identification Standard for Hazardous Wastes* (GB5085-1996);
- d) The World Bank's safeguard policies and World Bank Group Environment, Health and Safety Guidelines (known as EHS Guidelines)
- World Bank operational policy/Bank procedure *Environmental Evaluation* (OP/BP4.01);
 - World Bank operational policy/Bank procedure *Involuntary Resettlement* (OP/BP4.12);
 - World Bank operational policy/Bank procedure *Physical Cultural Resources* (OP/BP 4.11);
 - World Bank operational policies/Bank procedures *Indigenous People*(OP/BP4.10);
 - World Bank Group *General Guidelines for Health, Safety and Environment*;
 - World Bank Group *Environment, Health and Safety Guideline for Waste Management Facilities*;
 - Bank's Interim Guidelines on the Application of Safeguard Policies to Technical Assistance (TA) Activities in Bank-Financed Projects and Trust Funds Administered by the Bank.

3. Environmental and Social Safeguards Procedures

For the contaminated sites to be identified during project implementation, the following steps of environmental and social impact screening, mitigation and management measures development and implementation will be followed:

Step 1 - Identification of contaminated sites for cleanup pilots according to the selection criteria;

Step 2 - Screening for potential environmental and social impacts;

Step 3 - Development of site-specific TORs for Environmental Assessment (EA) and Social Assessment (SA), Resettlement Action Plan (RAP) and/or Ethnic Minority Development Plan (EMDP); when it is applicable, EA and SA should be integrated as ESA.

Step 4 - Review of the safeguards screening in view of all World Bank safeguard policies and EA, SA, RAP and/or EMDP TORs by World Bank;

Step 5 - Preparation of environmental and social safeguards documents;

Step 6 - Review and clearance of the safeguard documents by government and the Bank;

Step 7 - Implementation, supervision, and reporting.

3.1. Identification of Contaminated Sites for Cleanup Pilots

FECO and PMUs in the demonstration provinces will use the following set of criteria to select the contaminated sites in or outside the demonstration provinces for cleanup pilot during the project implementation stage. Criteria for site selection are as follows:

- Criteria 1: site belongs to the demonstration province
- Criteria 2: site production types belong to China's main type
- Criteria 3: site pollutant types belong to China's main type
- Criteria 4: potential contaminate area is neither too large nor too small
- Criteria 5: health risk from the site is medium or above
- Criteria 6: environmental risk from the site is medium or above
- Criteria 7: significant environmental benefit gained from site clean-up activity
- Criteria 8: significant economic and social benefit gained from site exploitation

Criteria 1 belongs to "priority principle", criteria 2-4 belong to "typically principle", criteria 5-6 belong to "risk principle" and criteria 7-8 belong to "benefit" criteria.

Following these criteria, a Site Selection Report has been prepared during the project preparation stage and recommended 8 sites in total for possible participation in the Project.

3.2. Screening for Potential Environmental and Social Impacts

Once FECO and PMUs select a contaminated site, the FECO or PMU hired environmental and social consultants shall conduct environmental and social safeguards screening according to World Bank safeguards policies, to determine the nature and extent of potential environmental and social impacts of the contaminated site cleanup activity. The screening exercise could also be part of the Phase I site investigation, which means that the screening sheet will be prepared by the consultant who will carry out site investigation (see session 4).

For specific sub-project³ screening, FECO Environmental and social consultants shall use the screening tool (in Appendix 1) to identify the potential environmental and social impacts, triggering of World Bank safeguards policies, propose an environmental classification for the each sub-project (each site) as follows:

³ A sub-project means cleanup of a selected contaminated site. The Project will cleanup up 5-6 selected sites in Chongqing, Liaoning and other provinces/cities.

- **Category A:** A sub-project of this type would have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the physical works. A contaminated site which is located in an environmental/social sensitive area, requires large amount of earth excavation, significant impacts on nearby communities and residents (such as including losses of land and/or houses), or ex-situ treatment with significant potential environmental impacts is likely to be classified as Category A.
- **Category B:** A sub-project may have some adverse environmental impacts, but less adverse than those of Category A projects. These impacts are typically site-specific; few if any of them are irreversible; and in most cases mitigation measures can be readily designed. A contaminated site located in non-sensitive area, well confined in-situ treatment or only warrant non-physical management approach is likely to fall in this category.
- **Category C:** A proposed sub-project is likely to have minimal or no adverse environmental impacts. According to OP4.01, no further action is needed beyond Category C classification.

The screening results will be cross-checked with national regulations, in order to determine the applicable Chinese domestic EA documentation requirements. Three possible instruments are specified in the Chinese regulations: (a) Environmental impact assessment report (EIA); (b) Simplified environmental assessment (EIA Form)⁴; and, (c) Environmental registration. In those cases where the EA documentation required by the Chinese regulations are not equivalent in depth and scope to those required by the World Bank safeguard policy requirements, the latter will apply.

With regard to social impacts, each sub-project shall also be screened by FECO or PMU and their consultant for social impacts, including: (a) the need, if any, for land acquisition and involuntary resettlement (permanent or temporary); (b) the population to be affected; and, (c) whether there is any ethnic minority community that would be affected by the sub-project. A social assessment report needs to be prepared for each site although the report can be included as parts of the EA. These considerations are included in the Appendix 1 screening tool to determine the significance of these impacts and identify the social safeguards documents that need to be prepared.

Given the project activities of cleanup of contaminated sites, the sub-projects are most likely to be category A or B types. It is envisaged that such contaminated site cleanup activity is considered as an environmental pollution mitigation effort which do not need to prepare environmental impact assessment report according to Chinese EIA law and regulations. While, the site remediation plan will need approval of local environmental authority before actual remediation actions, so does the verification/acceptance of final remediation results.

Based on both the World Bank and Chinese requirements, the safeguards documents for each site that need to be prepared and approved by the World Bank are as follows:

- A site-specific **Environmental Assessment (EA)**, including Site Investigation, Risk Assessment, Site Remediation Technology Program and Environmental Management Plan (EMP). An outline of the EA report is found in Appendix 2.1.
- A **Social Assessment (SA)**, should be undertaken for all demonstration sites. In line with OP 4.01, the scope of the SA should go beyond impacts related to OP 4.10 and OP 4.12 and consider social impacts in the wider area of influence of the project such as impacts on changes to land use and land values. The SA should include site investigation, social risks and impacts assessment, social and economic development status of the site area, key stakeholder analysis, especially ethnic minority and other vulnerable people living in and near the site, and social management plan. It is suggested that EA and SA is integrated when possible.
- A **Resettlement Action Plan (RAP)**, if land acquisition and/or resettlement is envisaged and the *OP4.12 Involuntary Resettlement* policy is triggered based on safeguards screening. A RAP outline is in Appendix 3.

⁴ Note that according to the Chinese EIA Law, the Simplified EA is called an “EA in Table form”. However, an EA in Table form is not a simple summary table, it is equivalent or more detailed than an EA that would be required by the Bank for Category B projects.

- An **Ethnic Minority Development Plan (EMDP)**, if an ethnic minority community would be affected by the sub-project which triggers the *OP4.10 Indigenous People* based on safeguards screening. The main contents of EMDP are in Appendix 5.
- For Category A site, a short **Environmental and Social Assessment (ESA) Summary** (preferably less than 5 pages) in English is needed which summarize the key findings and conclusions of the EA and SA, as well as the RAP and EMDP if applicable.

Gender Aspects. Social equity and gender equality will be promoted through wide and equal participation of, and consultation with, the local people (including the female of affected people in project areas) and site-owner's staff throughout sub-project preparation and implementation. Special attention will be given to the participation of vulnerable people, including women, with a good gender sensitivity in land acquisition and resettlement and employment assistance of project enterprises if any. Equal participation and gender responsiveness will be reflected in project activities such as capacity training, consultation, compensation, livelihood restoration as well as other related project activities.

3.3. Development of Site-specific TORs

After sub-project safeguards screening are completed, FECO shall submit the completed safeguards screening sheet for a specific site-cleanup sub-project to the World Bank for review, which includes (a) the recommended categorization according to World Bank policies; and (b) the proposed environment and social safeguards documentation requirements for the sub-project.

Upon confirmation of the World Bank task team, FECO or PMUs (assisted by its Environmental and social consultants) shall develop site-specific Terms of References (TORs) for Environmental Assessment. The TORs shall identify the key tasks for the EA for a specific site selected, including (but not limited to) review of national and local regulations, site investigation, risk assessment, site remediation technology program, environmental management plan etc. The key tasks for EA are included in Chapter 4, which will be used as a basis for FECO and PMUs to develop site-specific TORs.

“Feasibility study” is not commonly used for site cleanup engineering in China. A site cleanup process is defined in China include the following steps: (1) phase I site investigation (no sampling and testing), (2) phase II site investigation (pollution confirmation and pollution quantification with sampling and testing), (3) phase III site investigation (investigate site-specific parameters and receptor expose parameters) (4) risk assessment (including setup of remediation goals), (5) remediation technology program (including technology selection and EMP), (6) remediation implementation, (7) environmental supervision, and (8) remediation verification and acceptance. Therefore, according to the requirements of OP4.01, for Category A projects the borrower retains independent EA experts not affiliated with the project to carry out the EA, the team agreed with the client and decided an approach that site investigation and risk assessment, and remediation technology selection/remediation program for one site be packaged in one contract. Preparation of the EMP and a consolidated EA report for each site would be packaged in another contract. The consultants preparing the site investigation and remediation program would be independent of the consultants preparing the EMP and the consolidated EA reports. This approach has been used during the project preparation for the Guanshui site in Chongqing and will be consistently used throughout the project implementation.

If OP/BP 4.12 Involuntary Resettlement policy is triggered due to land acquisition and house demolition requested by site cleanup activities, a full RAP or an abbreviated RAP will be needed. If more than 200 persons are affected by the project, a full RAP should be prepared. If fewer than 200 persons are affected, and the affected people only face minor impacts, an abbreviated RAP will be sufficient. Impacts are considered minor if the affected people are not physically displaced and less than 10% of their productive assets are lost. FECO shall develop a site-specific TOR for Resettlement Action Plan (RAP) with technical support of an experienced social expert once a full RAP is required. If a full RAP has to be prepared, the full RAP should be based on accurate census and socioeconomic survey results, and incorporate measures to mitigate negative impacts arising from resettlement (e.g., compensation for assets (land and structures), assistance during the transition period, and assistance for livelihood restoration). To ensure that necessary resettlement measures will not displace or restrict the use of resources and assets before implementation, resettlement activities should be implemented in conjunction with the investment plan of the project. The key tasks for RAP are in Chapter 5 and

a full RAP outline in Appendix 3.

This project is very unlikely to be done in an ethnic minority area or have any significant social impacts on ethnic people. But in the case the Bank OP/BP 4.10 Indigenous Peoples policy is triggered, FECO needs to develop a site-specific TOR for social assessment and ethnic minority development plan by hiring an experienced social expert for technical support. The key tasks for Social Assessment are in Chapter 6 and a sample of main contents of EMDP TOR is in Appendix 5.

Requirements on Gender aspect will be included in the SA TOR.

3.4. Review of TORs by the World Bank

The site-specific TORs for EA, and RAP, SA/EMDP where applicable, will be reviewed and confirmed by the Bank. Site visits by the Bank safeguards specialists may be needed in order to better understand the situation and verify the appropriateness of TOR preparation.

3.5. Preparation of Environmental and Social Safeguards Documents

Upon the agreement by the Bank on the TORs, the provincial PMUs or FECO shall engage experienced consultants to prepare safeguards documents according to the requirement of TORs. The safeguard documents, i.e. EA, EA Executive Summary, and RAPs/SAs/EMDPs if applicable, are subject to public consultation and disclosure in an accessible place, in a timely manner, in a form and language understandable to the project-affected people. Particular attention will be given to ensure projected affected persons gets adequate time and ready access to draft documents before consultation takes place.

3.6. Review and Approval of Safeguard Documents

FECO and PMUs shall ensure that necessary approval of safeguard documents from local (or central) environmental authorities or other government agencies as needed be secured according to Chinese laws and regulations.

All safeguards documents prepared according to this framework requirement, including EA, EA Summary, and RAPs/SAs/EMDPs if applicable, will be subject to World Bank safeguards review and clearance procedures prior to commencement of implementation, i.e. approval by World Bank EAP Regional Safeguards Secretariat.

All the above-mentioned safeguards documents shall be submitted to the Bank in both English and Chinese.

3.7. Implementation, Supervision and Reporting

3.7.1. Implementation

The provincial PMUs or FECO (if sites are not located in the two demonstration provinces) are responsible for the site cleanup implementation, including engaging contractors, supervision companies, final verification and acceptance/approval by local environmental authority.

3.7.2. Supervision

An independent environmental supervision company will be hired by the provincial PMUs or FECO to provide on-site remediation supervision on a daily basis. The supervision company shall provide guidance and quality control of the site remediation works.

FECO and Provincial PMUs will conduct regular site supervision during site remediation, to ensure the overall compliance with national and local environmental regulations.

In case of sites with RAPs or EMDPs, the provincial PMUs or FECO shall hire an independent third party consultant acceptable to the Bank to conduct external monitoring of RAP and/or EMDP implementation regularly (once or twice a year pending on actual needs).

3.7.3. Reporting

During the project implementation stage, the supervision company shall provide monthly report, quarterly report and annual progress report to the Provincial PMUs or FECO according to work schedule. Such reports shall be made available to the Bank when requested. The main contents of environmental supervision progress report and its completion report are provided for reference as attached in Appendix 2.4.3.

Provincial PMUs shall provide monthly progress reports to FECO, FECO shall provide semi-annual progress reports to the Bank which, among others, including the status of implementation of site cleanup sub-projects and environmental and social management plans. A detailed outline of semi-annual environmental and social safeguards progress report is provided for reference as attached in Appendix 6.

In case of sites with RAPs or EMDPs, the provincial PMUs or FECO shall report in the semi-annual environmental and social safeguards progress report as mentioned above. And the third party consultant shall prepare a final monitoring and evaluation report at the project completion. The external monitoring reports will be submitted to the FECO and the Bank according to agreed timeframe.

4. Sub-Project/Site-specific Environmental Assessment

4.1. Objectives

The objectives of the site-specific environmental assessment are to:

- a) Identify the scope of site contamination through information collection, site investigation and sampling/testing;
- b) Assess risks of the contaminated site and propose remedial target and remedial area based on the future land use;
- c) Conduct alternative analysis for site remediation technologies and develop site remediation plan;
- d) Develop environmental management plan.

4.2. Scope of Work

4.2.1. Site Investigation

During site investigation, pollutants and pollution area of the site are confirmed; potential risk receptors and exposure pathways are investigated and the public (site-cleanup-affected people) consulted, soil types and other site characters are understood.

4.2.1.1. Phase I Site Investigation

During phase I site investigation, environmental pollution of the site is analyzed preliminarily and preliminary conceptual site model is established through data collection and analysis, field reconnaissance, public consultation and information disclosure, etc. If necessary, emergency treatment should be carried out firstly. The main contents include but not limited to the following:

- a) Data collection and analysis
 - Conditions of natural environment: geological and hydrogeological data and weather and climate data;
 - Site general information: for example, name, location, time of construction, floor area, product and output, raw materials and quantity, etc. Photos should be provided.
 - Site environmental information: for example, monitoring data of waste gas, waste water, solid wastes, soil and groundwater.
 - Distribution of buildings and equipment: for example, time of construction of buildings and production line, production history and status quo, layout chart, process flow of production equipment, pollution generation node, pollution discharge, pollution accidents, etc.;
 - Production, generation and storage of hazardous substances: for example, types, utilization and stock of hazardous chemicals and petroleum products, storage facilities and utilization conditions, as well as treatment of hazardous substances.
 - Historical and planned site utilization in future: attention shall be paid to collect the production and pollution conditions of the site as industrial land and land use planning of the site will be understood at the same time.
- b) Site investigation.
 - Investigation of suspicious pollution source, including location, type, scale and control measures of pollution source; analysis of potential pollutants, contaminated area and means of contamination;
 - Investigation of pollution evidence: for example, vegetation damage, damage and corrosion of vessels and sewage disposal facilities, peculiar smell on the site, as well as stains and traces of corrosion on the ground, roofs and walls.
 - Investigation places involving hazardous substances: including types, quantity, storage conditions and transportation lines of hazardous substances, whether power and hydraulic equipment are using PCB equipment or not, types of insulation materials for equipment, etc.

- Investigation of buildings (structures): including quantity and age of buildings, the floor decoration and stains of the production area, the storage area and the waste disposal site and utilization of sewage treatment structures and wells especially.
 - Investigation of surrounding areas (i.e. potential pollution risk receptors), including pollutant discharge of enterprises surrounding the site, residence communities, schools, hospitals, drinking water source protection areas which might be affected.
- c) Public consultation and information disclosure (the first round public consultation and information disclosure)
- The site owner, workers, surrounding residents, local officers, officers of the department in charge of environmental protection are consulted through interviews, group meetings and/or issuing questionnaires in order to further understand site production and pollution conditions, as well as inform the proposed site cleanup objectives, cleanup activities, and potential impacts.
 - A written summary of the proposed site cleanup objectives, description, and potential impacts should be provided to the site cleanup affected groups
- d) Establishing preliminary conceptual site model
- The potential pollution sources, contaminated areas, types of pollutants, migration pathway and diffusion of pollutants, and influence to surrounding environment are analyzed according to information mastered through document review, field reconnaissance and interview.
 - Preliminary conceptual site model, including pollution source, pollutant release mechanism, pollutant migration and transformation, exposed mode and potential receptors, is established according to future land use plan of the site.
- e) Emergency treatment
- In case of leakage of hazardous substances on the site and surrounding areas during field reconnaissance, the leakage and its extent of injury shall be evaluated rapidly. Meanwhile, efforts shall be made to confirm whether measures shall be taken to eliminate the leakage source.
 - Once emergency cleanup is confirmed, relevant departments shall be notified immediately for emergency treatment.

4.2.1.2. Phase II Site Investigation

Phase II site investigation is to screen whether there are risks on the site or not through preliminary sampling, including sampling, lab analysis and preliminary risk screening. If a risk is confirmed, detailed sampling shall be conducted, the main contents including but not limited to the followings:

a) Preliminary sampling plan

The preliminary site sampling plan, formulated based on site pollution condition, shall include sampling target, sampling point location, sampling medium, sampling quantity, sampling depth, arrangement of site boreholes and groundwater monitoring wells, collection, treatment, transportation and storage technology of samples, name and numbering of samples, analysis items and methods of laboratory analysis, quality assurance and quality control procedures.

- Sampling position: during the sampling stage, judgment method is generally used to arrange soil sampling points. As for sites with even pollution, or seriously damaged landform or whose historical production activities and various pollution devices can not be determined, the grid method can be used.
- Sampling quantity: at least three soil or groundwater sampling points shall be arranged in each suspected contaminated plot or at the bottom of each suspected contaminated facility; at least three groundwater monitoring wells shall be arranged upstream and downstream of groundwater and in the contaminated area on the site. The groundwater monitoring well sampling points and soil sampling points may be merged. Random method can be used in other non-suspected contaminated area and fewer sampling points may be arranged.
- Sampling depth: the pollution confirmation sampling shall include surface and overburden sampling at depth if nothing special happens. The sampling depth can be determined according to soil horizon structure, embedded depth of groundwater, means and principles of pollutant migration and depth of

ground disturbance.

- Analysis items: pollutants preliminarily determined in the first stage of pollution identification shall be included in the sampling analysis items. As for items which can not be determined, few potential typical pollutant samples shall be selected for screening and analysis.

b) Detailed sampling plan

If preliminary sampling results indicate site have been contaminated, detailed sampling should be carried out. Systematic method can be used to arrange soil sampling points. In the areas need to confirm pollution boundary, the sampling subarea should not be more than 1600 m²(40 m×40 m). The sampling depth and interval in vertical direction should decided according to praliminary sampling result.

c) Site sampling

- Preparation before sampling: sampling schedule shall be formulated according to the sampling plan. Various records and lists, necessary monitoring devices and enough sampling devices shall be prepared and disinfected or cleaned in advance.
- Site positioning: site positioning survey (elevation and coordinates) shall be carried out for sampling points using terrain method and instrument measurement method according to the sampling plan. Meanwhile, sampling points shall be marked.
- Plan adjustment: sampling points may be adjusted according to site conditions if sampling can not be completed due to limited site conditions or great difference between site conditions and expected conditions.
- Sample collection: samples of soil and groundwater shall be collected from the site according to the sampling plan. Meanwhile, site quality control samples shall be collected and site records shall be completed.
- Transportation and storage of samples: appropriate sample storage method shall be selected according to different inspection items. Samples and the inspection sheet shall be sent to the analysis and inspection laboratory after the sample inspection list is completed. Meanwhile, the ambient temperature for the transportation and storage of samples shall be controlled under 4°C.
- Precautions: cross contamination of site sampling processes and secondary pollution to environment shall be prevented; personal protection shall be completed; and field quality control shall be carried out through normalizing operations and collecting quality control samples.
- Emergency treatment: In case of leakage of hazardous substances during sampling, the leakage and its extent of injury shall be evaluated rapidly. If necessary, emergency treatment shall be carried out immediately.

d) Sample testing analysis

- On-site analysis: during site sampling, portable analytical equipment shall be used to carry out qualitative or semi-quantitative analysis for content of pollutants or other inspection indexes in the sample.
- Laboratory analysis: quantitative analysis is carried out for contents of pollutants or other indexes in the sample according to analytical methods stipulated in national standards and specifications or foreign methods. Meanwhile, laboratory quality control samples at least equal to 10% of total samples shall be arranged for laboratory quality control.

e) Analysis of testing results

- Sample testing results and data quality shall be analyzed, including types, concentration and distributions of site pollutants, embedded depth and flow direction of groundwater, soil characteristics and thickness, effectiveness and sufficiency of data, whether the data is complying with appropriate laboratory quality assurance requirements or not, etc.

f) Site risk screening

- Set site contamination screening value: relevant national soil and groundwater standards shall be used as site contamination screening value. If a national standard is not available, screening value commonly used internationally can be referred to or site parameters can be used to calculate site characteristic screening value.

- Sample testing results shall be compared with screening value to check whether there is a risk on the site or not. If the testing value is lower than the screening value, the site is not contaminated or the risk is low. Then, site investigation can be completed and report shall be prepared. If the testing value is higher than the screening value, there is potential health risk on the site and detailed sampling shall be developed.

g) Establishing conceptual site model

Types of pollutants and scope and distribution of contamination shall be confirmed according to site sampling results. Meanwhile, detailed conceptual site model shall be established with site geological conditions so as to describe pollution source, pollutant migration pathway, the process of human or ecological receptor contacting with contaminated media and exposure pathways through words, charts and tables.

4.2.1.3. Phase III Site Investigation

Phase III site investigation is to investigate site character parameters, receptor expose parameters, and hydrogeological conditions through data query, field measurement and lab analysis, etc.

- Site character parameters: soil physical and chemical properties parameters (such as pH value, bulk density, organic carbon content, water content, texture), regional climate data etc.
- Receptor expose parameters: land utilization type in and around the site, human and construction data, etc.
- Hydrogeological conditions: topography, geological structure, lithology, bedrock surface and its weathering characteristics, hydrogeological data, etc.

4.2.2. Risk Assessment

During risk assessment, risks caused by site contaminants (POPs chemicals and other toxic chemicals if any such as heavy metals) to the environment and human health are analyzed quantitatively, then site remediation target is formulated and scope of remediation is determined. Risk assessments mainly include but not limited to the following work contents:

a) Risk assessment procedures

During the risk assessment, the process during which the pollution source reaches the receptors through exposed means is analyzed. The main procedures include hazard identification, exposure assessment, toxicity assessment and risk characterization.

- Hazard identification refers to the procedure that focused pollutants on the contaminated site, space distribution of pollutants on the site and possible sensitive receptors are determined according to data collected during site environmental investigation while taking into consideration of means of soil (planned) utilization on the site.
- As for exposure assessment, future land use conditions are determined, means of exposure of pollutants which caused harm to the susceptible group is analyzed, pollutant migration model and human exposure model are determined, relevant model parameters are determined and quantity of pollutant exposure of susceptible population is finally calculated according to site land use plan based on hazard identification.
- As for toxicity assessment, the process during which pollutants cause detrimental effects on human, i.e., dosage – effect relationship, is determined and toxicity parameter is used to express it.
- As for risk characterization, the risk probability and extent of injury are indicated through certain quantitative indexes based on results of hazard identification, exposure assessment and toxicity assessment so as to determine the extent of injury of population exposure.

b) Uncertainty analysis

- Uncertainty analysis of site risk assessment results refers to qualitative or quantitative analysis of uncertainty of simulation results of models caused by input parameter error and model uncertain during the site risk assessment, including risk contribution rate analysis and parameter sensibility analysis.
- Common parameter uncertainty quantitative analysis includes simple covariance method and complicated probability method.

c) Determining preliminary remediation target and scope

- Acceptable level for carcinogenic (10^{-6}) and non-carcinogenic (1) risks of pollutants shall be determined. During detailed risk assessment, appropriate risk level can be selected according to the social and economic development level of each region.
- Threshold values of pollutants in soil and groundwater after site remediation are determined in accordance with site acceptable pollution level, site background value, economic and technical conditions, means of remediation (remediation and project control) and other factors.
- If the same pollutant in the site soil and groundwater poses health risk, the cumulative risk of pollutants in these two media shall be taken into consideration. When calculating remediation target, the weight shall be distributed to make the cumulative risk within acceptable level.
- Sample testing results shall be mapped into a contour map to compare with site remediation target so as to determine the area of remediation preliminarily. If the contour map cannot reflect actual site conditions, the scope of remediation can be corrected by taking into consideration of position of monitoring points, distribution of production facilities and migration and transformation principle of pollutants. The scope of remediation shall be delimited according to different levels of contamination.

d) Supplementary sampling

If existing site sampling cannot satisfy requirements for risk assessment or remediation scope determining, one or more supplementary sampling shall be carried out until enough data is available. If necessary, soil gas, site population, flora and fauna investigation shall be conducted for further risk assessment.

Refer to Technical Guideline for Risk Assessment of Contaminated Sites (HJ 25.3-2014) and (Environmental Site Assessment Guideline) (DB11/T- 656-2009) for detailed risk assessment calculation method and uncertainty analysis method.

An outline for risk assessment is provided for the project entity's reference as attached in Appendix 2.2.

4.2.3. Site Remediation Technology Program

The contaminated site remediation technology program should be prepared based on the site investigation and risk assessment. Firstly, refine the conceptual site model, determine the overall remediation goals and develop appropriate remediation strategy; secondly, determine the feasible site remediation technology through remediation technology screening and technical feasibility evaluation finally, establish the potentially feasible remediation technical program through the rational combination of all feasible technologies; then compare the solutions by taking economic, technical, environmental and social indexes into account so as to determine the best remediation technology program. It shall mainly include, but not limited to, the following work contents:

a) Select remediation strategy

The remediation strategy, based on risk management, is an overall site remediation idea to control health and ecological risks caused by pollution within an acceptable range, including pollution source treatment technology, engineering control technology of cutting off the exposure pathways or institutional control technology of limited receptor exposure behavior or their combination. Remediation strategy selecting process includes refine conceptual site model, confirm the overall goal of site remediation and confirm the remediation strategy.

- Refine conceptual site model: overall considering the risk assessment results, physical and chemical nature of, pollutant, pollutant concentration and distribution, site topographic and hydrogeological conditions to further refine the conceptual site model, which will guide the design and implementation of remediation project.
- Confirm the overall goal of site remediation: the overall goal of site remediation is to make the site soil and groundwater achieve the goal of a certain use function. The overall goal of groundwater remediation can be divided into short-term (cut off and control the pollution source of polluted groundwater and prevent further contamination), medium-term (eliminate the direct site health risks) and long-term (restore the use function of groundwater) remediation goals in different stages. The overall goal of VOCs contaminated soil remediation can be divided into risk elimination (clear pollution source), risk reduction (reduce pollution source concentration through remediation) and risk control (cut off expose pathway through engineering control).

- Confirm the remediation strategy
 - When the pollution source treatment technology is used, the target pollutants, remediation goal and remediation scope of different medium (soil or groundwater) shall be confirmed for various technology types.

For the polluted soil, the remediation goal shall be comprehensively determined based on the risk assessment result, characteristics of treatment technology, final destination of soil or usage mode. When the source treatment technology for reducing the soil concentration is used, it is to reduce the content of targeted pollutants in the soil to the acceptable level of risk that can meet the soil reusing purpose; when soil solidification/stabilization technology is used to reduce the activity and mobility of targeted pollutants and control its risks, the leaching concentration limits shall be determined based on the environmental protection requirements of the final solidification processing site. The treatment medium scope description shall include the depth of polluted soil to be treated, treatment area and boundary and treatment soil quantity.

For polluted groundwater, the remediation goal is closely related to the function to be reached; while the treatment medium scope description shall include the area, depth or water yield of polluted groundwater to be treated.
 - When the engineering control technology is used, the targeted pollutant in different medium, remediation scope and exposure pathways shall be confirmed. Proper exposure pathway cutoff method shall be selected to prevent the diffusion of targeted pollutants and limit exposure or control the transport of pollutant. As the engineering control cannot thoroughly remove the pollutants in the site, so it always requires the combination with institutional control such as regular monitoring and evaluation system. In large and complicated site remediation, the pollutant source treatment technology, engineering control technology and institutional control will always be used together.
 - When the institutional control is used, various rules, criteria, regulation frameworks shall be formulated and carried out to reduce or prevent the pollutants exposure of people, which can control the potential risks for human health and environment from the contaminated site.

b) Screening and evaluation of remediation technology

Remediation technology screening and evaluation consist by three parts: remediation technology screening, evaluation and comprehensive evaluation.

- Remediation technology screening: according to the selected remediation strategy, screen the potential feasible technologies using the methods of literature research and application cases analysis, from the perspectives of remediation effect, achievable and cost. .
 - Technical feasibility assessment: feasibility assessment can be divided into screening test (based on the bench-scale test in the lab) and selective test (further test the potential feasible technology obtained from the screening test, based on bench-scale test or pilot-scale test, to confirm the process parameters, cost and period, etc.) based on the difference of goals and methods. The feasibility evaluation process can be skipped if the materials of efficiency, time and cost are sufficient. The screening test can be skipped if the technology suitable for treatment of a certain pollutant has been proved by a large number of application cases.
 - Remediation technology comprehensive evaluation: make a qualitative (listing description) or quantitative (scoring) evaluation for the remediation technology, which has passed selective test, to confirm the feasible technologies on site.
- #### c) Formulation and comparison of remediation technology program
- Make reasonable combination of various feasible technologies based on the screening and evaluation of remediation technology to determine the potential feasible remediation programme, including detailed remediation goal, remediation scheme design, cost estimate and period estimate, etc.
 - Establish remediation technology comparison indicator system which includes technical indexes, economic indexes, environmental indexes and social indexes, and then use detailed analysis method or expert evaluation method to compare the different remediation programs, and determine the best one.

An outline for the site remediation program is provided for the project entity's reference as attached in Appendix 2.3.

4.2.4. Site Selection for Testing of Remediation Technologies

The Project will also include testing of few remediation technologies that have been successfully applied abroad but not yet in China. During project preparation, Chongqing Ganshui site, which a small pesticide storage site, was identified and its EA report was prepared. The Ganshui site is relatively small and only around 150.7m³ of material is contaminated, mainly with (α - β -)HCH and arsenic. Pollution levels are relevant but limited, in international perspective at or slightly above 'intervention' levels. Although the soil is not heavily contaminated, given the close vicinity of residential dwellings, remediation and ex-situ treatment appear fully justified. The assessment of the site contamination, the local circumstances and the limited quantities, deem this soil as well suited for alternative treatment to achieve standards within a reasonable time-frame that would make the final product suitable for reuse at a lower overall cost than incineration. It was agreed, that the full quantity of 150.7m³ would be excavated and stored for intermediate disposal at a cement factory in Chongqing. Chongqing has identified a location in the cement factory where the demonstration of alternative treatment of the soil (anaerobic biological reduction and phyto-remediation) will be undertaken. The location has been evaluated in the EA report for cleanup of the Ganshui site.

During project implementation, if other technologies is decided for testing, the selection of the location for piloting these technologies should follow the following principles:

a) Selection and construction of the site for alternative treatment (testing of alternative technologies)

For selection and construction of the site, the local urban planning and remediation technology characteristics should be fully considered, and the following requirements need to be met:

- The site area should meet the requirements for testing of two alternative technologies, and the covering area of drainage canal, machinery operation channel and ancillary facilities, etc. need to be taken into account;
- The remediation demonstration site should not be within or near the environmentally-sensitive areas (such as forests, grasslands, rivers and wetlands), urban industrial and agricultural development planning areas, social protected areas (national parks, nature reserves, scenic spots and world heritage sites, etc.), ecological protected areas, drinking water protected areas, water supply vision planning areas, mineral resources reserves, military bases, national confidential areas and other areas requiring special protection;
- It should be far away from hospitals, factories, schools, organs, residential areas and other densely populated areas as much as possible, and keep a necessary safe distance according to the relevant requirements;
- It should be far away from mining smelting, petrochemical, pesticides production and other polluting enterprises, and keep a necessary safe distance according to the relevant requirements;
- It should keep a necessary safe distance according to the relevant requirements outside the warehouses of inflammable, explosive and other hazardous goods, the facilities generating large amount of smoke and electromagnetic interference and the protection areas for high-voltage power transmission line;
- It should be located at the downward of maximum wind frequency throughout the year in the residential center area;
- The siting of remediation demonstration site should be at favorable sections in the terrain, topography and geology, etc. The wasteland, scabland and areas with less demolition should be utilized as much as possible, with factors of convenient transportation, water and electricity required to be considered.
- Before the siting of the site, the geological hydrological conditions need to be investigated. The areas with stable geological structures should be selected, avoiding cave areas or regions easily affected by serious natural disasters, such as floods, landslides, debris flows and tides, etc., as well as the regions with shallower groundwater level;
- The site should be built with flood-control canal, drainage canal, sewage treatment unit, unorganized atmospheric emission monitoring unit, noise monitoring unit, groundwater

monitoring well, etc., and the anti-seepage treatment should be done for the remediation units so as to prevent the groundwater and other surface water from polluting during the remediation.

- The site should be kept away from flood-control areas;
- For the siting construction of the site, it is basically required that at least 3 (inclusive) possible sites should be preselected for comprehensive comparison, and technical and economic analysis should be done;
- The environmental impact assessment must be performed for the newly-built site for the two alternative treatment technologies.

b) Environmental impact assessment of the site

Environmental impact assessment needs to be performed for the site (especially if it is a newly-built site), with the contaminated soil remediation testing work allowable only after passing the environmental acceptance. The principles, contents, working procedures and methods of environmental impact assessment should also meet the requirements in the World Bank's environment and social safeguard policies and also the requirements of China's environmental impact assessment.

4.2.5. Environmental and Social Management Plan

Environmental and social management plan is an instrument that details (a) the feasible and cost-effective measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental impacts, or to reduce them to acceptable levels; (b) the actions needed to implement these measures. The ESMP is an integral part of an EA. The ESMP for the contaminated site cleanup sub-project will include the environmental and social impacts of the site cleanup activity, mitigation measures, environmental supervision plan, remediation validation plan, institutional arrangement and responsibilities, capacity building activities, and implementation schedule and cost estimate.

4.2.5.1. Environmental/ Social Impact and Mitigation Measures

a) Identify potential environmental/social impacts related to site remediation according to site remediation program, site pollution characters and local environmental conditions, including the secondary environmental pollution, occupational health and safety risk, community health and safety risk.

b) Develop a set of mitigation measures to address potential secondary environmental pollution, occupational health and safety risk, community health and safety risk identified.

c) Identify potential cumulative impacts for project sites where large-scale land use change and induced development is foreseen upon completion of the site remediation, and propose measures to deal with such cumulative impacts.

A sample of environmental/ social impact and mitigation measures is attached in Appendix 2.4.1, site-specific supplement and refinement shall be made according to the cleanup sub-project characteristics.

4.2.5.2. Environmental Supervision Plan

The environmental supervision during site remediation is to conduct environmental supervision in the remediation program design stage, remediation facilities construction and installation stage, remediation action implementation stage, remediation validation stage and decontaminated soil reuse stage by the methods of inspection, tour, stand-by supervision, follow-up inspection, monitoring, meeting and reporting, etc.

a) Working methods and system of environmental supervision:

- The working methods of environmental supervision mainly include inspection, tour, stand-by supervision, follow-up inspection, environmental monitoring, environmental supervision meeting, information feedback, record and report etc.
- The working system of environmental supervision mainly includes work record system, document approval system, reporting system, correspondences system, meeting system, contingency report and treatment system, personnel training, propaganda and education system, file management system and quality assurance system.

b) Environmental supervision in remediation program design stage

- Collect the site environmental investigation and risk assessment record files, site remediation program record files, site remedial scheme record files, relevant environmental protection laws and regulations, technical specifications, other relevant documents and contracts.
 - Main supervision contents include: review the compliance of relevant pollution control nodes in the remedial scheme with the original remediation program and environmental protection requirements; review the implementation of environmental protection measures in the design documents; review remediation-related pollution treatment technologies, measures, pollutants final disposal method and destination; review the special terms of environmental protection in the construction and contract agreement; review relevant environmental management system establishment in the implementation scheme.
- c) Remediation facilities construction and installation stage
- Review whether the construction and installation of remediation facilities are consistent with the designing remedial scheme, and whether the environmental protection measures are adopted.
 - Inspect whether the environmental protection facilities meet the design performance.
- d) Environmental supervision in remediation implementation stage
- Supervision of main part of remediation
 - For ex-site soil remediation sub-projects, the environmental supervision is conducted in digging stage, remediation stage and backfilling stage:

Digging stage--whether the digging reaches the boundary, closure measure of transport process, seepage-proofing of the ground with soil piled, sealing measures and braking measures of smell diffusion for workshop stacked with volatile organic contaminant;

Remediation stage--whether the ground seepage control measure and remediation are implemented based on the technical parameters of the implementation scheme, supervise the stacking of soil after remediation for acceptance, the secondary pollution caused by medicament adding during supervision and management of remediation, sealing of treatment workshop stacked with volatile organic contaminant, exhaust gas collection and treatment;

Backfilling stage--supervise whether the backfill soil is reasonably backfilled based on the land use planning, supervise whether the soil foundation pit seepage control and surface blocking measures with solidification and stabilization technology are complete.
 - For in-situ soil remediation projects, boundaries of remediation area shall be strictly supervised and managed, regular monitoring of remediation result shall be conducted, sampling points shall be established in the surrounding area so as to avoid the adverse impact of the remediation projects on the surrounding soil and groundwater.
 - For the groundwater remediation or long-term risk control process, regular monitoring of the pollution source remediation effect or pollutant attenuation effect in groundwater shall be conducted; different supervision measures shall be taken based on different remediation measures; where the in-situ mediation measures such as air injection are taken, sampling monitoring shall be conducted for the surrounding area of air injection, monitoring wells of downstream groundwater and soil gas monitoring facilities, so as to avoid secondary pollution of remediation projects on the surrounding soil and groundwater.
 - Real-time monitoring of environmental impact:
 - To master the environmental pollution situation caused by daily construction and the implementation effect of environmental/social mitigation measures, the supervision company may be requested to conduct simple site environmental monitoring by using portable environmental monitoring instruments. If the monitoring content is complex, a qualified monitoring company is suggested to undertake the work.
 - Pay attention to the waste water, waste gas, solid waste and noise generated during the site cleanup process of soil excavation, transportation, piling up and treatment. The supervision company may be requested to establish atmospheric environmental monitoring points in the surrounding area of the stacking greenhouse, the remediation sub-projects and site boundary, etc..

- Develop an environmental monitoring plan, provide a specific description of monitoring measures, including the parameters to be monitored, methods to be used, sampling locations, frequency of monitoring, etc., which refer to the Technical Guidelines for Environmental Site Monitoring (HJ 25.2-2004) issued by the Environmental Protection Department of the People's Republic of China. A sample of environmental monitoring plan table is attached in Appendix 2.4.2, site-specific supplement and refinement shall be made according to project characteristics.
 - Supervision of supporting facility operation:
Inspect whether the construction and maintenance of treatment facilities for waste water, waste air, noise and solid wastes can meet the requirements in the site remedial scheme and records; in case of any discrepancy with the above documents, a report shall be sent to the PMU or FECO and the environmental protection department in a timely manner and solutions shall be provided.
 - Supervision of environmental risk mitigation measures:
It is required to supervise that whether the construction personnel has taken safety measures, whether security alert identifies are provided in the construction site and whether individual protection plan and environmental risk contingency plan have been prepared; inspect the establishment of environmental risk contingency plan, training of emergency response team and storage of various emergency supplies; and put forward practicable improvement measures and suggestions on the existing problems.
 - Supervision of environmental management:
Assist the building unit and construction unit in establishing and improving the environmental protection management system, supervise and inspect whether the building unit has established professional institutions to take charge of the daily environmental management and require the construction unit implementing construction based on the prepared environmental protection training and promotion plan; investigate the implementation of environmental monitoring plan step by step based on the environmental monitoring requirements in the trial production in the environmental assessment documents; put forward future improvement suggestions on the discovered problems and insufficiency based on the supervision and inspection of environmental management in the remediation process.
- e) Remediation validation stage
- Inspect whether the validation process is in accordance to the validation scheme.
 - Inspect the standardization of the validation method.
 - Supervise the establishment and handover of the validation report.
- f) Decontaminated soil reuse stage
- Make sure the soil reuse process is in accordance with the programme.
 - Inspect the anti-seepage measures and surface barrier measures.

The environmental supervision plan shall be included in EMP, the environmental supervision summary report shall be provided after the site remediation activity is finished. A detailed outline for environmental supervision summary report is provided for the project entity's reference as attached in Appendix 2.4.3.

4.2.5.3. Site Remediation Validation Plan

The contaminated site validation is used to confirm whether the site remediation effect can meet the acceptance standard after completion of contaminated site remediation based on the document review, site investigation, site sampling and testing analysis; where the remediation can pass the acceptance, the re-utilization and development procedure can be adopted for the site; if necessary, long-term monitoring and risk management are required. It shall mainly include, but not limited to, the following work contents:

- a) Document review and site investigation
- Collect materials related to the site environmental pollution and remediation, which mainly include the site environmental investigation and assessment, remediation programme, site remediation engineering design, environmental supervision documents, environmental management organizations, relevant contractual agreements, original records, pictures, images and photo records during remediation process.

- Sort and analyze the materials and organize interviews with the site principal, remediation implementation personnel and supervision personnel; confirm the site target pollutant, remediation scope, remediation target, verify the remediation scheme and implementation of environmental protection measures, verify the quantity and destination of polluted soil and verify the quantity and quality of backfill soil after completion of ex-situ remediation.
- Confirm the site remediation scope and depth based on the post materials or geographic coordinates in the site environmental investigation and assessment report and in combination with relevant reports issued by the remediation supervisor and verify whether the remediation scope can meet the requirement of site remediation scheme.
- Observe and judge the site surface soil and side exposed soil situation and left items; use portable testing instruments to conduct on-site test and identify the site pollution trace by visual inspection and sense of smell.

b) Preparation of sampling plan

- Ex-situ remediation site: sampling in-situ soils within and around the remediation scope, with the sampling points located in the pit and side wall; surface samples shall be taken first and the deep sampling is not excluded; the sampling in the pit is conducted with grid arrangement method and side-wall sampling is conducted with the equidistance arrangement method.
- In-situ remediation site: sampling of polluted soil within the remediation scope is conducted; grid method is used for point arrangement scheme; stratified sampling shall be conducted within the remediation scope by drilling.
- Soil after remediation: for the soil after ex-site remediation, sampling points shall be arranged based on random method. In principal, the soil volume of each sample shall not exceed 500m³; for monitoring in situ abatement and remediation engineering measure effect (such as isolation and anti-migration diffusion), the monitoring points shall be arranged based on relevant requirements of engineering design.
- Groundwater: establish the monitoring well of groundwater based on the flow direction of groundwater and geographic location of pollution area; the sampling point of groundwater in the upstream of the remediation scope shall not be less than one; sampling point within the remediation scope shall not be less than three and sampling point in the downstream of remediation scope shall not be less than two; in principle, the monitoring wells established during site investigation, and remediation can be used; however, the quantity of these shall not exceed 60% of the total monitoring wells.

c) Sampling and lab testing analysis

- Requirements on sampling method, on-site quality control, on-site quality assurance, sample storage and transportation method, sample analysis method, lab quality control, site personnel protection and site pollution emergency treatment for the soil samples and groundwater samples shall be same with that in site investigation phase.
- For nonvolatile organic compound, a small number of soil mixture samples can be collected.
- Leaching test shall be conducted for the solidified body after solidification/stabilization.

d) Evaluation of remediation results

- When the quantity of soil samples is less than 8, the one-by-one comparison method shall be used for evaluation:
 - Where the testing value is less than or equal to the remediation goal, it can meet the acceptance standard requirement;
 - Where the testing value is more than or equal to the remediation goal, it fails to meet the acceptance standard requirement;
- When the quantity of soil samples is larger than or equal to 8, the statistics analysis method can be used for evaluation; in general, 95% of confidence upper limit of the whole average value is used for comparison with the remediation goal:
 - If 95% of confidence upper limit of the whole average value is larger than the remediation goal, it shall be considered as failure in meeting the remediation standard requirement;
 - If 95% of confidence upper limit of the whole average value is less than or equal to the

remediation goal, the maximum value of samples is less than twice of the remediation goal and excessive points are not concentrated in a certain area, it shall be considered that the site can meet remediation standard requirement.

- When the quantity of parallel samples in the polluted samples of same pollutants is larger than or equal to 4 groups, the t-test method can be used:
 - Where the testing result of various sample points is significantly lower than the remediation goal value or the difference between the inspection result and remediation goal is not obvious, it shall be considered that the site can meet remediation effect;
 - Where the inspection result of a sample point is significantly higher than the remediation goal value, it shall be considered that the site cannot meet the remediation effect.
 - The t-test method of parallel samples can be used together with the one-by-one comparison method or 95% UCL.
 - For foundation pit, if the sampling acceptance inspection is not qualified, cleaning and acceptance for the partial polluted soil shall be conducted based on the grids; if necessary, partial detailed sampling can be conducted and grid point arrangement method can be used for detailed sampling point arrangement.
 - For the piled soil after remediation, if the sampling inspection is not qualified, the polluted soil shall be transported to the disposal facility. After remediation by re-operating the remediation facility, sampling validation shall be conducted again.
- e) Long-term monitoring and management shall be conducted for the site passing the remediation validation if necessary.
- For monitoring the effect of in-situ remediation engineering measure (such as isolation and anti-migration diffusion), the monitoring points shall be arranged based on relevant requirements of engineering design, which shall be in line with the detailed sampling and monitoring points in the site environmental investigation.
 - The areas that may be affected by long-term abatement and remediation projects shall also be equipped with a certain number of monitoring points.
 - Regular monitoring shall be conducted for groundwater, surface water and ambient atmosphere. The monitoring points can be established based on the monitoring points in detailed investigation and site environmental supervision.

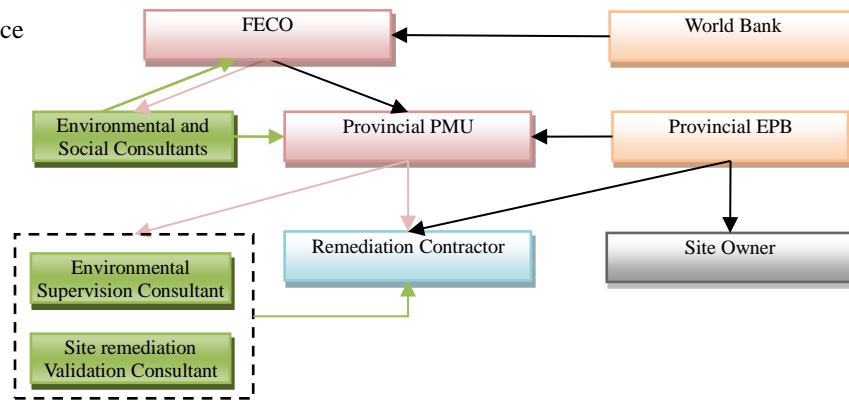
The site remediation validation plan shall be included in EMP, the site remediation validation report shall be provided after the site validation work is finished. A detailed outline for the site remediation validation report is provided for the project entity's reference as attached in Appendix 2.4.4.

4.2.5.4. Institutional Arrangement and Responsibilities

(1) Institutional Arrangement

The project-related institutions include: management organizations (FECO and Provincial PMUs), supervisory organizations (World Bank and Provincial EPB), Site Owner, the implementation organization (Remediation Contractor), consulting service individuals or firms (Environmental and Social Consultants, Environmental Supervision Consultant, Site remediation Validation Consultant). The relationship between agencies is shown in Figure 4-1.

(a) demonstration province



(b) non-demonstration province

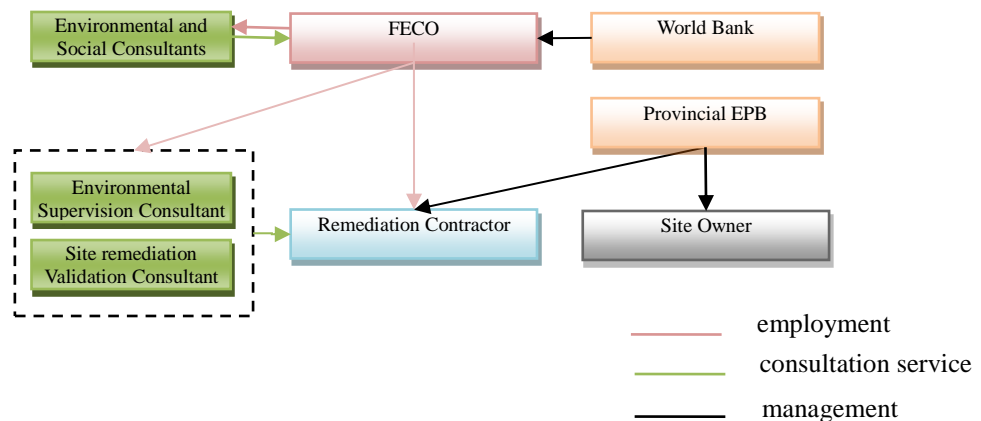


Figure 4-1 Environmental Management Organization Establishment

(2) Institutional Responsibilities

Main responsibilities of different institutions are shown in Table 4-1.

Table 4-1 Institutional Responsibilities

Institution nature	Institution name	Institutional responsibilities
Management organizations	FECO	Be responsible for the overall coordination and management of the project and ensuring the smooth implementation of relevant policies and requirements in the environmental and social management plan including: <ul style="list-style-type: none"> • Inspect and coordinate the work in local environmental management departments • Be responsible for arranging the investigation activities of environmentalists in World Bank • Summarize the reports of various subprojects in different stages and submit them to the World Bank for review For the sub-projects outside demonstration provinces: <ul style="list-style-type: none"> • Enter into relevant construction contracts with the Contractor • Supervise and urge the Contractor to implement the environmental management plan • Hire the environmental supervision consultant to supervise its work • Hire the remediation validation consultant and responsible for acceptance of the sub-project
	Provincial PMUs	Be responsible for the implementation and management of various subprojects and ensuring the smooth implementation of relevant policies and requirements in the environmental and social management plan including: <ul style="list-style-type: none"> • Enter into relevant construction contracts with the Contractor of the sub-projects in demonstration provinces

		<ul style="list-style-type: none"> • Supervise and urge the Contractor to prepare and implement the environmental management plan • Hire the environmental supervision company and supervise its work • Hire the remediation validation consultant and responsible for acceptance of the sub-project • Prepare the environmental management periodic reports of the remediation projects • Report the work to the FECO and World Bank regularly
Supervisory organizations	World Bank	To provide implementation support for all site cleanup activities. The Bank task team's environmental and social specialists will engage and advise the environmental and social consultants hired by FECO or PMUs supporting the demonstrations on the specifics of what will be needed for ESA/ESMP, land acquisition- or ethnic minority-related plans
	EPB in China	The governmental administrative supervision and management organization will be responsible for the supervision and management of whole-process environment of the remediation sub-projects, including the EA approval, providing guidance, and remediation acceptance.
Non-consulting service organization	Remediation Contractor	Site remediation
Consulting service organizations	Environmental and Social Consultants	Hired by the PMUs or FECO to prepare EA reports, including screening of the environmental and social impacts of site cleanups
	Environmental Supervision consultant	Conduct environmental supervision of the Contractor under the entrustment of PMUs or FECO
	Site Remediation Validation consultant	Conduct site remediation effect validation under the entrustment of Project Environmental Management Organization

4.2.5.5. Capacity Building and Technical Assistance

Capacity building is important for successful implementation of the EMP. FECO and PMUs, with assistance of its Environmental and social consultants and the Bank, shall develop a project-wide training plan to provide proper training to various stakeholders, including relative staffs from FECO, Provincial PMU, Provincial EPB, remediation contractor, supervision consultant and validation consultant.

(1) Training Contents

The training will include but not limited to:

- Environmental and social policies of World Bank;
- Domestic laws, regulations and policy of environmental protection and contaminated site management;
- Site investigation, risk assessment, site remediation program, site remediation environmental supervision and remediation acceptance;
- Environmental and social management plan;
- Responsibilities of all stakeholders involved;
- Preparation of EMP implementation progress report, environmental supervision progress report;
- Site visits.

(2) Training Plan

The training contents and training plan have been fully integrated into the project Component 1. Annual training plan will be prepared by FECO and PMUs for the Bank review and approval.

4.2.5.6. Implementation schedule and cost estimate

Detailed EMP with implementation schedule and cost estimates will be provided by the potential bidders as part of their proposed overall site cleanup plan and cost. The environmental supervision will be included in the procurement plan for the project.

4.3. Outputs

The EA exercise will be assigned with the following reports, the draft reports should be submitted for review by the PMUs, FECO and the World Bank before finalization:

- a) EA including site investigation, risk assessment, remediation program, and ESMP
- b) An environmental supervision report of site remediation shall be provided by the consultant to the PMUs and FECO as well as the Bank during site remediation and when the site remediation sub-project is finished.
- c) A site remediation validation and acceptance report shall be provided by the consultant to the PMUs and FECO as well as the Bank when the site remediation sub-project has passed the remediation validation.

4.4. Consultant Qualification

The consultant (person or team) should possess the following qualifications:

- A master or higher degree in contaminated site management or other field related to site environmental assessment; a certified EA preparer;
- Well know laws, regulations, policies and standards about contaminated site management in China;
- Minimum of eight years of experience with contaminated site investigation, risk assessment and remediation work under the Bank-financed projects;
- Excellent oral and written communication skills in Chinese and English.

4.5. Timeframe

As discussed and agreed with the PMU and Bank team according to the project needs.

5. Sub-project Resettlement Policy Framework

As sites for cleanup demonstrations (except for the first site) will be confirmed during project implementation, it is unclear how many and which specific project sites may require land or affect people nearby during actual site cleanup. Thus involuntary resettlement in relation to land requisition and resettlement cannot be fully determined at this stage. An RPF is therefore prepared. It is important to note that when it is known land acquisition and involuntary resettlement will be caused by this project, the principles and procedures of this RPF need to be strictly followed. Under this circumstance, the RPF highlights the situation when a Resettlement Action Plan (RAP) is needed. The preparation of RAP is to steer the project design and implementation to minimize the potential social impacts and provide the compensation and work opportunities to the displaced persons. Through provision of compensation and other forms of assistance, the income and living standard of the displaced persons should be improved or at least restore to the level prior to the project.

5.1. OP 4.12 Policy Objectives and key definitions

The sub-project resettlement preparation aims to provide affected people with appropriate assistances and compensation during and after resettlement implementation caused by site cleanup, and with sufficient investment resources and opportunities to enable them to share project benefits and receive appropriate compensation for impacts. The sub-project resettlement needs to be eventually carried out as a local sustainable development program by which the sub-project affected people are able to improve their livelihoods and living standards based on consultation and their participation. Key objectives and definitions are highlighted as follows:

Every reasonable effort will be made to avoid or minimize the need for land acquisition, and to minimize all resettlement-related adverse impacts. If land acquisition and associated adverse impacts cannot be avoided, the principle objective of the RPF is to ensure that all persons subjected to adverse impacts (“displaced persons” as defined below) are compensated at replacement cost (as defined below) for lost land and other assets and otherwise provided with any rehabilitation measures or other forms of assistance necessary to provide them with sufficient opportunity to improve, or at least restore, their incomes and living standards.

“Displaced persons” refers to all of the people who, on account of the activities listed above, based on the criteria for eligibility for compensation; “Displaced Persons” may be classified in one of the following three groups:

- a) those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country);
- b) those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets-provided that such claims are recognized under the laws of the country or become recognized through a process identified in the RAP; and
- c) those who have no recognizable legal right or claim to the land they are occupying.

Persons covered under (a) and (b) are provided compensation for the land they lose, and other assistance. Persons covered under (c) are provided resettlement assistance in lieu of compensation for the land they occupy, and other assistance, as necessary, to achieve the objective set out in this policy, if they occupy the subproject areas prior to a cut-off date⁵ established by the borrower and acceptable to the World Bank. Persons who encroach on the area after the cut-off date are not entitled to compensation or any other form of resettlement assistance. All persons included in (a), (b), or (c) are provided compensation for loss of assets other than land.

Specifically in practice, the displaced person may have their (1) standard of living adversely affected, or (2) right, title, interest in any house, land (including premises, agricultural and grazing land) or any other fixed or movable asset acquired or possessed temporarily or permanently. (3) access to productive assets adversely affected, temporarily or permanently, or (4) business, occupation, work or place of residence or habitat adversely affected.

⁵ Normally, this cut-off date is the date the census begins. The cut-off date could also be the date the subproject areas was delineated, prior to the census, provided that there has been an effective public dissemination of information on the area delineated, and systematic and continuous dissemination subsequent to the delineation to prevent further population influx.

"Replacement cost" is the method of valuation of assets which determines the amount of compensation sufficient to replace lost assets, including any necessary transaction costs. Compensation at replacement cost is defined as follows: For agricultural land, it is the pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes. For land in urban areas, it is the pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes. For houses and other structures, it is the market cost of the materials to build a replacement structure with an area and quality similar to or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes. In determining the replacement cost, depreciation of the asset and the value of salvage materials are not taken into account, nor is the value of benefits to be derived from the project deducted from the valuation of an affected asset. Where domestic law does not meet the standard of compensation at full replacement cost, compensation under domestic law is supplemented by additional measures so as to meet the replacement cost standard. Such additional assistance is distinct from resettlement measures to be provided under other clauses in OP 4.12, Para. 6.

"Land acquisition" is the process whereby a person involuntary loses ownership, use of, or access to, land as a result of the project. Land acquisition can lead to a range of associated impacts, including loss of residence or other fixed assets (fences, wells, tombs, or other structures or improvements that are attached to the land).

"Rehabilitation" is the process by which displaced persons are provided sufficient opportunity to restore productivity, incomes and living standards.

"Cut-off Date" is the date prior to which the ownership or use establishes eligibility as displaced persons for compensation or other assistance. The cut-off date is established in the RAP. It normally coincides with the date of the census of affected persons, or the date of public notification regarding the specific civil works that would cause displacement. Persons coming into the project area after the cut-off date are not eligible for compensation or other assistance.

5.2. Key Principles

World Bank's OP 4.12 establishes several key principles to be followed in resettlement planning and implementation below:

- a) Wherever possible, project designs and RAPs should be conceived as development opportunities and an integral part of the project, so that displaced persons may benefit from the services and facilities created for, or by, project activities.
- b) All displaced persons are entitled to compensation for lost assets, or to alternative but equivalent forms of assistance in lieu of compensation; lack of legal rights to the assets lost will not bar displaced persons from entitlement to such compensation or alternative forms of assistance.
- c) Compensation rates as established in a RAP refer to amounts to be paid in full to the individual or collective owner of the lost asset, without depreciation or deduction for taxes, fees or any other purpose.
- d) When cultivated land is acquired, effort should be made to provide land-for-land replacement.
- e) Replacement house plots, sites for relocating businesses, or replacement agricultural land should be of equivalent use value to the land that was lost.
- f) The resettlement transition period should be minimized. Compensation for assets should be paid prior to the time of impact, so that new houses can be constructed, fixed assets can be removed or replaced, and other necessary mitigation measures can be undertaken prior to actual displacement.
- g) Displaced persons are to receive support (direct assistance or allowances) to meet moving expenses or for temporary subsistence until they can resume productive activities.
- h) Displaced persons should be consulted during the process of RAP preparation, so that their preferences regarding possible resettlement arrangements are solicited and considered; RAPs are publicly disclosed in a manner accessible to displaced persons.

- i) Displaced persons should be consulted during the process of RAP preparation, so that their preferences regarding possible resettlement arrangements are solicited and considered; RAPs are publicly disclosed in a manner accessible to displaced persons.
- j) Responsibility must be clearly established for meeting all costs associated with land acquisition and resettlement, and for ensuring that sufficient funds are available as they become needed.
- k) Clear institutional arrangements must be established to ensure effective and timely implementation of all resettlement and rehabilitation measures.
- l) Adequate arrangements for effective monitoring will be made on implementation of all resettlement measures.

5.3. Methods

Methods by which displaced persons can pursue grievances will be established, and information about grievance procedures will be provided to displaced persons. Chinese Legal and Regulatory Framework
For any land acquisition and resettlement activities in China, they will follow a set of national laws and regulations, the latest standard for compensation, which include:

- (1) Land Administration Law of the People's Republic of China (issued in 1986 and amended in 1998 and 2004 respectively). The pertinent provisions of the Land Administration Law of the People's Republic of China (State Council Order No.256 1998).
- (2) Regulation on Dismantlement Basic Farmland Protection (State Council Order No.257 1998).
- (3) Regulation on the Compensation and Dismantlement of Houses on State-owned Land. (State Council Order No. 590, 2011).
- (4) Circular of the Ministry of Land and Resources Concerning the Issuance of the Guiding Opinions on Improving the System of Compensation for Requisition of Land (Circular No. 238, issued by Ministry of Land and Natural Resources (MLR) in 2004), regulations on deepening the reform provisions of strict land management (Guofa [2004] No.28). Circular of the State Council Concerning the Issues of Strengthening the Control of Land (Guofa [2006] No.31).
- (5) Measures for Announcement of Land Acquisition (MLR Order No.10).
- (6) Circular of the General Office of the State Council on the approval and transmission of the Guidelines submitted by the State Council Ministry of Labor and Social Security on employment training and social security for Landless farmers (Guobanfa [2006] No.29).
- (7) Relevant Questions Concerning the social security for Landless farmers (Circular No. 14, issued by Ministry of Labor and Social Security in 2007).
- (8) Provincial and local implementation regulations.

These laws and regulations form the legal basis for providing compensation and rehabilitation to those affected by land acquisition and resettlement activities. Key provisions of Land Administration Law and Circular No. 238 are highlighted below.

5.3.1 Key Provisions of the Land Administration Law

Article 2

The state may, out of necessity of public interest, requisition land collectively owned in accordance with law.

Article10

for land collectively owned by peasants but has been allocated to villagers for collective ownership according to law shall be operated and managed by village collective economic organizations or villagers' committee; and the land that has been allocated to two or more peasants collective economic organizations of a village, shall be operated and managed jointly by the collective economic organizations of the village or villagers' groups; and the land that has been allocated to township (town) peasant collectives shall be operated and managed by the rural collective economic organizations of the township (town).

Article12

Changes of owners and usages of land should go through the land alteration registration procedures.

Article 31

The State protects the cultivated land and strictly controls the conversion of cultivated land into non-cultivated land.

The State fosters the system of compensations to cultivated land to be occupied. In the cases of occupying cultivated land for non-agricultural construction, the units occupying the cultivated land should be responsible for reclaiming the same amount of land in the same quality as that occupied according to the principle of "reclaiming the same amount of land occupied. Whereas units which occupy the cultivated land are not available with conditions of reclamation of land or the land reclaimed is not up to requirements, the units concerned should pay land reclamation fees prescribed by provinces, autonomous regions and municipalities for reclaiming land for cultivation the land reclaimed.

Article 46

Where land is to be requisitioned by the State, the requisition shall, after approval is obtained through legal procedure, be announced by people's governments at or above the county level, which shall help execute the requisition.

Units and individuals that own or have the right to the use of the land under requisition shall, within the time limit fixed in the announcement, register for compensation with the land administration department of the local people's government by presenting their certificates of land ownership or land-use right.

Article 47

Land requisitioned shall be compensated for on the basis of its original purpose of use.

Compensation for requisitioned cultivated land shall include compensation for land, resettlement subsidies and attachments and young crops on the requisitioned land. Compensation for requisition of cultivated land shall be six to ten times the average annual output value of the requisitioned land for three years preceding such requisition.

Resettlement subsidies for requisition of cultivated land shall be calculated according to the agricultural population needing to be resettled. The agricultural population needing to be resettled shall be calculated by dividing the amount of requisitioned cultivated land by the average amount of the original cultivated land per person of the unit the land of which is requisitioned.

The highest resettlement subsidies to be divided among members of the agricultural population needing resettlement shall not exceed fifteen times its average annual output value for the three years preceding such requisition.

Standards of land compensation and resettlement subsidies for requisition of other types of land shall be prescribed by provinces, autonomous regions and municipalities directly under the Central Government with reference to the standards of compensation and resettlement subsidies for requisition of cultivated land.

Standards for compensation for attachments and young crops on the requisitioned land shall be prescribed by provinces, autonomous regions and municipalities directly under the Central Government.

For requisition of vegetable plots in city suburbs, the land users shall pay towards a development and construction fund for new vegetable plots in accordance with the relevant regulations of the State.

If land compensation and resettlement subsidies paid in accordance with the provisions of the second paragraph of this Article are still insufficient to help the peasants needing resettlement to maintain their original living standards, the resettlement subsidies may be increased upon approval by people's governments of provinces, autonomous regions and municipalities directly under the Central Government. However, the total land compensation and resettlement subsidies shall not exceed 30 times the average annual output value of the requisitioned land for the three years preceding such requisition.

Article 48

Once a plan for compensation and resettlement subsidies for requisitioned land is decided on, the local people's government concerned shall make it known to the general public and solicit comments and suggestions from the collective economic organizations, the land of which is requisitioned, and the peasants.

Article 49

The rural collective economic organization, the land of which is requisitioned, shall accept supervision by making known to its members the income and expenses of the compensation received for land requisition. The compensation and other charges paid to the unit for its land requisitioned is forbidden to be embezzled or misappropriated.

Article 57

Where land owned by the State or by peasant collectives needs to be used temporarily for construction of projects or for geologic prospecting, the matter shall be subject to approval by the land administration departments of people's governments at or above the county level. However, if the land to be temporarily used is located in the area covered by certain urban planning program, the matter shall be subject to agreement by the urban planning administration department concerned before it is submitted for approval. The land user shall, depending on who owns the land and who has the land-use right, enter into a contract for the temporary use of the land with the land administration department concerned, or the rural collective economic organization, or the villagers committee and pay compensation for it in accordance with the provisions of the contract.

The temporary land user shall use the land for purposes stipulated in the contract for temporary use of the land and may not build permanent structures on it.

Generally, the period for temporary use of land shall not exceed two years.

5.3.2. Key Provisions in the Circular No.238

(1) The Formulation of the Unified Standards of Annual Output Value. The departments of land and resources at the provincial level shall, in conjunction with other departments concerned, work out the unified minimum standards for annual output value, which shall be announced and executed after the examination and approval by the people's governments at the provincial level. Factors such as types and quality of arable land requisitioned, peasants' input, prices of primary products and the categories of farmland shall take into account when deciding the value of average annual output.

(2) The Determination of the Unified Multiple of Annual Output Value. The unified multiple of the value of average annual output for calculating land compensation and resettlement subsidies shall comply with the principle of non-decrease of the standards of living of the peasants whose arable land has been requisitioned and shall be decided within the limits prescribed by laws and regulations; compensation for requisitioned land calculated with reference to the prescribed multiple of the value of average annual output shall increase the multiple upon approval of the people's governments at the provincial level if it is unable to maintain the original living standards of the peasants whose land has been requisitioned and still insufficient to pay social security expenses for peasants who have lost land due to requisition; the total land compensation and resettlement subsidies shall be 30 times the value of the average annual output of arable land, or shall be subsidized by a proportion of proceeds from the sale of State-owned land use rights under the overall planning of a local people's government if they are still insufficient to maintain the original living standards of the peasants whose land has been requisitioned. Compensation for arable land that is authorized to be requisitioned shall be implemented in compliance with the maximum compensation standards announced by the local people's government.

(3) The Formulation of the Comprehensive Prices of Farmland in Resettlement Areas. In the areas where conditions permit, provincial-level departments of land and resources may make comprehensive land prices in counties (or cities) within provincial boundaries together with the administrative departments concerned, which shall go into effect upon approval and promulgation by the people's governments at the provincial level and shall be applied to compensation for land requisitioned. In calculating the comprehensive prices of farmland, the categories and rates of arable land, its production value, location, per capita quantity as well as demand and supply or the local economic development levels and the minimum standards of living should be given full consideration.

(4) The Allocation of Compensation for Land. In accordance with the principle of distributing land compensation funds mainly among peasants whose land has been requisitioned, land compensation funds shall be appropriately allocated within rural collective economic organizations. The people's governments at the provincial level shall guide detailed ways of allocation. In the areas where land is expropriated and rural collective economic organizations are dissolved, all compensation for land shall be applied for the restoration of agricultural production and livelihood of the peasants whose land has been requisitioned.

(5) Rehabilitation by Agricultural Production. During requisitioning of peasants' collective land beyond urban planning areas, first priority shall be given to providing peasants with necessary cultivated land for continuity of agricultural production by utilizing the rural collective land reserves, the contracted land returned voluntarily by the contracting rural households or the newly added arable land after land circulation and land consolidation.

(6) Rehabilitation by Reemployment. Favorable conditions shall be created to provide free technical training and assign corresponding posts to peasants whose land has been requisitioned. Under equal conditions, the land users shall give priority to creating employment opportunities for peasants whose land has been requisitioned. During requisitioning of peasants' collective land within urban planning areas, the peasants losing their arable land due to land acquisition shall be incorporated into urban employment system and a social security system shall also be established.

(7) Rehabilitation by Dividends. Regarding land with long-term stable earnings to be used in any projects, under the premise of rural households' willingness, the rural collective economic organizations, the land of which is requisitioned, shall regard land compensation as stocks or converge the land-use right of the land approved for construction purposes into stocks through consultation with the land users. The rural collective economic organizations and rural households shall receive dividends by means of preference stocks based on the contracted conditions.

(8) Rehabilitation by Resettlement. In the area where peasants losing land due to land acquisition are not provided with basic production and living conditions, the local government shall organize their resettlement into other areas on the basis of fully soliciting opinions from the rural collective economic organizations and rural households whose land has been requisitioned.

5.4. Sub-project screening

Due to the nature of this project, potentially only a few project sites may involve minor land acquisition and or house demolition for cleanup. For such subprojects, this policy frame should be strictly followed. A social safeguard screening will be carried out by a domestic social safeguard specialist engaged by the PMUs and FECO in order to determine scale of land acquisition and resettlement impacts for such subprojects and ensure related Chinese government regulations and laws and World Bank safeguards policies followed when and as required. The screening will look into basic information on (1) amount of land acquisition required for the project; (2) amount of buildings to be demolished; (3) number of households or persons to be resettled; (4) number of people to be affected by land acquisition; and (5) whether the PMUs/FECO and site owner are willing and able to comply with resettlement policies. Based on the information and screening, relevant social safeguard instrument will be prepared as applicable.

5.5. RAP Preparation and Approval

The overall responsibility for preparation and implementation of any necessary RAPs rests with the local PMUs and FECO in consultation with site owners. They will work with other local government agencies or jurisdictional units with direct responsibility for acquiring land or implementing resettlement measures. PMUs and FECO will be responsible for engaging the site owner in any land acquisition and resettlement and preparing the RAP in accordance with national and local laws and regulations and the safeguard policy OP 4.12

of the World Bank. The RAP as part of the site-specific EAS will be submitted to the Word Bank for review and clearance.

Once it is determined that land acquisition or any associated impacts is essential to complete any project activities, and the land scope and site to be acquired is decided, resettlement action planning should begin and a qualified consulting team should be hired to prepare a RAP. The PMUs and FECO, as well site owners should provide all necessary support and arrangements for a census survey to identify and enumerate all displaced persons, and a socioeconomic survey to determine the range and scope of adverse impacts in the affected area. The census survey must cover 100% of the persons to be displaced; the socioeconomic survey may be undertaken on a sample basis. The surveys, which may be undertaken separately or simultaneously, determine whether a full RAP or an “abbreviated” RAP (as defined in OP 4.12, Annex A) is necessary. When the number of persons affected exceeds 200, a full RAP is necessary. Where impacts on all displaced persons are relatively minor, or fewer than 200 people are affected, an abbreviated RAP may be prepared. Impacts are considered “minor” if the affected people are not physically displaced and less than 10% of their productive assets are lost.

If a RAP is necessary, it will be prepared in accordance with the policy principles and planning and implementation arrangements set forth in this RPF. The RAP is based on accurate census and socioeconomic survey information, and establishes appropriate mitigation measures (e.g., compensation for assets, transitional assistance, and economic rehabilitation assistance) as appropriate for all categories of adverse impacts. Depending on the categories of impacts, the RAP specifically addresses the following:

- a) Description of the activity causing land acquisition.
- b) Range and scope of potential adverse impacts.
- c) Purposes and objectives of RAP.
- d) Socioeconomic survey and baseline census survey information.
- e) Review of relevant laws and regulations relating to land acquisition and resettlement.
- f) Specific compensation rates (or alternative measures) for all categories of affected assets.
- g) Other measures, if any, necessary to provide opportunities for economic rehabilitation of displaced persons.
- h) Eligibility criteria for compensation and all other forms of assistance.
- i) Relocation arrangements, if necessary, including transitional support.
- j) Organizational arrangements for implementation.
- k) Consultation and disclosure arrangements.
- l) Resettlement implementation schedule.
- m) Grievance procedures.
- n) Costs and budget.
- o) Monitoring arrangements.

If an abbreviated RAP is to be prepared, it also must be based on principles and planning and implementation arrangements established in this RPF. An abbreviated RAP normally includes the following contents,

- a) A census survey of displaced persons and valuation of assets.
- b) Description of compensation and other resettlement assistance to be provided.
- c) Eligibility criteria.
- d) Consultation and disclosure arrangements.
- e) Organizational arrangements for implementation.
- f) Timetable and budget.
- g) Monitoring arrangements.
- h) Grievance procedures.

For those subprojects whose land acquisition for the new location of the project-supported plant was finished within 2 years when participating in the project, the PMUs and FECO are responsible (through hiring consultants if needed) for the preparation of Due Diligence Report to review the land acquisition and make sure that remedial actions have been taken and there is no legacy issue in compensation and resettlement.

5.6. Eligibility

All displaced persons are eligible for compensation and/or other forms of assistance, as relevant to the nature of impacts affecting them.

In general, people eligible for compensation would include those affected in the following ways:

Land to be permanently acquired for the project: This includes a) owners with formal legal title, b) land users eligible for formal legal title under the Chinese law, and c) those residing on, or using, state land prior to an established cut-off date, usually the date of public notification regarding the specific civil works activity that would cause displacement. Displaced persons in categories a) and b) are entitled to compensation at replacement cost. In lieu of formal compensation, displaced persons in category c) are provided with alternative forms of assistance, in value equivalent to replacement cost.

Loss of houses, other structures and fixed assets, including trees and standing crops: Owners of houses and other assets (regardless of whether they hold land title or building permits for structures erected prior to the cut-off date).

Losses associated with temporary impacts: This includes temporary loss of land, and transitional costs associated with moving, or disturbance to businesses during construction.

Specifically, displaced persons will be entitled to the following types of compensation and rehabilitation measures,

1. Displaced persons losing farm land

- a) The preferred mechanism for compensation of lost farm land will be through provision of replacement land of equal productive capacity and satisfactory to the displaced person. If satisfactory replacement land cannot be provided, compensation at replacement cost should be provided.
- b) Displaced persons should be compensated for the loss of crops at market price, for cash trees at net present value, and for other fixed assets (ancillary structures, wells, fences, irrigation improvements) at replacement cost.
- c) Compensation will be paid for temporary use of land, at a rate tied to duration of use, and the land or other assets will be restored to prior use conditions at no cost to the owner or user.

2. Displaced persons losing residential land and structures

- a) Loss of residential land and structures will be compensated either in-kind (through replacement of house site and garden area of equivalent size) satisfactory to the displaced person or in cash compensation at replacement cost.
- b) If after partial land acquisition the remaining residential land is not sufficient to rebuild or restore a house of other structures of equivalent size or value, then at the request of the displaced person the entire residential land and structure will be acquired at replacement cost.
- c) Compensation will be paid at replacement cost for fixed assets.
- d) Tenants, who have leased a house for residential purposes will be provided with a cash grant of three months rental fee at the prevailing market rate in the area and will be assisted in identifying alternative accommodation.

3. Displaced persons losing business

Compensation for loss of business will involve, as relevant: (i) provision of alternative business site of equal size and accessibility to customers, satisfactory to the displaced business operator; (ii) cash compensation for lost business structures; and (iii) transitional support for loss of income (including employee wages) during the transition period.

4. Infrastructure and access to services

Infrastructure (such as water sources, roads, sewage systems or electrical supply) and community services (such as schools, clinics or community centers) will be restored or replaced at no cost to the communities affected. If new resettlement sites are established, infrastructure and services consistent with local standards will be provided at no cost to the relocated persons.

5.7. Rehabilitation Measures

Most of the sub-project sites are brownfield sites, since it is near the city, industrial and other off-farm activities were the main ways of living, and incomes from agriculture will be a small portion. In order to mitigate adverse impacts from land acquisition, mitigating measures should be taken by the PMUs and FEEO in consultation with site owners and local governments, including: (1) compensatory payment for land loss and (2) Provide convenience for affected person to get off-farm job, and restore livelihoods, and (3) provide social security such as endowment insurance, vocational training and reemployment assistance to eligible affected person as appropriate. These measures make sure that the living standard of affected people be restored or improved. The RAP shall assess the significance of impacts to be imposed on displaced persons, and provide measures to assist those displaced persons in adapting to a new living environment.

5.8. Consultation and Information Disclosure

To promote active project participation and adaptation to changed living circumstances, displaced persons should be provided with opportunities to participate in planning and implementation of the project. Displaced persons should be consulted on preferences and concerns during the resettlement action planning process. All displaced persons should be informed of potential impacts and proposed mitigation measures, including compensation rates. The RAP will be disclosed, in a manner and location accessible to displaced persons and the public.

Participation in Preparation Stage

- A. The responsible persons of the local government and each relevant department held discussions and briefing meetings to introduce major technical standards, construction meanings, and project schedule, etc. so as to make the local government understood all conditions of this project in detail.
- B. Propagate and report the related legal regulations and construction condition so as to let the affected people and the public have good understanding of this project.
- C. Collect opinions of the PAPs on land acquisition and house demolition.
- D. Publicize the work of land acquisition and house relocation, as well as the implementation schemes.

Public Participation in Land Acquisition, House Relocation and Implementation

A. Participation in House Reconstruction

(1) Housing compensation criteria

Before the houses relocated, the relevant resettlement authority will consult and sign an agreement with the resettlers on the compensation criteria for the houses. The consulting results will be disclosed before the agreement signed so as to put the resettlement under public supervision.

(2) Location of new house site

During preparation of the land acquisition, removal and resettlement, the relevant department has carried out a survey on the new house site, construction mode and other issues.

(3) Demolition of old houses

All the old houses to be demolished will be compensated at replacement cost.

B. Participation in Management of Land Compensation

The use of compensation fund should be decided after consultation and discussion with PAPs and affected communities.

C. Participation in Project Construction

In order to ensure the affected persons to get benefits from the project, the local people will be encouraged to take part in the project such as provision of local materials and labor force.

5.9. Implementation Arrangements

Once land acquisition is confirmed and preliminary design is adopted, a RAP should be prepared by the PMUs

and FECO by engaging consultants, site owners and local governments. The following key tasks (not limited to) should be carefully undertaken during the sub-project resettlement preparation:

- The PMUs or FECO designates a staff to supervise resettlement preparation and implementation for each participating site;
- Setting up special resettlement team(s) as necessary, consisting of resettlement experts from professional agencies (such as qualified design institutes or universities) and local staff/practitioners, in order to carry out census and socio-economic surveys, impact inventorying, public consultation and feedback solicitation, social and economic analysis, implementation planning, livelihood rehabilitation planning, monitoring and evaluating, etc.
- Training of resettlement team(s) and PMUs and FECO relevant staff, provided by experienced resettlement experts;
- Desk review and risk assessment of local resettlement related information and policy applicability;
- Field investigation on resettlement impacts and local social and economic conditions;
- Drafting resettlement action plan with consultation with and dissemination to the affected people, and internal and external M&E mechanism for resettlement implementation.

In particular, field investigation on details of the land and its ground attachments should be carried out by relevant local partners. During the on-site investigation, scope of land acquisition and the impacts should be measured carefully and recognized by affected people through consultation on and participation. Based on the investigation, the RAP reviews organizational arrangements to ensure that implementation procedures are clear, that responsibility is clearly designated for provision of all forms of assistance, and that adequate coordination among all agencies involved in RAP implementation is assured. The RAP also indicates that, except for cash compensation, other forms of assistance to affected people should be provided by the PMUs, site owners or local governments during the resettlement process in a timely manner.

Given the fact that this project is the first experience of the PMUs to cooperate with the Bank and both PMUs and FECO have little experience in resettlement work of the Bank-supported projects, it is necessary to obtain technical assistance (TA) from qualified and experienced consultant on RAP and resettlement preparation. The TA could be conducted in two phases: a) training of the relevant PMU and FECO staff and responsible staff from relevant local authorities; and b) the resettlement preparation work by the RAP consultants.

In any event, the following skills and qualifications of the consultant(s) for preparation of RAP are specifically required: expertise in social sciences or other fields related to involuntary resettlement theories; b) knowledgeable of resettlement practice, policies and laws in China; c) minimum ten years of experience in involuntary resettlement work under the Bank-financed projects; and d) excellent oral and written communication skills in Chinese and English.

The draft RAP should be submitted for review and/or approval/clearance by the site owner, local PMUs and FECO, and finally the World Bank before finalization.

5.10. Costs and Budget

Each resettlement action plan will include detailed cost of compensation and other rehabilitation entitlements and resettlement of displaced persons. The cost estimates will also include adequate costs for contingencies. The resettlement action plans will explicitly establish sources for all funds required, and resettlement fund flow should be compatible with the timetable for payment of compensation and provision of all other assistance.

5.11. Grievance Redress Procedure

RAPs will establish means for displaced persons to bring complaints to the attention of relevant project authorities. Grievance redress procedures should include reasonable performance standards, e.g., time required to respond to complaints, and should be provided without charge to displaced persons. The RAP should also state other avenues available to aggrieved persons if the project-related procedures fail to resolve complaints. The affected collective unit or individual can appeal the relevant difficulty, problem, complain and

dissatisfaction through the following channels and ways: (i) the PMUs and FECO; (ii) city and region government; (iii) city and district State Land Resources Departments; and (iv) legal litigation.

5.12. Time frame

The project resettlement preparation should well fit into the project preparation and implementation schedule as a whole; and specific time table can be decided on each case of sub-project.

Each RAP must include a detailed implementation schedule, linking the project construction timetable to resettlement-related activities. The implementation timetable should establish that compensation (in cash or in kind) should be paid in 3 months prior to the initiation of civil works.

5.13. Resettlement Monitoring and Evaluation

To ensure that all affected people get adequate compensation, and to ensure that their incomes and ways of living are recovered after relocation, project implementation should be under internal and external monitoring. The PMUs, FECO (together with site owners) are responsible for the internal monitoring and external monitoring and evaluation should be conducted by an independent qualified agency contracted by the project owner.

Internal Monitoring

The overall goal of internal monitoring is to guarantee the implementation according to approved "Resettlement Action Plan". Specific goal is as follows: (i) according to planned schedule and budget, to inspect the implementation condition of the important issue during resettlement and the project preparation stage. (ii) ensure to have the unblocked channel for consulting and ideal exchanging between the affected persons and manager; (iii) guarantee that the affected persons would get the full payment on time; and (iv) check whether the complaint is handled according to time limited. It is the resettlement implementation organization to take the responsibilities for the internal monitoring.

The External Independent Monitoring and Evaluation

External monitoring and evaluation means to carry out regular monitoring and evaluation on the land acquisition and relocation as well as resettlement from the outside of resettlement organization, to monitor and evaluate whether the target of the resettlement is realized, by which evaluation opinions and proposals will be put forward on the resettlement and restoration of the resettlers' living standards, and to provide predicting and alarming system to the project management and reflecting channel to the resettles.

The external monitoring institution will be the consultant for the local PMU in relation to project-led resettlement, it will conduct follow-up investigation, monitoring and evaluation of the resettlement activities according to the RAP and provide advice for decision-making.

Main Indicators for Monitoring

- A. Progress: including preparation, implementation of land requisition and resettlement.
- B. Quality: including civil work construction quality and degree of resettles' satisfaction.
- C. Investment: including allocation and use of the funds

Main Indicators for Evaluation

- A. Production and living conditions of resettlers
 - (1) Economic conditions: household economic development before and after resettlement, including assets, production materials, subsistence materials, income, etc.
 - (2) Employment: changes in employment, including employment rate, assistance to the different PAPs, especially the vulnerable PAPs and minority.
 - (3) Development in community: local economy in resettlement host sites
- B. Infrastructure
 - Changes in infrastructure in the affected area before and after the Implementation
- C. Enterprises and institutes
 - Changes in the business condition and environment before and after resettlement

6. Project Social Assessment

6.1. Objectives

The overall purpose of the SA is to assist the PMU and FECO in designing and implementing the cleanup sub-project with broad support and active involvement of individuals and groups that will potentially be the most directly affected by site cleanup activities (especially the poor, minority nationalities, women, or other vulnerable groups whose views may otherwise be under-represented), so that the project's positive benefits are identified and maximized while its negative social impacts are avoided or mitigated. The social assessment also establishes a basis for subsequent project monitoring and evaluation. Social assessment is to be conducted for all project sites and prepared by the PMUs and FECO through engaging consultants, site owners and local government agencies. The SA key findings and recommendations are incorporated into the Environmental and Social Assessment and the environmental and social management plan for implementation.

Specific objectives of the social assessment exercise should be achieved in consultation with a broad sample of resident households, community leaders, local authorities and environmental management officials, as follows:

- Identify ways for the sub-project activities to bring equitable opportunities and benefits to local residents in the cleanup of contaminated sites;
- Provide a clear picture on presence of ethnic minority groups in overall sub-project areas, ascertain who and where they are (meeting the criteria of “indigenous peoples” as spelled out in OP4.10 in the EMDF in session 7), and indicate what the demographical census, socio-economic composition and cultural characteristics of the ethnic minority communities are;
- Direct and extend free, prior and informed consultation among ethnic minority communities for their opinions so as to ensure their broad support to the sub-project activities which are devised as they need, and as compatible to local cultures. Especially, this kind of consultation will be fully reflected in the project resettlement preparation and implementation;
- Identify any adverse impacts of the sub-project and recommend appropriate measures to avoid or mitigate the related impacts and risks;
- Provide assessment and methods for establishment of participation framework in for majority residents in general and ethnic minority communities in particular, in design and implementation of project activities;
- Provide quality basis for the sub-project safeguard instruments, especially the EMDP (RAP would be prepared by a different expert team); and suggest monitoring indexes for project M&E;
- Identify and avoid any potential harm on the physical cultural resources in the project area and advise methods for chance findings, in accordance with OP4.11 requirements and in cooperation with the local or national Relics Bureau.

6.2. Scope of the Work

By nature, the sub-project SA would be relatively simple. It will be conducted to help achieve identification of stakeholders, prioritization of social issues relating to the project like poverty, vulnerability, equitability, ethnicity, and gender, and establishment of a participatory process. In this project context, the SA exercise could be fulfilled by a social consultant as follows:

- Prepare for PMU and FECO and World Bank review and acceptance a brief work plan, including surveys and consultations in project sites, the range of issues to be considered in consultations, and methodologies to be used (such as outlines for semi-structured interviews and focus group discussions);
- Make use of secondary data (information from project documents, relevant literatures and government reports) and discuss with local authorities for understanding of Local government city development strategy and planning in cleanup of contaminated sites under this project; collect socio-economic statistics and demographical census especially ethnic minority composition in the project areas, and identify project key stakeholders;

- Provide training for SA practitioners and project staff after identifying capacity gaps amongst the staff and institutions to be engaged in project preparation. It is expected that the trained project staff and practitioners will have the capacity to extend the SA work in a broader scope and adopt participatory methodologies in all sub-project design;
- Conduct sample surveys and consultation through fieldwork (with appropriate methodologies of participatory rural appraisal) in the selected sampling sites, in order to collect first-hand data for in-depth analysis and pilot the participatory process in project preparation. In particular, free, prior and informed consultation with ethnic minority communities should be highlighted in the project context in order to fully understand their interests and priorities in cleanup of the contaminated site;
- Carry out social analysis to assess project benefits and risks, and to establish participatory mechanism in project management. Stakeholder analysis, beneficiary assessment and institutional analysis will be employed as the main methods for the analyzing of the quantitative and qualitative data collected. The social analysis will be able to finally inform the project design and implementation arrangement of the key social processes and factors interacting with the project, and identify ways to minimize risks and maximize opportunities for local communities to participate in the project and development;
- Based on the SA findings, if needed, an Ethnic Minority Development Plan (EMDP) will be prepared in accordance with requirements of OP4.10, as one of the project safeguard documents to be disclosed locally and internationally;
- Prepare the SA report, as the conclusion of the SA exercise to steer the project design and implementation in compliance with its social objectives.

6.3. SA Methodologies

The SA will involve a variety of methods for collecting and analyzing data and information. The SA could make use of the secondary statistic data from existing bibliography and reports. Meanwhile, detailed information can be gathered by consulting key stakeholders in a participatory manner and field investigation. Most of the consultations require face-to-face interviews or focus groups with informants. It is important that the selection of the informants is random and representative of the community population. Every effort should be made to reach the poor and marginal and remote individuals or groups.

The baseline survey will require the drafting and pre-testing of a household questionnaire prior to the actual fielding if there many households to be affected by the project. It is important that the questions accurately measure the intended concepts. Purposive sampling methods could be used in the quantitative surveys of current socio-economic situations, and sentiments and perceptions of key stakeholders relative to the subjects covered by the proposed project, so as to ensure the data collected in a limited time period to be representative and typical. As a culminating activity of the SA, a stakeholder workshop for each of the project components may be conducted for validation, verification and communication of the SA results.

6.4. Outputs

The SA exercise will be assigned with three primary outputs, each subject to review and acceptance by project entity and World Bank:

- A work plan, establishing scope and methods for the social assessment process, is required before initiating fieldwork;
- A social assessment report summarizing findings and making recommendations as may be warranted for the project design with its social objectives;
- The Ethnic Minority Development Plan in compliance with OP4.10 (if triggered based on findings of SA), to ensure ethnic minority communities have equitable opportunity to gain access to and benefits from the project at their wills; and especially, those who are affected by resettlement and other potential adverse impacts are not marginalized and disadvantaged but compensated with sufficient resources and assistances to improve their livelihoods under the project (while a RAP may be prepared by another consultant in compliance with OP4.12).

The main content of Ethnic Minority Development Plan is provided for the project entity's reference as attached in Appendix 5.

6.5. Technical Assistance

Training will be provided for PMUs and affected people and community in each site.

6.6. Social Supervision

During project implementation, supervision of the implementation of social safeguard instruments (if any, such as RAP, EMDP) shall be conducted as a part of the overall project supervision. A qualified and experienced social expert will carry out supervision and monitoring for the social aspects of the project.

6.7. Timeframe

As discussed and agreed with the PMU, FECO and Bank team according to the project needs.

7. Ethnic Minority Development Framework

The Project sites are not fully determined and it probably has impacts on ethnic minority groups that are present in some part of the project sites. Ethnic minority groups are covered by the World Bank Operational Policy on Indigenous Peoples (OP 4.10) and, consequently, the project was prepared and will be implemented in a manner consistent with this policy. Whether the OP4.10 policy is triggered or not will be determined by the criteria of IP definition of this policy.

Criteria of IP term definition:

The term “Indigenous Peoples” is used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees:

- a) self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- b) collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories
- c) customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- d) an indigenous language, often different from the official language of the country or region.

The OP4.10 policy is intended to ensure that indigenous people be provided with opportunities to participate in, and benefit from, the project in culturally appropriate ways. This policy requires that a process of free, prior, and informed consultation be undertaken with the affected peoples’ communities, and that there is broad community support for the project.

As a social assessment will be conducted for each project site, each subproject proposal needs to demonstrate that an SA has been done during the preparation stage before the proposal can be accepted. The key issues to be addressed in each proposal based on the SA as stated in the above section 6.

The SA process and key findings, direct consultations with members of relevant population groups must be documented in an annex to each proposal, which should include the following (see appendix 4 for details):

- a description of the relevant population groups and their key issues related to the contaminated sites, as well as key stakeholders and their interests;
- a discussion of key differences in environment-related health, poverty issues for different population groups, based on characteristics such as ethnicity, gender, age, disability, location and economic status;
- an assessment of the extent to which the most vulnerable sectors of the population are currently reached by, or face barriers in access to, existing forms of provision of environmental protection related to contaminated land; and
- a discussion of the implications of the findings for proposed project activities, implementation and monitoring.

Addressing Ethnic Minority Issues in subproject cleanup plan and the environmental and social management plan

While the empirical evidence is limited, the studies available suggest that ethnic minorities in China face significant barriers to access to environment services due to their location (often in remote, mountainous areas) and lifestyle (many are pastoralists). In general, existing surveys provide evidence of differences in the burden of environment-related disease among ethnic minorities. Linguistic barriers are particularly an issue for the elderly and women.

The SA for a given project site will provide an indication of the numbers of ethnic minorities, if any, in the project site and a brief description of their situation. If the SA indicates that ethnic minorities are likely to be affected by project activities, it will, as part of project preparation, undertake a process of prior, free and informed consultation with ethnic minority communities in a culturally appropriate place, time and manner.

All affected ethnic minority groups will be included in the consultation process, which will be conducive to open and frank discussion without outside intervention or intimidation.

The consultation process should establish that the affected ethnic minorities:

- broadly support the project objectives
- are aware of the project benefits and find them to be culturally appropriate
- understand how they will participate during project implementation
- have sufficient opportunity to identify their preference and constraints.

The findings from the consultations and social assessment should be incorporated in subproject proposals, which should include all the applicable elements of an Indigenous Peoples Plan as specified in the World Bank Operational Policy 4.10. The project proposal, or the elements of the proposal applicable to ethnic communities, should be disclosed locally in an appropriate form and language(s) in ethnic minority community and other places accessible to the public.

Furthermore, the project management units at the central and provincial and other local levels will contribute to this overall process by promoting indigenous minorities' participation in the project. They should also suggest potential areas where additional support or different kinds of support may be required.

Institutional Arrangements for the EMDF

Given this project particular objectives, the project will attempt to address concerns of ethnic minorities (if any) related to project activities in the following ways:

- the development of better environment in terms of no or less polluted land that can be more safely and productively used by ethnic minorities in remote areas;
- in the process or cleanup and improving environmental services culturally appropriate languages, consultation and capacity building activities will be applied;
- encourage proper project focus on addressing environment-related health, water for ethnic minorities located in project sites;
- providing support in the course of implementing innovative community participation and feedback mechanisms which ensure the participation of ethnic minorities.

Monitoring and Reporting Arrangements

The project places particular importance on the process of learning lessons through routine monitoring data as well as careful evaluation of specific innovations that are tested. Monitoring and reporting of project efforts to ethnicity will be included as applicable as part of the project overall monitoring and reporting if the OP4.10 is triggered and an IP plan is prepared for implementation.

Disclosure Arrangements

Before initiating bidding process of site remediation, the PMUs and FECO in consultation with site owners will send the SA (and/or a standalone EMDP) for the World Bank's review and clearance. Once the World Bank has no objection to the documents as providing an adequate basis, the World Bank will make the document available to the public in accordance with the World Bank Policy on Disclosure on Information and the borrower makes them available to the affected ethnic minority communities.

8. Public Consultation and Information Disclosure

Public consultation and information disclosure are a two-way communication between project party and the public, which is crucial to improving decisions. Its purposes are summed up as follows:

- a) publish information concerning the project for the public in project area, so that the public may understand main conditions, construction operation characteristics and major environmental problems concerning the project;
- b) help appraisers to find out problems and confirm that all the major environmental problems caused by the project have been analyzed and appraised in relevant project;
- c) confirm the feasibility of environmental protection measures and implementation of optimized measure scheme.

It can directly reflect public opinions, enable decision-making department to timely find out potential problems, and timely alter and improve design scheme, so that the problems put forward by the public can be solved completely. It strives to obtain the optimization of environmental benefit, social benefit and economic benefit.

The safeguard documents, i.e. Environmental Assessment, Resettlement Action Plan and Social Assessment/Ethnic Minority Development Plan where applicable, are subject to public consultation and disclosure in an accessible place, in a timely manner, in a form and language understandable to the project-affected people. Particular attention will be given to ensure projected affected persons gets adequate time and ready access to draft documents before consultation takes place.

8.1. Public Consultation

a) Objects of public consultation

- In order to make sure that public consultation can objectively reflect public's opinions on site remediation project and that public opinions have adequate representativeness and focus, the investigation scope of public consultation is in the area of the project and the area which is likely to be affected, and the respondents of public consultation is surrounding masses of the project or other public who care much about the project.

b) Methods of public consultation

- Throughout the preparation of the environmental assessment, the EA consultant shall undertake by means of public meetings, individual interviews and questionnaire survey. For Category A sub-projects and sub-projects that require RAPs, SAs or EMDPs, consultation shall be undertaken at least twice during the preparation: 1) first round during the initial stage of the site investigation to scope environmental and social issues, local public shall be informed of the general information of the site cleanup sub-project and consulted on their concerns; 2) second round when raft EA/SA is available in which the key findings of environmental assessment and mitigation measures are provided to public for comments and feedback.

This is particularly important when ascertaining the future site use. The details of public consultation process, including date, locations, participants, key issues raised and responses etc. shall be recorded in the EA report.

8.2. Information Disclosure

Information disclosure is an important requirement of Bank's policy. The information to be disclosed will include, at a minimum, sub-project description, site investigation results, possible remediation options and potential impacts, and proposed mitigation measures. Disclosure methods could vary, but may include posters, booklets, newspapers, TV, the internet, and community meetings. All draft safeguard documents will be disclosed at a public place accessible to affected groups and other stakeholders prior to consultation to establish the basis for meaningful consultation. Disclosure and consultation mechanisms will be planned and detailed in the relevant safeguard documents. The final safeguards documents are also needed to be disclosed.

8.3. Complaints Mechanism

In order to better maintain the interests of local environment quality condition and the surrounding residents, a convenient, effective and open complaint mechanism should be established by the PMU. Setting an accepting institution and disclosing the accepting institution's telephone number, fax, address, Email, etc. through the bulletin board and other channel, so the affected people can complaint any environmental problems at any time.

a) Procedure for handling complaints

- Receiving and Recording of complaints

All the affected people can make an oral or written complaint directly to the accepting institution if they are dissatisfied with the project EMP or the influence to the local environment quality caused by the clean-up activity. All the complaints should be recorded by the accepting institution staff with at least the following information: date of receipt, Complainant Contact Details, Class of Complaint (Air, Water, Waste, Litter, Wastewater, Noise, Planning), Complaint Details, appropriate responsible person who will investigate, etc..

As a general rule, the contact details of complainants will always be treated with discretion, A written acknowledgment of receipt to the complainant will be provided within 5 working days where requested by the complainant.

- Complaint investigation, further action and resolution

On receipt of the complaint, the issues raised will be assessed to identify the appropriate personnel to drive the complaint resolution e.g. environmental engineer, water services personnel, scientific officer, litter warden, environmental enforcement officer. A copy of the original complaint will be forwarded to the appropriate personnel with a request for a report on same to be completed within 10 working days. On assessment of the issues presented in the complaint, the appropriate personnel will determine the appropriate action to investigate and resolve same. Liaison with other bodies may be required at this point so as to keep the other involved parties informed and also to prevent unnecessary duplication of work.

The investigation of complaints seeks to identify the cause of the event and its impact on the environment. As a result of our investigations, the accepting institution will determine the actions, if any, that are required and the timeframe for completion of these actions. We will also determine any further enforcement actions necessary by us and other authorities to mitigate and remedy the environmental impacts of the event.

- Response to Complainants

A response to complainants is crucial. A general rule of thumb in this regard is written complaints require a written response and telephone complaints require a telephone response, as a minimum. It is desirable that a complaint investigation report would issue to the complainant within 20 working days from date of receipt of complaint. If it is not possible to meet this 20 day response target, the written reply to the complainant will advise of progress to-date and also when a more complete investigation report is likely to issue.

b) Responsibility of the complainant accepting institution

- Overall responsible for handling environmental complaints;
- Coordinating affected people, contractors, CECS and relevant government in handling environmental complaints;
- Handling environmental crisis during the clean-up activity.

c) Responsibility of the complaint investigator

- log complaint and date of receipt
- investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- if a complaint is valid and due to works, identify mitigation measures;

-
- if mitigation measures are required, advise the Contractor(s) accordingly;
 - review the Contractor's response on the identified mitigation measures, and the updated situation;
 - undertake additional monitoring and verify the situation if necessary as well as review that any valid reason for complaint does not recur;
 - report the investigation results and the subsequent actions to the source of complaint for responding to complainant;
 - recording the complaint, investigation, the subsequent actions and the results in the monthly EMP reports.

Appendix 1: Environmental and Social Safeguards Screening Sheet

Table 1. Basic Information

Site Name:		Location	
Project proponent:		Contact:	
Land use type:		Land owner:	
Brief description of site situation (including potential pollution and buildings, attachments, residents in the construction range):			
Screening result summary:			

Table2. Screening Checklist for Chinese Regulations

Does this sub-project require any of the following safeguard documents?	Yes	No	Specify if other documents are required
A full Environmental Impact Assessment			
A simplified Environmental Impact Assessment (EIA Form)			
Other document requirements			

Table3. Screening Checklist for World Bank Environmental and Social Safeguards

	Questions	Yes	No	Unknown	Note	If Yes WB Policy triggered	If Yes Documents requirement
I Environmental and Social Impacts							
1	Are the sub-project impacts likely to have significant					<i>OP 4.01</i>	Site-specific

	adverse environmental impacts that are sensitive, diverse or unprecedented? ¹ (note: significant adverse environment impacts refers to any of the following conditions (if any yes to the following questions))					<i>Environmental Assessment Category A</i>	Environmental Assessment (incl. EMP)
	--The sub-project located within or nearby environmental sensitive areas (e.g. forests, grasslands, river or wetland), social protected areas (national park, national reserve, world heritage site, etc) or ecological protected areas.						
	--There are priority pollutants in the sub-project.						
	--The sub-project leads to soil degradation of erosion in this area.						
	--The sub-project creates large volume of excavation soil, wastes and other construction materials, and the direct discharge, improper storage and handling will adversely affect local soils, rivers, streams or groundwater.						
	--The sub-project includes the export of waste to another territory which will not comply with national conventions on the trans-boundary movement of hazards materials and wastes.						
2	Do the impacts affect an area broader than the sites or facilities subject to physical works and are the significant adverse environmental impacts irreversible?						
3	Are the sub-project impacts likely to have less adverse environmental impacts than those of Category A project?					<i>OP 4.01 Environmental Assessment Category B</i>	Site-specific Environmental Assessment (incl. EMP)
4	Are the impacts site-specific and few of them irreversible?						
5	Is the proposed sub-project likely to have minimal or no adverse environmental impacts? ²					<i>OP 4.01 Environmental</i>	No action is needed

¹ Examples of sub-projects where the impacts are likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented are major excavation of earth in large and severe contaminated site, the site is environmentally or socially sensitive, remediation operation may have potentially significant environmental risk, or large scale resettlement is expected.

² Examples of sub- projects likely to have minimal or no adverse environmental impacts are supply of goods and services, technical assistance, simple repair of damaged structures etc..

						Assessment Category C	
II Natural Habitats							
6	Will the sub-project involve the significant conversion or degradation of natural habitats? ³					OP 4.04 Natural Habitats	No eligible
III Physical Cultural Resources							
7	Will the sub-project adversely impact physical cultural resources? ⁴					OP 4.11 Physical Cultural Resources	If yes, physical cultural resources management plan is needed; If no, provisions for managing chance finds included in EMP
IV Dam Safety							
8	Does the sub-project construct a new dam or rely on the performance of an existing dam or a dam under construction?					OP 4.37 Dam Safety	Dam safety plan
V Resettlement and Land Acquisition							
9	Will the project require the acquisition of land (public or private, temporarily or permanently) for its development?					OP 4.12 Involuntary Resettlement	Resettlement Action Plan
10	Will anyone be prevented from using economic resources (e.g. pasture, fishing locations, forests) to which they have had regular access?					OP 4.12 Involuntary Resettlement	Resettlement Action Plan
11	Will the project result in the involuntary resettlement of individuals or families?					OP 4.12 Involuntary Resettlement	Resettlement Action Plan
12	Will the project result in the temporary or permanent loss of crops, fruit trees and household infra-structure (such as granaries, outside toilets and kitchens, etc.)?					OP 4.12 Involuntary Resettlement	Resettlement Action Plan
VI Indigenous Peoples							
13	Might the project adversely affect tribal communities or					OP 4.10 Indigenous	Social Assessment/

³The Bank does not support projects involving the significant conversion or degradation of critical natural habitats (those habitats that are legally protected, officially proposed for protection, identified by authoritative sources for their high conservation value, or recognized as protected by traditional local communities) unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, so mitigation measures such as minimizing habitat loss and establishing and maintaining an ecologically similar protect area acceptable to the bank are needed.

⁴ Examples of physical cultural resources are archaeological or historical sites, including historic urban areas, religious monuments, structures and/or cemeteries particularly sites recognized by the government.

	vulnerable people living in the area?					People	Indigenous Peoples Planning Framework
14	Are there members of these groups in the area who could benefit from this project?					OP 4.10 Indigenous People	Social Assessment/ Indigenous Peoples Planning Framework
15	Are there any ethnic minority communities present in the project area and are likely to be affected by the proposed sub-project?					OP 4.10 Indigenous People	Social Assessment/ Ethnic Minority Development Plan

Table4. Safeguards Screening Conclusion

Category	
Safeguards Documents to be prepared	

Screened by: _____

Appendix 2: Outlines of Environmental Assessment Report

Appendix 2.1 Outline of the EA report

Executive summary

- 1 Project Background
- 2 Legal and Regulation Framework
 - 2.1 Review of domestic laws and regulations
 - 2.2 Compliance with World Bank safeguards policies
 - 2.3 Compliance with World Bank Group Environmental, Health and Safety Guidelines
- 3 Site Investigation
 - 3.1 Objectives
 - 3.2 Scope
 - 3.3 Site investigation methods
 - 3.4 Site investigation process and results
- 4 Risk Assessment and Remediation Targets (see Appendix 2.2)
 - 4.1 Risk assessment process
 - 4.2 Site conceptual model
 - 4.3 Risk calculation
 - 4.4 Setup of remediation target
 - 4.5 Remediation scope
- 5 Remediation Program (see details in appendix 2.3)
 - 5.1 Overall remediation strategy
 - 5.2 Contaminated soil excavation plan
 - 5.3 Contaminated soil transportation plan
 - 5.4 Contaminated soil storage plan
 - 5.5 Contaminated soil remediation plan
 - 5.5.1 Technology selection
 - 5.5.2 Location selection
 - 5.5.3 Remediation plan
 - 5.5.4 Treatment of cleaned soil
 - 5.5.5 Remediation cost
 - 5.5.6 Remediation implementation timeline
- 6 Uncertainty analysis
- 7 Site Remediation Environmental Management Plan (see Appendix 2.4)
- 8 Public consultation and information disclosure
 - 8.1 Objectives and methodology
 - 8.2 Stage 1 consultation

Appendix 2.2: Outline of Risk Assessment

- 1 Establishment of Site Concept Model
 - 1.1 Confirmation Concerning Pollutant and Exposure pathway
 - 1.2 Confirmation of Concentration of Exposure Point
 - 1.3 Establishment of Site Concept Model
- 2 Calculation of Health Risk
 - 2.1 Selection of Calculation Model
 - 2.2 Selection of Calculation Parameter
 - 2.3 Risk Calculation
- 3 Confirmation of Remediation Goal and Remediation Scope
 - 3.1 Remediation Goal
 - 3.2 Estimation of Remediation Scope
- 4 Supplementary Sampling (Optional)
 - 4.1 Supplementary Sampling Plan
 - 4.2 Lab Analysis Method
 - 4.3 Analysis of Detection Result
- 5 Conclusion of Risk Assessment

On-site record photo, on-site investigation and drilling record, lab analysis result, hydrogeological reconnaissance report, attached figure and pollution distribution map, etc. should be provided in the EA report.

Appendix 2.3: Outline of Site Remediation Technology Program

- 1 Selection of Remediation Strategy
 - 1.1 Refining Concept Site Model
 - 1.2 Confirm Site General Remediation Goal
 - 1.3 Confirm Remediation Strategy
 - 1.3.1 Soil Remediation Target and Remediation Range
 - 1.3.2 Groundwater Remediation Target and Remediation Range
 - 1.3.3 Estimation of Work Amount
 - 1.3.4 Confirm Remediation Strategy
- 2 Screening and Appraisal of Site Remediation Technology
 - 2.1 Technical Screening Process
 - 2.1.1 Preliminary Screening of Remediation Technology
 - 2.1.2 Detail Screening of Remediation Technology
 - 2.2 Technical Assessment Process
 - 2.2.1 Feasibility Assessment
 - 2.2.2 Screening Test
 - 2.2.3 Selective Test
 - 2.2.4 Quantitative Assessment of Remediation Technology
 - 2.3 Confirm Feasible Remediation Technology
- 3 Formation, Comparison and Selection of Remediation Program
 - 3.1 Potential Feasible Remediation Program
 - 3.1.1 Soil Remediation Technology Program
 - 3.1.1.1 Technical Route
 - 3.1.1.2 Application Scale
 - 3.1.1.3 Technological Parameter
 - 3.1.1.4 Cost and Time Estimation
 - 3.1.2 Groundwater Remediation Technology Scheme
 - 3.1.2.1 Technical Route
 - 3.1.2.2 Application Scale
 - 3.1.2.3 Technological Parameter
 - 3.1.2.4 Cost and Time Estimation
 - 3.2 Program Comparison and Selection
 - 3.2.1 Method and Indexes
 - 3.2.2 Indexes Comparison
 - 3.2.3 Comparison Result and Program Selection
- 4 Site Remediation Program Design
 - 4.1 Total Technology Route of Remediation Program
 - 4.2 Application Scale of Various Remediation Technologies
 - 4.3 Soil Remediation Program
 - 4.3.1 Technology Process
 - 4.3.2 Remediation Program
 - 4.3.3 Time and Cost
 - 4.4 Groundwater Remediation Program
 - 4.4.1 Technology Process
 - 4.4.2 Remediation Program
 - 4.4.3 Time and Cost
- 5 Conclusion and advice
 - 5.1 Conclusion
 - 5.2 Problem and Advice

Appendix 2.4: Outline of Environmental and Social Management Plan

- 1 Objective and Compilation Basis of EMP
- 2 Environmental and Social Impact and Mitigation Measures
 - 2.1 Environmental and Social Impacts
 - 2.2 Mitigation Measures
- 3 Environmental and Social Supervision Plan
- 4 Environmental Validation Plan
- 5 Institutional Arrangement and Responsibilities
 - 5.1 Institutional Arrangement
 - 5.2 Institutional Responsibilities
- 6 Training Plan
- 7 Public Consultation and Information Disclosure
 - 7.1 Public Consultation
 - 7.2 Information Disclosure
 - 7.3 Complaint Mechanism
- 8 Implementation Schedule and Cost Estimation
 - 8.1 Implementation Schedule
 - 8.2 Cost Estimate

Appendix 2.4.1 Potential Environmental/ Social Impacts of Site Cleanup and Mitigation Measures

Sub-project Activity	Potential Impacts	Mitigation Measures	Implementing Agency	Supervising Agency
Secondary Environmental Pollution				
Construction demolition	<ul style="list-style-type: none"> Dust Noise Solid waste Mechanical exhaust 	<ul style="list-style-type: none"> Spray water to constructions to reduce dust emission Take sound insulation measures around site and arrange construction time reasonably Try to reduce the storage and disposal period of solid waste, cover the solid waste when stockpiling temporarily Construction machinery should meet the national health protection standard 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Contaminated soil excavation	<ul style="list-style-type: none"> Dust Volatilized gas containing pollutants Mechanical noise Mechanical exhaust Solid waste Water and soil erosion 	<ul style="list-style-type: none"> Insulate the excavated area, try to avoid working in the windy, dry weather, spray water to the exposed ground Insulate the excavated area, such as establish a closed frame, and try to avoid working in the windy and hot weather Take sound insulation measures around site and arrange construction time reasonably Construction machinery should meet the national health protection standard Try to reduce the storage and disposal period of solid waste, cover the solid waste when stockpiling temporarily Try to avoid working in the rain weather and cover the exposed ground around the excavated area 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Contaminated soil packaging	<ul style="list-style-type: none"> Dust 	<ul style="list-style-type: none"> Spray water before packaging 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Contaminated soil transportation	<ul style="list-style-type: none"> Dust Sprinkling of contaminated soil leading to soil contamination Vehicle Noise Vehicle exhaust 	<ul style="list-style-type: none"> The vehicles transporting soil should be covered with tarpaulin and canopy, wash the vehicle before leaving The vehicles transporting soil should be covered with tarpaulin and canopy, it shall not be overload or overspeed Don't horn when the vehicles go in and out the site Construction machinery should meet the national health protection standard 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Contaminated soil stockpiling	<ul style="list-style-type: none"> Dust 	<ul style="list-style-type: none"> Soil pile should be sealed, covered, compacted or sprayed 	Remediation	Environmental

		<ul style="list-style-type: none"> • Volatilized gas containing pollutants • Soil, surface water and groundwater contaminated by leachate 	<ul style="list-style-type: none"> • Soil pile should be sealed, covered or compacted, set waste gas collection and treatment equipment • Set rain-proof facility, anti-seepage measure and percolate collection and treatment facility 	contractor	supervision firm/ FECO / Provincial PMU / Provincial EPB
Contaminated soil and groundwater treatment	Incineration	<ul style="list-style-type: none"> • Gas contaminated by technology waste gas from soil preparation, mixing, adding and combustion • Soil, surface water or groundwater contaminated by technology waste water that not be collected or treated in time • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling • Soil, surface water or groundwater contaminated by waste oil leakage that generated from mechanical equipment operation or maintenance • Soil, surface water or groundwater contaminated by treated soil stacking or backfilling casually 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements • Collect and treat the waste oil in time, conduct regular safety inspection for the mechanical equipment • The stacking or backfilling of treated soil should be done strictly according to regulations 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
	Thermal Desorption	<ul style="list-style-type: none"> • Air contaminated by pollutants desorbed from soil heating • Soil, surface water or groundwater contaminated by technology waste water that not be collected or 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB

		<ul style="list-style-type: none"> treated in time • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling • Soil, surface water or groundwater contaminated by waste oil leakage that generated from mechanical equipment operation or maintenance • Soil, surface water or groundwater contaminated by treated soil stacking or backfilling casually 	<ul style="list-style-type: none"> regular monitoring and inspection at the sensitive point to discover contamination in time • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements • Collect and treat the waste oil in time, conduct regular safety inspection for the mechanical equipment • The stacking or backfilling of treated soil should be done strictly according to regulations 		
	Solidification Stabilization	<ul style="list-style-type: none"> • Gas contaminated by technology waste gas emission • Soil, surface water or groundwater contaminated by technology waste water that not be collected or treated in time • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent • Soil, surface water or groundwater contaminated by waste oil leakage that generated from mechanical equipment operation or 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements • Collect and treat the waste oil in time, conduct regular safety inspection for the mechanical equipment • The stacking or backfilling of treated soil should be done strictly according to regulations 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB

		<ul style="list-style-type: none"> • maintenance • Soil, surface water or groundwater contaminated by treated soil stacking or backfilling casually 			
	Soil Vapor Extraction	<ul style="list-style-type: none"> • Gas contaminated by technology waste gas generated from extraction process • Soil, surface water or groundwater contaminated by technology waste water that not be collected or treated in time • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent • Soil, surface water or groundwater contaminated by waste oil leakage that generated from mechanical equipment operation or maintenance • Soil, surface water or groundwater contaminated by treated soil stacking or backfilling casually 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements • Collect and treat the waste oil in time, conduct regular safety inspection for the mechanical equipment • The stacking or backfilling of treated soil should be done strictly according to regulations 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
	Soil Washing	<ul style="list-style-type: none"> • Gas contaminated by technology waste gas emission • Soil, surface water or groundwater contaminated by leaching waste that not be collected or treated in time 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB

		<ul style="list-style-type: none"> • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by eluting reagent leakage or sprinkling, such as curing agent or chelating agent • Soil, surface water or groundwater contaminated by waste oil leakage that generated from mechanical equipment operation or maintenance • Soil, surfacewater or groundwater contaminated by treated soil stacking or backfilling casually 	<p>regular monitoring and inspection at the sensitive point to discover contamination in time</p> <ul style="list-style-type: none"> • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements • Collect and treat the waste oil in time, conduct regular safety inspection for the mechanical equipment • The stacking or backfilling of treated soil should be done strictly according to regulations 		
	Biological Treatment	<ul style="list-style-type: none"> • Gas contaminated by technology waste gas emission • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent • Soil, surface water or groundwater contaminated by waste oil leakage that generated from mechanical equipment operation or maintenance • Soil, surface water or groundwater contaminated by treated soil stacking or backfilling casually 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements • Collect and treat the waste oil in time, conduct regular safety inspection for the mechanical equipment • The stacking or backfilling of treated soil should be done strictly according to regulations 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB

	Groundwater Extraction Treatment	<ul style="list-style-type: none"> Gas contaminated by waste gas generated from extraction process Soil, surface water or groundwater contaminated by leaching waste that not be collected or treated in time Vehicle Noise Soil contaminated by waste residues that not be collected or treated in time Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent 	<ul style="list-style-type: none"> Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time Collect and treat the waste residues in time The storage, transport and use of chemical reagent should comply with safety requirements 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
	Groundwater Air Sparging	<ul style="list-style-type: none"> Gas contaminated by waste gas generated from extraction process Vehicle Noise 	<ul style="list-style-type: none"> Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
	Groundwater Chemical Oxidation	<ul style="list-style-type: none"> Soil, surface water or groundwater contaminated by leaching waste that not be collected or treated in time Vehicle Noise Soil contaminated by waste residues that not be collected or treated in time Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent 	<ul style="list-style-type: none"> Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time Collect and treat the waste residues in time The storage, transport and use of chemical reagent should comply with safety requirements 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
	Groundwater Barrier	<ul style="list-style-type: none"> Soil, surface water or groundwater contaminated by leaching waste that not be collected or treated in time Vehicle Noise 	<ul style="list-style-type: none"> Try to reduce the waste water quantity and pollutant load, avoid the substandard emission caused by misoperation, conduct regular monitoring and inspection at the sensitive point to discover contamination in time Use the low noise equipment or install noise isolation device, conduct 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU /

		<ul style="list-style-type: none"> • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent 	<p>regular monitoring and inspection at the sensitive point to discover contamination in time</p> <ul style="list-style-type: none"> • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements 		Provincial EPB
	Groundwater Biological Treatment	<ul style="list-style-type: none"> • Gas contaminated by technology waste gas emission • Vehicle Noise • Soil contaminated by waste residues that not be collected or treated in time • Soil contaminated by chemical reagent leakage or sprinkling, such as curing agent or chelating agent 	<ul style="list-style-type: none"> • Install air cleaner equipment, conduct regular air monitoring and inspection at the sensitive point to discover contamination in time • Use the low noise equipment or install noise isolation device, conduct regular monitoring and inspection at the sensitive point to discover contamination in time • Collect and treat the waste residues in time • The storage, transport and use of chemical reagent should comply with safety requirements 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
II Occupational Health and Safety Risk					
Dust		Dust generated from soil excavation, backfilling, crushing, and screening, or mixing of power material, or incomplete combustion during heat treatment of soil organic matters, or dust deposited on earth surface floats in the air due to vibration or air flow	<ul style="list-style-type: none"> • Reform the technology to make the production process become mechanical, enclosed, and automatic, so as to reduce and decrease the harm of dust • Intensify individual protection, when dust prevention and dust fall measures fail to ensure that the dust concentration meet requirements of national standard, wear dust mask • Use wet-method operation if wet-method operation is not applicable to the site, use enclosed method • Intensify education training, on-site inspection and comprehensive control on anti-dust 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Toxicants		Normal contact during work, maintenance and emergency repair, or accidents	<ul style="list-style-type: none"> • For the work related to contacting toxicants, formulate targeted individual health protection regulations and provide protective articles, such as anticorrosion clothing, anti-poison respirator and anti-gas mask • Use non-toxic or low-toxicity substances to replace toxic or high-toxicity substances • Enclosed and automatic production process is the fundamental way to solve the harm of toxicants • Purify discharged noxious gas 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Physical hazards		<ul style="list-style-type: none"> • Voice • Vibration 	<ul style="list-style-type: none"> • Eliminate or decrease the source or route of noise, restrict work time and intensify individual protection 	Remediation contractor	Environmental supervision

	<ul style="list-style-type: none"> • Radiation (electromagnetic field, microwave, infrared ray, ultraviolet ray or laser) • Abnormal meteorological conditions 	<ul style="list-style-type: none"> • Eliminate or decrease the source or route of vibration and intensify individual protection • Set field source shield and safe distance, wear special protective articles and execute safety principles • Follow close to safe operation rules, use personal protective equipment and take health protection measures 		firm/ FECO / Provincial PMU / Provincial EPB
Object strike	Objects on the site of remediation projects hit people by gravity or external force, causing casualties	<ul style="list-style-type: none"> • Set safety distance, make sure that the dangerous parts are not accessible to staff • Provide personal protective equipment 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Vehicle harm	The motor vehicles used in various remediation projects impact or grind people; and the falling, collapse caused by impact	<ul style="list-style-type: none"> • The vehicle should meet the requirements of safety travel, and the braking performance, dynamic property, handling stability, comfort, structure dimension, view and light, etc. meet the requirements of use • Restrict the travel speed 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Mechanical injury	Staff directly contact mobile mechanical equipment or stationary parts, tools, and processing parts, causing converging attack, crashing, shearing, twisting, grind, cutting, stabbing, etc.	<ul style="list-style-type: none"> • Re-designing machine, make sure that the dangerous parts are obvious • Provide personal protective equipment 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Electric shock	Various electric shocks including lightning casualty accidents	<ul style="list-style-type: none"> • Set safety insulation, safety screen protection and safety distance • Use explosion proof electrical equipment and explosion-proof electrical wiring to guarantee that the shell of electrical equipment is complete and in good condition • Various lightning protection buildings shall be installed with external and internal lightning protection devices. Take measures to prevent lightning surge 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Drowning	Various electric shocks including lightning casualty accidents	<ul style="list-style-type: none"> • Set warning signs on various pools and near surface water • Install protective guard and forbid climbing over 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU /

				Provincial EPB
Burn	Fire scalding, high-temperature physical scalding, chemical scalding, physical scalding, etc. on remediation projects site	<ul style="list-style-type: none"> • Avoid that the workers directly contact hazardous environment through measures of enclosed environment or setting protective screen • Intensify personal protection. The protective equipment mainly includes head protector, respiratory protective equipment, eye protection device, body protection equipment, hand and foot protective equipment, etc. • Stored dangerous chemicals shall have obvious warning signs 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Fire disaster	Harm caused by fire disaster on the site of remediation projects	<ul style="list-style-type: none"> • Use refractory building materials • Take sunshade measures for the plants and warehouses which may suffer explosion, the window should use ground glass to avoid generating ignition source • Supply fire-fighting equipment which accords with the actual situations of project site 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Fall from high place	When working on high place, staff may fall	<ul style="list-style-type: none"> • Wear safety equipment and prepare personal protection • Work carefully 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Collapse	Accidents caused by exceeding object ultimate strength or damaging structure stability under the force of external force or gravity	<ul style="list-style-type: none"> • Work on flat and solid ground • Operators shall have certain experience and work carefully • Set warning signs 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Water leak	During soil excavation or canal dredging, the surface water or groundwater enter roadway through certain pipeline, causing accidents	<ul style="list-style-type: none"> • Conduct geological prospecting in advance, and acquire the local geological and hydrogeological conditions • Operators shall have certain project experience and work carefully • Prepare personal safety protection 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Explosion	Includes incinerator explosion, vessel explosion and chemical	<ul style="list-style-type: none"> • Set explosion-proof ventilation system or accident exhaust system in the place which has explosive substances 	Remediation contractor	Environmental supervision

	explosion, etc.	<ul style="list-style-type: none"> The motor vehicles which transport inflammables and explosives shall be equipped with fire-fighting equipment. Take sunshade measures for loading and transportation in high-temperature area Store dangerous chemicals according to characteristics, category, and warehouse. Various dangerous chemicals shall not be stored with the materials which may react together 		firm/ FECO / Provincial PMU / Provincial EPB
III Community Health and Safety Risk				
Daily life	Noise, dust and three wastes pollution from site remediation, and also the constructors' overrange movement will disturb and destroy the life of local residents	<ul style="list-style-type: none"> Set isolation wall around the site, and restrict working scope The three wastes generated from soil remediation should be treated according to the regulations 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Domestic water	Waste water emission and water usage during site remediation will impact water quantity and quality of local residents	<ul style="list-style-type: none"> Waste water should be treated according to the regulations The potential impact assessment should be done if the remediation activity involves groundwater or surface water extraction 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Structure safety of the infrastructures	Personal injury caused by construction collapse in site	<ul style="list-style-type: none"> Set buffer zone around the site to protect people from injury Remediation site siting should follow the safety engineering standards The constructions in site should be constructed according to the architectural standards 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Traffic Safety	Traffic jam or accident caused by engineering vehicle	<ul style="list-style-type: none"> Plan the vehicle running route and time reasonably Regular maintenance the vehicles The drivers must obey the safety regulations 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Endemic disease and epidemic disease	The large number of constructors and other relative person come from outside is likely to introduce epidemic disease or extend the	<ul style="list-style-type: none"> Establish friendly relationship with local epidemic prevention department. Under the guidance and assistance of local epidemic prevention department, intensify efforts to monitor, prevent and control epidemics 	Remediation contractor	Environmental supervision firm/ FECO / Provincial

	scope of endemic disease	<ul style="list-style-type: none"> Periodically clean and wash construction site. Keep construction site clean and tidy 		PMU / Provincial EPB
Immigrant	Permanency or temporary immigrant caused by site remediation	<ul style="list-style-type: none"> Planning and design resettlement in advance For the compensation of permanent or temporary immigrants, compensate according to capital compensation, labor resettlement, production condition, and life conditions, etc. 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB
Preservation of cultural relics (physical cultural resources)	Historic sites or cultural relics discovered in site remediation	<ul style="list-style-type: none"> During site remediation construction, if cultural relics are found, stop excavation and take emergency measures to protect site and cultural relics, and immediately report to local cultural relics management department Conduct publicity and education for constructors in advance 	Remediation contractor	Environmental supervision firm/ FECO / Provincial PMU / Provincial EPB

Appendix 2.4.2 Environmental Monitoring Plan Table of Site Cleanup

The table provides the environmental monitoring medium, item, location, time and frequency, etc. for reference. The detail environmental monitoring plan shall be redefined according to site pollution characteristics and site remediation sub- projects design.

Sub-project Activity	Monitoring Medium	Monitoring item	Monitoring Location	Monitoring Time and Frequency	Implementing Agency	Supervising Agency
Construction demolition	Air	Total suspended particulates	Operating area, site boundary, nearby residential area	No less than 1 time every month	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Noise	Equivalent sound level	Operating area, site boundary	1 time in the day and night everyday	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
Contaminated soil excavation	Air	Total suspended particulates, site specific contaminants	Operating area, site boundary, nearby residential area	No less than 1 time every month	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Noise	Equivalent sound level	Operating area, site boundary	1 time in the day and night everyday	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
Contaminated soil packaging	Air	Total suspended particulates, site specific contaminants	Operating area, site boundary, nearby residential area	No less than 1 time every month	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
Contaminated soil transportation	Air	Total suspended particulates, site specific contaminants	Next to the transport road	No less than 1 time every month	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
Contaminated soil stockpiling	Air	Total suspended particulates, site specific contaminants	Nearby the stockpiling area	No less than 1 time every month	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Soil	site specific contaminants	Nearby the stockpiling area	According to requirements	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB

	Surface water	site specific contaminants	Nearby surface water	1time every 2 months	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Groundwater	site specific contaminants	Downstream of the groundwater in the stockpiling area	1time every 2 months	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
Contaminated soil treatment	Ambient air	Total suspended particulates, site specific contaminants	<p>For unorganized emissions:</p> <ul style="list-style-type: none"> At the possible pollution center, downwind direction boundary, and main sensitive spots within 500m of boundary. About 1.5-2.0m above ground At the same time, install comparison monitoring point in upwind direction of pollution site <p>For the remediation facilities which have fixed discharge tube:</p> <ul style="list-style-type: none"> Monitor the tail gas during normal operation. The monitoring sampling points shall select vertical pipeline section and avoid gas flue bend and fracture surface which change dramatically The sampling location shall be located under the downstream direction of bend, valve, and adapter bonnet and the distance shall not be less than 6 times of diameter. The sampling location shall be located above the upstream direction of bend, valve, and adapter bonnet and the distance shall not be less than 3 times of diameter Where the space of monitoring site is limited, failing to meet above requirements, select appropriate pipeline sampling. However, the distance between sampling fracture surface and bend shall be at least 1.5 times of gas flue diameter. Besides, properly add quantity of 	The monitoring shall be conducted during normal operation. For unorganized emissions, monitor for at least one time each month. For constant emissions, monitor 1 time every half a month.	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB

Sub-project Activity	Monitoring Medium	Monitoring item	Monitoring Location	Monitoring Time and Frequency	Implementing Agency	Supervising Agency
			monitoring points			
	Surface water	Site specific contaminants, other conventional indexes	Surface water nearby the remediation site	1 time every two months, in case of special conditions or pollution accidents, monitor according to actual conditions	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Groundwater	Site specific contaminants, other conventional indexes	Downstream of the groundwater in the stockpiling area	1 time every two months, in case of special conditions or pollution accidents, monitor according to actual conditions	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Soil	Site specific contaminants	Area potentially contaminated by remediation activity	Defined according to specific conditions	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Noise	Equivalent sound level	<ul style="list-style-type: none"> Generally at the place of 1m away from construction site and 1.2m above ground When site boundary has fence and surround has noise-sensitive buildings, the location shall be 1m outside site boundary and 0.5m above enclosure When failing to find out sound source on site boundary, set monitoring point 1m away from noise-sensitive buildings 	1 time in the day and night everyday	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB
	Solid waste	Site specific contaminants	Solid waste generation and stacking area	Defined according to specific conditions	Environmental supervision firm or environmental monitoring firm	FECO, Provincial PMU, Provincial EPB

Appendix 2.4.3 Outlines of Environmental Supervision Progress Report and Completion Report

Progress Report

The main contents are summarized as follows:

- 1 Project Overview
- 2 Implementation of Environmental Protection
- 3 Remediation Progress
- 4 Implementation of Environmental Protection Measures
- 5 Environment Accident Risk or Environmental Accident
- 6 Existing Problems and Advice

Completion Report

- 1 Project Overview
 - 1.1 Project Background
 - 1.2 General Conditions of Site Remediation
 - 1.3 Environmental Situation of Construction Area
- 2 Major Environmental Influence of the Project
 - 2.1 Influences on Water Environment
 - 2.2 Influences on Air Environment
 - 2.3 Influences on Sound Environment
 - 2.4 Solid Waste Influences
 - 2.5 Ecological Influences
 - 2.6 Other Influences
- 3 Implementation of Environmental Supervision
 - 3.1 Work Basis
 - 3.2 Institutional Framework
 - 3.3 Scope and Work Contents
 - 3.4 Work Procedures
 - 3.5 Management System
 - 3.6 Work Method
 - 3.7 Events
- 4 Environmental Supervision Progress
 - 4.1 Implementation of Environmental Protection Measures
 - 4.2 Disposal of Environment Pollution Accidents
 - 4.3 Other Achievements
- 5 Conclusion and Advice
- 6 Image Data Annex

Appendix 2.4.4 Outline of Site Remediation Validation Summary Report

- 1 Introduction
 - 2 Validation Basis
 - 3 Site Overview
 - 3.1 Conclusion of Site Investigation Appraisal
 - 3.2 Site Remediation Scheme
 - 3.3 Remediation Implementation
 - 4 Acceptance Content and Method
 - 4.1 Work Scope
 - 4.2 Key Points of Acceptance
 - 4.3 Acceptance Procedure and Method
 - 5 Document Review and Site Investigation
 - 5.1 Document Audit
 - 5.2 Site Inspection
 - 6 Formulating Sampling Distribution Scheme
 - 6.1 Analysis Project
 - 6.2 Distribution Principle
 - 6.3 Sampling Distribution Scheme
 - 7 On-site Sampling and Lab Detection
 - 8 Appraisal of Remediation Effect
 - 9 Conclusion and Advice
- Annex
- Supervision Report
 - Testing data Report

Appendix 3: Outline of a Full RAP

- 1 Project Introduction
 - 1.1 Objectives of the Project
 - 1.2 Contents of the Project
 - 1.3 The Beneficial and Impacted Areas under the Project
 - 1.3.1 Project Areas and People (population and ethnicities)
 - 1.3.2 Beneficial Areas
 - 1.3.3 Impacted Areas
 - 1.4 The Project Design Process
 - 1.5 The Project Overall Budgets and Financial Resources
 - 1.6 Measures to Reduce Project Adverse Impacts
 - 1.7 The Linkage Concerns if there is any
- 2 Project Impacts
 - 2.1 Impact Survey
 - 2.2 Affected Land (state-owned, collective-owned)
 - 2.3 Permanent Land Acquisition
 - 2.4 Temporary Land Occupation
 - 2.5 Affected Houses/Structures in Urban and Peri-Urban Areas
 - 2.6 Affected Enterprises/Institutes
 - 2.7 Temporarily Affected Housing
 - 2.8 Affected Population
(People in Different Ethnic Groups and Vulnerable Groups if Any)
 - 2.9 Affected Attachments to the Land
 - 2.10 Other Impacts
- 3 Socio-Economic Conditions and Analysis of the Affected Areas
 - 3.1 The Socio-Economic Background Information of the Project Areas
 - 3.1.1 Information of the Project Areas
 - 3.1.2 Information of Local Community Economies in the Resettlement Areas
 - 3.2 Socio-Economic Sampling Survey of Affected Households (PAP)
 - 3.3 The Basic Condition and Deployment of Households to be demolished
 - 3.4 The Basic Situation of the Vulnerable Groups/Households to be affected
- 4 Framework of Laws and Policies
 - 4.1 Laws and Policies Relevant to Resettlement
 - 4.1.1 National Laws and Decrees
 - 4.1.2 Provincial and Local By-Laws and Regulations
 - 4.1.3 The World Bank Relevant Policies
 - 4.2 Resettlement Policies under this Project
 - 4.2.1 Principles for Resettlement Compensations under the Project
 - 4.2.2 Compensation Criteria
- 5 Compensation Criteria
 - 5.1 Compensation Criteria for Rural/Collective Land Acquisition
 - 5.2 Compensation Criteria for Temporary Land Occupation
 - 5.3 Compensation Criteria for House Demolition
 - 5.4 Compensation Criteria for Attachments to the Land
- 6 Resettlement Plan
 - 6.1 The Resettlement Targets
 - 6.2 Analyses of Risks Caused by Resettlement
(Loss of land, property, job, social services, etc.)
 - 6.3 Resettlement Plan and Analysis of Resettlement Results
 - 6.4 Social Security Policy for Resettled, Land Lost Farmers (if any)
- 7 Public Consultation/Participation and Information Disclosure
 - 7.1 Strategy for Public Consultation and Participation

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- 7.2 Process for Public Consultation/Participation and Information Disclosure
 - 8 Grievance Redress Mechanism
 - 9 Resettlement Organization
 - 10 Implementation Time Frame
 - 11 Resettlement Funds and Budgets
 - 12 Monitoring and Evaluation
 - 13 Matrix of Resettlers' Entitlements and Rights

Annex

Eg. Information tables and documents from the sub-project community or local government

Appendix4: Social Assessment Guidelines

Introduction to Social Assessment

Each project proposal needs to demonstrate that a social assessment has been undertaken during the preparation stage, including a discussion of the social context and key social issues relevant to the project. A social assessment ensures that the project take account of the needs and interests of different groups or institutions who might affect or be affected by the project. This might include:

- ✓ people or groups who may be affected directly (whether positively or negatively) by the project
- ✓ people who should benefit but who are at risk of being excluded
- ✓ people or institutions that may affect the outcomes of the project (e.g. through their support or opposition).

The following note and checklist is designed to assist the local project owners/PMUs in undertaking this assessment in order to ensure that a) relevant information is included in the proposals, and b) the project activities and monitoring mechanisms take this information into account.

Social Assessment for the Project

The social assessment of this project is concerned with the issues of

- ✓ whether all people living in or near the project sites are able to benefit from the proposed interventions in an equitable way; and
- ✓ whether the environmental protection needs for cleaning up the contaminated sites of different groups – particularly the poor or vulnerable - are being considered and addressed.

Key questions to address in a social assessment are therefore:

- ✓ *What are core social issues of disadvantages resulted from the polluted land in project sites?*
- ✓ *How do proposed cleanup interventions or activities aim to address these?*
- ✓ *How will activities be monitored to ensure the goals of the project are achieved?*

What social information should the future subproject proposal include?

Addressing the above questions requires that the proposals provide the following types of social information (discussed in more detail in the following pages):

1. Context or background information:

- Background information on the economic, social and cultural context of the project site including income; poverty, main environment-related social issues, and the opportunities and constraints for cleaning up the site.
- Identification of population groups with different environmental protection needs; or who may need special consideration in project design (for example, by ethnicity, income, gender, age, illness or disability, location etc.). The proposal should consider:
 - who are the particular groups of concern for the project?
 - how would the project affect them? what could the project do to help them ?
 - what does this mean for design and implementation of the project?

2. Stakeholder Analysis

- A discussion of key stakeholders, that is: people likely to be affected by or influence the project) and their interests. The assessment should address: their interests; how they are likely to be affected by, or affect, the project; and how they have been consulted during project design. Findings should be based on consultations, interviews, focus group discussions or stakeholder workshops with identified groups.

3. Implications for project design and implementation

-
- A discussion of how the proposed pilot activities will address the equity and access objectives of the project and the needs of the groups identified. This should include: how the needs of the poorest or most vulnerable will be addressed through the project; and how these groups will participate in the process of project implementation and monitoring.
 - A discussion of how the impacts will be monitored and evaluated, including indicators for monitoring the social impacts of the project; what kind of information is already being collected or needs to be collected?

1. Context: project site background information

a) General – economic and social context

For example:

- ✓ Income – level and variation in household incomes
- ✓ population: main demographic groups – e.g. by gender, age
- ✓ ethnicity – main groups, share of population
- ✓ poverty status (share of population that is poor by some measure (egdibao recipients; pinkunhu; MA recipients etc).
- ✓ literacy or education levels
- ✓ geographic variables – eg distance to township or county; mountainous; etc.

b) Population Groups

- ✓ Identification of population groups with different environmental protection needs, differential access to services related to healthy environment, or who may need special consideration in project design (e.g. by sex, age, ethnicity, etc.)

For example: some of the following groups might be of particular concern:

- ✓ Households in extreme poverty (wubao households, extremely poor households)
- ✓ Poor, marginal or near poor: households in lower income quintiles / deciles
- ✓ Households / communities located in more remote locations / villages / households
- ✓ Women (especially of reproductive age)
- ✓ Children and the elderly
- ✓ Farmers without land / who have lost their land
- ✓ Migrant population – out-migration and in-migration (to county)
- ✓ Ethnic minority groups with barriers to access for language, cultural or other reasons
- ✓ People with limited education or literacy who are unable to access written information
- ✓ Households / individuals who have become poor through ill-health
- ✓ Household with individuals who have polluted environment-related health problems or disabilities

2. Stakeholder analysis

Stakeholders are all those affected by the intervention (positively or negatively) or who can affect (positively or negatively) the outcome of a proposed intervention. Different groups have different *interests* in the project intervention, its implementation process and outcomes. These need to be identified. Understanding the key stakeholders is an important part of the risk analysis of a project.

In the context of the *social assessment*, it is important to understand how the interests of different stakeholders can influence whether the project achieves its goals of equitable access to environment-related health services for all.

For example:

- some stakeholders in the environmental protection system may prefer to improve quality of environmental services which are only available and affordable to a few, rather than the wide public or the most affected, the poorest population groups;
- women's environment-related health problems may not receive priority attention;

-
- individuals with limited education and low levels of literacy in Chinese may have limited access to written materials; this may be particular the case for the elderly and ethnic minority groups.

The project proposal should include:

- a stakeholder analysis
- a discussion of the process of consulting with different stakeholders (eg meetings, focus group discussions, stakeholder workshops, etc.)
- the implications of the analysis for the project design and implementation.

Special attention to ethnic minority population in project site

For project sites with ethnic minority populations, it is particularly important to provide information on

- the situation of ethnic groups in the project site-community
- how they have been consulted during project design
- their interests and opinions in the project
- their access to project benefits and how they will participate during project implementation
- how their participation and the impact of the project on them will be monitored.

3. Implications for the project proposal and implementation

The main purpose of the social assessment is to ensure that the project is designed to meet the needs of the poor, marginalised or vulnerable groups, and that these groups benefit from project activities. The subproject proposal should include a discussion of:

The impact of proposed activities on different population groups:

- how the proposed activities will address the core objectives of cleaning up the contaminated land given the identification and analysis of relevant population groups.

Participation and Governance:

- how will different stakeholders, service users or intended beneficiaries, especially vulnerable groups, be consulted or participate in project implementation? In particular, how will women and ethnic minorities (where appropriate) participate or be consulted?

For example, the proposal should include information about:

- what mechanisms exist to inform different groups about project activities, find out their opinions, and understand their preferences or concerns?
- what mechanisms can be developed for community engagement in different aspects of the project, including design, implementation and monitoring (e.g mechanisms of community based monitoring and supervision)?
- what mechanisms need to be put in place to receive feedback about the project?

Monitoring and evaluation

In line with the results framework (or log frame), indicators and milestones, the proposals should include indicators for monitoring the impacts of the project on the different groups (including ethnic minority group) identified in the social assessment.

Appendix 5: Main Contents of an EMDP

Given the project is very unlikely to trigger the Bank OP4.10 safeguards policy, the following outline of an EMDP is provided just in case.

- a) A summary of the information of the legal and institutional framework applicable to the ethnic minorities, and baseline information of the demographic, social, cultural, and political characteristics of the ethnic minority communities;
- b) A summary of the social assessment;
- c) A summary of results of the free, prior, and informed consultation with the affected ethnic minority communities that was carried out during project preparation as OP4.10 required and that led to broad community support for the project;
- d) A framework for ensuring free, prior, and informed consultation with the affected ethnic minority communities during project implementation;
- e) An action plan of measures to ensure that the ethnic minority groups receive social and economic benefits that are culturally appropriate, including, if necessary, measures to enhance the capacity of the project implementing agencies;
- f) When potential adverse effects on ethnic minority groups are identified, an appropriate action plan or measures to avoid, mitigate, or compensate for these adverse effects (such as the RAP);
- g) The cost estimates and financing plan for the EMDP;
- h) Accessible procedures appropriate to the project to address grievances by the affected ethnic minority communities arising from project implementation. When designing the grievance procedures, the project entity takes into account the availability of judicial recourse and customary dispute settlement mechanisms among the ethnic minority groups;
- i) Mechanisms and benchmarks appropriate to the project for monitoring, evaluating, and reporting on the implementation of the EMDP. The monitoring and evaluation mechanism should include arrangements for the free, prior, and informed consultation with the affected ethnic minority communities.

Appendix 6: Outline of Semi-annual Environmental and Social Safeguards Progress Report

1. Brief project description
2. Environmental management and supervision setup and working procedures
3. Project progress and activities during the report period
4. Compliance supervision of ESMF/ESMP implementation
 - Site screening conducted;
 - Site ESA preparation and approval status;
 - Site cleanup activities and implementation of applicable mitigation measures;
 - Contaminated soil remediation/disposal status and implementation of applicable mitigation measures;
5. Environmental monitoring results during the report period
 - Monitoring for site cleanup/remediation quality control by contractors;
 - Impacts monitoring results by Environmental Supervision Company
 - Results of final acceptance monitoring
6. Public consultation conducted during the report period
7. Social safeguard progress

Annexes

- Site environmental screening sheets conducted during this period
- Tables or graphs of monitoring data
- Photos of compliance or issues