
China: Hunan Integrated Management of Contaminated Agricultural Land Project

(Second Batch Subprojects)

ENVIRONMENTAL AND SOCIAL ASSESSMENT

Executive Summary

JULY 2018

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1. INTRODUCTION

Hunan, the largest rice producing province in China, produces about 10 percent of the nation's rice from only 3 percent of its arable land, making a significant contribution to food security in China. However, Hunan Province is also well-known as a home of nonferrous metal, nonferrous metallurgy, chemical, and mining industries that account for more than 80 percent of the province's industry. Safety of agricultural product area in Hunan, therefore, has been particularly affected by heavy metal contamination, mainly caused by industrial discharges of flu gas, wastewater and waste residue, and metal mine tailings. The quality of agricultural soil is further affected by overuse of agrochemicals and poor farming practices.

Recognizing the seriousness of such contamination and implications of food safety and agricultural land protection, Hunan Provincial Government has issued an *Implementation Program for Heavy Metal Pollution Control in Xiang River Basin (2012–2015)*, a first ever program ratified by the State Council, aiming to address agricultural land pollution in Hunan. Since then, multiple billions have been spent by national and local governments on prevention/control of industrial pollution and remediation of contaminated land in the province. Along with these extensive domestic efforts, Hunan and the World Bank jointly implemented the Hunan Integrated Management of Contaminated Agricultural Land Project, with a total investment of USD 111.94 million (including World Bank loan of USD100 million).

This World Bank project focuses on demonstration of risk-based agricultural land pollution management, agricultural environment monitoring and management, and capacity building and knowledge sharing in 15 selected counties¹ in the province. Considering the project complexity, three counties (Yongding, Hengyang and Yongxing) have been selected as pioneers for pilot in the first year at the project appraisal stage. The project became effective in early March, 2018 and is still in the initial stages of implementation.

The Project is assigned as a Category A project due to the environmental risks of heavy metal pollution in the project areas and food safety and public health concerns. An Environmental and Social Management Framework (ESMF), three Environmental and Social Impact Assessment reports (one for each county), a Pest Management Plan (PMP) and an EA Executive Summary were prepared and approved by the Bank for the first year of

¹ The 15 counties include Yondging, Hengyang, Yongxing, Baojing, Jishou, Yongshun, Huanghuan, Cili, Zhongfang, Anhua, Hengnan, Yizhang, Linwu, Lengshuitan and Qiyang, as shown in Figure 1.

implementation. A separate Social Assessment (SA) was also prepared to address the social impacts of the project, and the key findings and recommendations have been incorporated in the ESIA.

Currently, the Provincial Project Management Office (PPMO) is preparing the second batch subprojects, and a new ESIA has been prepared for the remaining 12 counties following the procedures and requirements of the approved ESMF and guidance from the Bank's task team.

This document is an executive summary of the new ESIA for the batch 2 subprojects. In summary, the activities under the batch 2 are environmental protection, risk reduction and public welfare improvement efforts, and have significant positive environmental and social benefits. There is no land acquisition and resettlement issue, and no indigenous peoples involved. The potential adverse impacts mainly include dust, noise, wastewater and solid waste related to small-scale civil works, and health and safety concerns from agricultural activities. Such impacts and risks are small in scale, site-specific, and can be effectively avoided, reduced or mitigated through proper environmental protection measures as developed in the ESIA report.

2. PROJECT DESCRIPTION

The overall project development objective is to demonstrate a risk-based integrated approach to managing heavy metal pollution in agricultural land for safety of agricultural production areas in selected counties in Hunan.

The Batch 2 subjects involve the 12 counties in Hunan and include the following four components: (1) demonstration of risk-based agricultural land pollution management; (2) strengthening agricultural environmental monitoring and management; (3) capacity building and knowledge distribution; and (4) project management and monitoring and evaluation.

The location of the project counties is shown in Figure 1, and the detailed activities of Batch 2 are listed in Table 1.

Table 1 Batch 2 Subproject Activities

Components	Activities	Budget (1,000 yuan)
1. Demonstration of risk-based agricultural land pollution management	Monitoring and risk assessment: monitoring of water quality of irrigation water, heavy metal monitoring for soil and agricultural products and sediments; risk assessment and risk control plans	22,978.4
	Integrated risk control measures: <ul style="list-style-type: none"> • <u>Engineering measures</u>: construction and renovation of irrigation channels of 176.9km, 199 sedimentation tanks, improvement of 49.35km tractor access roads; 720m interception ditch; 2 interception dikes; 3 irrigation pumps; 2 water storage tanks and 1 well. • <u>Agronomic measures</u>: rice species control; optimization of irrigation management; regulation of soil pH; application of organic fertilizer; application of soil passivating agents; straw management. • <u>Pest management</u>: cleaner agriculture production; promotion of scientific use of pesticide; green pest control; and promotion of low toxicity/low residue pesticides. • <u>Other measures</u>: selection of rice species; procurement of standard-exceeding rice for industrial use; green products certification; brand promotion 	380,499.6
	Project supervision: supervision of agronomic measures by professional institutions, as well as local communities	15,988.7
2. Strengthening agricultural environment monitoring and management	Development of agricultural environmental database: procurement of sampling vehicles, computers, GPS etc.	22,978.4
	Development of risk-based agricultural land management tools and risk map	
	Development of local policy and standards on agricultural land pollution control and remediation	
	Study of sustainable financing mechanism and eco-compensation mechanism	
3. Capacity building	Training and study tours for government officials; training for monitoring staff and local farmers; workshops; and development of outreach materials	48,916.9
4. Project management and	Office equipment; staff training; daily project management	29,500.2

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3. REGULATORY AND LEGAL FRAMEWORK

The ESIA was conducted in accordance with Chinese EIA laws/regulations and the World Bank safeguards policies.

3.1 Chinese Laws and Regulations

The EIA is prepared fully in compliance with relevant China national laws, regulations, plans, technical guidelines and standards, which mainly include:

- Environmental Protection Law (2014)
- Environmental Impact Assessment Law (2002).
- Air Pollution Control Law (2016)
- Water Pollution Control Law (2008)
- Solid Waste Pollution Control Law (2015)
- Noise Pollution Control Law (1997)
- Land Administration Law of the PRC (2004)
- Soil Pollution Control Action Plan (2016)
- Agricultural Products Quality Safety Law of the PRC (2006)
- The Twelfth-Fiver Plan for Integrated Control of Heavy Metal Pollution in Hunan Province
- Implementation Program for Heavy Metal Pollution Control in Xiang River Basin (2012–2015)
- EIA Technical Guidelines (including general guidelines, and specific guidelines for air, surface water, noise, ecology, groundwater and risk assessment etc.)
- 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 Sites (HJ 25.3-2014)
- Technical Guidelines for Soil Restoration of Contaminated Sites (HJ 25.4-2014)
- Guidelines for Evaluation of Site Environment (DB11/T 656-2009);
-

A short description of key relevant laws and regulations is provided in Annex 2 of this document.

3.2 World Bank Safeguard Policies

Of the ten safeguards policies, the following are triggered: 1) OP4.01 Environmental Assessment; 2) OP4.09 Pest Management; 3) OP4.37 Dam Safety. The compliance with these policies are described below.

Table 2 Compliance with World Bank Safeguards Policies

World Bank Policies	Project Compliance
<i>Environmental Assessment (OP 4.01)</i>	<ul style="list-style-type: none"> • The project was assigned as Category A at project appraisal stage. • A SA and a full ESIA has been prepared following the requirements of the approved ESMF. • Pubic consultations and disclosure conducted as per OP4.01 requirements as part of the ESIA process.
<i>Pest Management (OP4.09)</i>	<ul style="list-style-type: none"> • Pest management related impacts are embedded in the ESIA report; • A Pest Management Plan (PMP) has been developed during appraisal for the whole project following the requirement of OP4.09.
<i>Dam Safety (OP 4.37)</i>	<ul style="list-style-type: none"> • All the dams related to water supply for the projects have been assessed in terms of dam safety, based on which detailed dam safety action plans have been developed.

As the project activities are all in the existing farmland of the project villages, there is no nature habitats involved, neither there is any need for land acquisition and resettlement. Based on social screening, there is no people that falls in the definition of OP4.10 Indigenous Peoples.

3.3 Applicable Standards

The ESIA adopted Chinese standards for ambient environment, food safety, agricultural products and soil pollution identification, after a comparison analysis between Chinese standards and some internationally recognized standards (such as EU, Japan, Netherland), to ensure that stringent standards be applied and can be achieved at reasonable cost.

4. ENVIRONMENTAL QUALITY AND POLLUTION BASELINES

4.1 Surface Water

Surface water quality monitoring has been conducted for all the irrigation water sources in the 12 project counties during Jan – Oct 2017, covering key parameters of pH, COD_{Cr}, TP, NH₄-N, As, Pb, Cd, Cr⁶⁺ and Hg. Monitoring data showed that all the water sources meet the Standards for Irrigation Water Quality (GB5084-2005, Class 3) and Environmental Quality Standards for Surface Water (GB3838-2002, Class 3), except minor exceedance of NH₄-N and TP at three irrigation channel locations in Linwu and Qiyang counties.

4.2 Soil Quality

Soil quality monitoring has been conducted for all the subproject areas in the 12 project counties during Nov 2016 – Oct 2017, with key parameters of Cd, As, Pb, Hg and Cr. The monitoring results showed that there is a general presence of Cd pollution in all counties, with Cd concentrations over applicable standards (Environmental Quality Standards for Soil, GB15618-1995, Class 2²) up to 10 times. Pollution of As and Hg are occasionally found in some counties, with exceedance over standards up to 2 and 5 times respectively.

4.3 Sediments of Irrigation Channels

Monitoring of sediments in the irrigation channels in the project areas showed that there is a general presence of Cd pollution, with Cd concentration exceeding the applicable standards (Environmental Quality Standards for Soil, GB15618-1995, Class 2) up to 8

² Class 1 is for protected areas, drinking water sources, tea garden, grassland etc.; Class 2 is for general farmland (including vegetation, tea trees, orchards, grazing grassland); Class 3 is forest land and other farmland with high background concentration of pollutants or near mining areas (except vegetable field).

times. Pollution of As is occasionally detected at a few locations with exceedance up to 8 times. There is overall compliance of Cr and Hg concentration at all the project counties.

4.4 Rice Quality

Heavy metal concentrations in rice products are monitored for all project counties, with total 1254 samples analyzed. Compared to the National Standards for Food Safety (GB2762-2012) ³, there is general presence of Cd pollution at all counties, and presence of As pollution is detected in nearly half of the project counties.

4.5 Pollution Sources Investigation

Through field visit, stakeholder consultation and data research, it is concluded that farmland pollution in the project areas is mainly from the industrial waste from historical heavy metal and mining industries. Excessive use of high heavy metal content fertilizer and pesticides is also a reason of soil pollution in the region. Extensive efforts have been made by provincial and local governments over the year to tackle the industrial pollution, and all these historical pollution sources have been shut down. All current industrial sources in the region are clearly identified and are in compliance of environmental requirements control. There is no legacy issues of mines, mine tailing and on-site wastes that would cause new pollution to downstream farmland

4.6 Environmental and Social Sensitive Sites/Areas

Based on field investigation and screening of environmental and social impacts, the main environmental and social sensitive receptors are identified for all the project counties, which mainly include sources of irrigation water (rivers and reservoirs); forest land which will receive straw wastes and sediments from irrigation channels⁴; liquor brewery plants which will receive standard-exceeding rice products for liquor making; landfill sites which will receive polluted sediments from irrigation channels; agricultural material recycling stations which will re-collect packaging materials of agriculture input; and local

³ Pb: 0.2mg/kg, As: 0.2mg/kg, Cr: 1.0mg/kg, Hg:0.02mg/kg, Cd: 0.2mg/kg.

⁴ Sediments with concentration higher than Class 2 but lower than Class 3 is safe for application in forest land according to national standard. Sediments with concentration exceeding Class 3 will be disposed of in sanitary landfills.

populations (especially poverty groups) in the project region. These are clearly identified for each county based on mitigation measures are explicitly developed in the ESMP.

5. IMPACTS ASSESSMENT AND MITIGATION MEASURES

As the project is an environmental protection and pollution mitigation, risk reduction and public health protection effort, it is embedded with significant positive environmental and social benefits, including improvement of soil environmental quality and food safety, increase of public awareness and capacity, improvement of agricultural infrastructure, building of risk-resistance capacity of farmers and competitiveness of rice products and improvement of income level in the project region.

The main potential environmental impacts are mostly related to construction of small-scale agricultural infrastructures (e.g. dust, noise, waste etc.), and environmental and health concerns from agricultural activities during operation (e.g. irrigation, application of lime, fertilizer and soil passivating agents, disposal of straw etc.). These impacts are assessed in ESIA's, and mitigation measures have been developed in ESMP's.

The key findings of potential impacts and mitigation measures are summarized as follows:

5.1 Impacts on Civil Works

The project will include small-scale civil works for construction of sedimentation tanks, pump station, water storage tank, well and maintenance of farmland access road (without widening or extension), renovation of drainage channels and interception ditches. These civil works are small in scale and are located in the existing farmland. Construction typically requires less than 5-10 people, and there is no land acquisition, resettlement or any camp site needed.

Wastewater: wastewater is mainly from irrigation channel excavation, cement mixing, aggregate washing and oil-containing wastewater from construction machines. Such wastewater is very limited in amount, and can be adequately tackled with proper treatment measures (e.g. settling tank). Workers are all staying in nearby villages, and their sewage will be treated through existing local sanitation facilities (typically septic tanks).

Dust: Soil excavation, land leveling, waste loading and transportation and other construction activities will generate dust. Given the small scale of civil works in each specific site and their scattering around in the project region, such impact is small and can be readily mitigated with proper construction method and dust suppression practice (e.g. simple water-spraying).

Noise: Noise mainly comes from construction equipment and transportation vehicles. As the construction site is small and construction activities are only conducted during daytime, such impacts are temporary and limited to immediate vicinity of the site where typically over 200m away from villages.

Solid wastes: solid waste mainly comes from spoil soil, garbage and dredging of irrigation channel. As all the civil works are small in scale, the total amount of solid waste is small and can be readily handled through soil balance and in-situ land leveling. Garbage from workers will be small in amount, and can be timely collected at work site and sent to local garbage collection/disposal system. Dredging material from irrigation channels can be safely disposed of through farmland backfilling, forest application or sanitary landfills according to various levels of pollution status.

Ecological impact: the civil works under the project are mainly located in exiting farmland area. Construction activities and material storage may disturb and occupy small amount of land, causing temporary damage of surface vegetation and soil erosion. Application of dredged materials in farmland and forest land may have temporary impact on vegetation too. Given the small scale and short construction period for each site, such impacts is small and site-specific, and surface vegetation can quickly recover through reclamation and natural restoration after construction.

Mitigation measures: To address above-mentioned environmental impacts, mitigation measures have been developed through development of *Environmental Code of Practice for Small Civil Works (Annex 1 of ESIA)*, and *Environmental Code of Practice for Irrigation Facility Construction (Annex 2 of ESIA)*. In addition, specific measures have been developed for disposal of dredging material from irrigation channels (with heavy metal concentrations exceeding Class 2 but within Class 3) in forest land in nearby villages; and disposal of material (with concentration exceeding Class 3 standards) in sanitary landfills in the project counties which are identified through due diligence review of the landfill design and operation.

5.2 Impacts of Upstream Pollution Sources

Based on investigation, it is confirmed that all the historical pollution sources have been shut down, and there is no legacy issues of mining operation, mine tailings and waste disposal. Current industrial enterprises are under strict regulation and are operated in compliance with environmental requirements. To ensure the environmental compliance of the irrigation water sources, the following **mitigation measures** are developed as part of the project design and ESMP:

- Regular monitoring of irrigation water quality;
- Renovation and maintenance of irrigation channels;
- Construct sedimentation tanks for irrigation channels for identified villages to allow at least 2h retention time for sedimentation. Periodic monitoring of sediments will be conducted, based on which appropriate disposal methods will be implemented for the sediments (either application in forest land or disposal in landfills).

5.3 Impacts of Agronomic Activities

Potential environmental concerns mainly come from irrigation, lime application, application of organic fertilizer, and application of soil passivating agents, as well as from straw disposal and standard-exceeding rice product control.

Flooding irrigation: Flooding irrigation for rice field during certain period of rice growing may require large amount water resources. While, there is abundant water resources in the project area, and such a demand is minor in comparison with regional water resources provision, therefore, the impact of water resources usage is little.

Lime application: Lime application is used to regulate pH of soil. During application, there would be certain impacts of dust. Such dust is limited in small scale and has little impact on the nearby villages. Personal protection is also a concern, which can be addressed through adequate personal protection equipment (proper cloth and mask).

Application soil passivating agents: Typical agents could include main ingredients of clay minerals, phosphorus-containing materials; silicon-calcium materials; metal oxides (such as iron oxide, ferrous sulfate, iron sulfate, goethite, manganese oxide, manganese potassium ore, etc.); organic materials; and industrial wastes, etc. During practical application, industrial

wastes will not be used for such purpose. Long-term monitoring of stability of agents will be conducted.

Application of organic fertilizers and chemical fertilizers: organic fertilizer and chemical fertilizers with high heavy metal concentration will be increase the heavy metals in the farmland soil, causing secondary pollution.

Application of pesticide: use of pesticide in agricultural activities may have potential impacts on human health, which will require selection of pest control methods, chemicals and health protection measures. This is addressed through the PMP developed for the whole project at the preparation stage.

Solid waste from agronomic materials: plastic membranes and other packaging materials, if not well managed, will have adverse impacts on soil environment and aesthetics. Such issue will be addressed through collection tanks established in project area and central recycling through Agronomic Material Stations in each county. Through such an arrangement, the impact of solid waste from agronomic materials can be effectively managed.

Mitigation measures: To address agronomic related impacts and concerns, a *Pest Management Plan (PMP)* has been developed for the whole project and a generic *Environmental Code of Practice for Agronomic Activities* has been developed as *Annex 3* of this ESIA. In addition, specific mitigation measures are identified certain specific issues, including:

- Disposal of straws in forest land and orchards in identified subareas of the project counties;
- Procurement of standard-exceeding rice from liquor protection in identified brewery companies in the project counties, in which brewery residues will be further disposal of in identified sanitary landfills;

5.4 Social Risks and Impacts

The project is embedded with significant social benefits to local communities in terms of improved agricultural product quality, increased awareness of local people on farmland contamination, improved rural infrastructure, better utilization of farmland, increase of job employment and household income etc. All project activities are within existing village

farmland and improved facilities will be owned and used by villagers, there is no land acquisition involved.

Based on social assessment, the potential social risks and impacts mainly include:

- Temporary disturbance of traffic, nuisance of noise and dust during construction, which can be readily addressed through good project management practice;
- Economic risks: (1) risks of keeping original farming practices, including net income decrease, market sale risks of new rice species, decrease of product output and non-compliance of rice product; (2) risks of changing crops, including cost and benefit risks, market sale risks and management risks;
- Social stability risks due to unreasonable judgement of pollution sources, exaggeration of heavy metal pollution and inadequate environmental protection of awareness of farmers.

Mitigation measures: To address these potential social risks and impacts, a series of measures have been developed for the project, including:

- Development of Resettlement Policy Framework to address the potential impacts on income and livelihood impacts;
- Development of basic compensation package for pollution remediation (technical subsidies to compensate the loss of non-compliance product with a rate of 200yuan/t and crop adjustment subsidies to compensate the income loss of crop change with a rate of 6000yuan/ha), and nurturing of farmers cooperatives;
- Strengthening of technical training to farmers;
- Establishment of accountability mechanism at all levels of governments; and
- Establishment of grievance redress mechanism, and use of media to educate public and receive/guide the public opinions

5.5 Safety of Dams

The irrigation water supply under the project will involve 27 existing reservoirs. Following the OP4.37 Dam Safety requirements, dam safety due diligence assessment has been conducted for all the dams. Based on the assessment, a dam safety action plan has been developed in the ESIA.

6. ANALYSIS OF ALTERNATIVES

6.1 With/Without Project

A thorough comparison for with and without project scenarios was analyzed. Given the seriousness of agricultural land pollution in Hunan province and related food safety and public health risks, if without the project, the heavy metal pollution will continue, and public health will continue to bear the risk of intaking polluted food. The rice pollution in Hunan has already had significant impacts on the sale of rice product and livelihood of local farmers. The proposed project will significantly help address the farmland pollution issues, improve the quality of rice product to meet applicable standards, and improve the income level of local farmers. The potential adverse environmental and social impacts related to the proposed project are small in scale, site specific and can be readily addressed through mitigation measures developed in the ESMP. Therefore, there is significant benefits for the “with project” scenario over “without”.

6.2 Selection of Project Areas

The selection of project counties/villages is conducted through a set of systematic principles, considering the scale of poverty alleviation, clear identification of pollution sources, representativity of farmland pollution, sustainability and social stability. Based on these principles, total 47 towns in the 12 counties have been selected as project towns.

Further identification of farmland plots is carried within selected towns with consideration of soil pH, pollution type and seriousness, organic contents of soil, investment and ownership commitments, total 47 farmland plots have been selected for demonstration.

7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public consultation and information disclosure have been conducted following the national laws and regulations, as well as World Bank *OP4.01 Environmental Assessment*. Two rounds of consultation and information disclosure were carried out during March/April 2017 and June 2017. The stakeholders consulted include farmers in the project areas, agricultural cooperatives, relevant government departments, industrial enterprises (closed or to be relocated), brewery companies receiving rice product and NGOs etc. Consultation is carried out through public meetings, field interview, telephone interview and questionnaire survey in the project affected communities.

In total over 700 people were consulted in project areas. The project received a broad support from the stakeholders consulted who expressed strong wishes to see the demonstration of the project to promote agricultural development in the project region. Public concerns on construction management, health, polluted rice control, dredging material management, dam safety issues were introduced and responded in the mitigation measures of the ESIA(ESMP), which will be closely supervised during construction period. Information disclosure has been conducted along the consultation processes, and is summarized as follows:

Table 3 Summary of Information Disclosure

Time	Locations	Methods	Contents
1st round disclosure			
2017.3-4	Bulletin boards of local county and township governments	Information posters	Brief introduction of project information and key activities
2nd round disclosure			
2017.6	Villages at project areas	Information posters	Project information; public consultation objectives; EIA information; contacts of project owners and EIA consultant



In addition to public consultation by EIA consultant, social assessment consultant has also conducted extensive consultations during SA preparation, which include multiple meetings ,

interviews and questionnaire survey with local farmers, local government departments, women associations, vulnerable groups and ethnic minority peoples. These include 12 meetings with county government officials; 24 meetings at township level with township governments and villager leaders; 24 meetings with villagers; 2 meetings with poverty groups; 24 meetings with women representatives; in-depth meetings with 120 villagers (including 40 women and 40 ethnic minority people). In addition, questionnaire survey has been conducted in the project subareas in the 12 counties with 1540 responses on social assessment, 541 responses on crop change, 436 responses from ethnic minority groups. Over 3000 people were consulted during social assessment. The main concerns of farmers include: (1) improvement of agricultural infrastructure such as maintenance and construction of new irrigation canal, tractor road; (2) increase of agricultural product quality; (3) participation in cooperatives to reduce risks; (4) adjustment of crop structure with increase of cash crops; (5) reduction of risk from cost increase due to pollution remediation. The main concerns from farmer's cooperatives include: (1) Availability of funding support; (2) improvement of cooperation management; (3) establishment of monitoring station for soil and agricultural product; (4) reduction of risk of sales and cost increase. The main concerns from village committees include: (1) Establishment and improvement of cooperatives; (2) strengthening of awareness and technical training; (3) development of reasonable compensation mechanism. These concerns and recommendations have been incorporated into the Social Assessment, and relevant measures have been incorporated into the project design and ESMP.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Institutional Arrangements

The project has established a comprehensive environmental management arrangement, with clear responsibilities and staff assignment as follows:

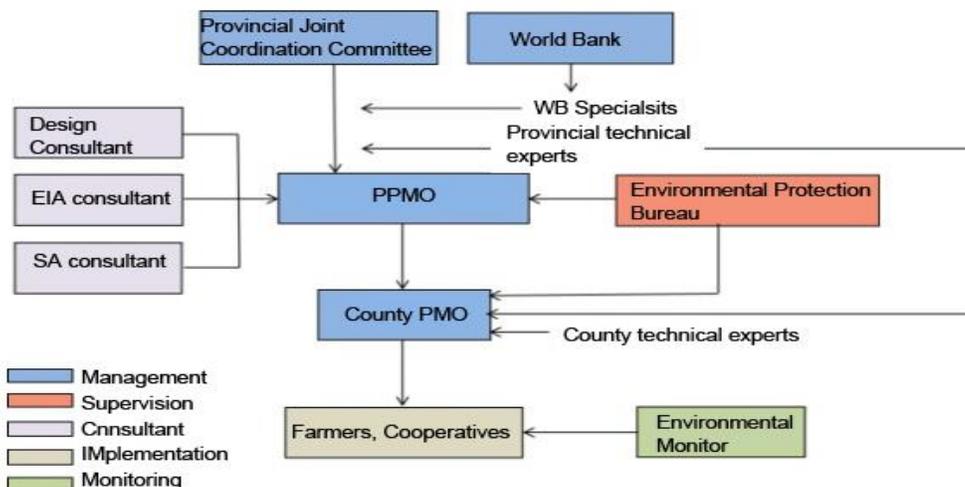


Figure 2 Institutional Arrangement for Environmental Management System

Table 4 Roles and Responsibilities of Environmental Management

Role	Name	Responsibilities	Staff Allocation
Management	Provincial Joint Coordinating Committee	Providing overall and general guidance on the relevant policies, implementation and coordination as well as tricky issues; supervising the implementation of the project; review and clear project proposals, seek counterpart funding and coordinate inter-institutional cooperation for the project.	-
	Provincial PMO	Responsible for overall management of the project to ensure the successful implementation of ESIA. It is explicitly responsible for: <ul style="list-style-type: none"> Supervise the implementation of ESMP; Reporting to the World Bank regularly Supervise environmental performance of lower level PMOs 	2-3

		<ul style="list-style-type: none"> • Hire external monitoring consultant to monitor the environmental and social performance; • Coordinate with relevant departments to solve major environmental issues 	
	County PMO	<p>Responsible for implementation of the ESIA, by:</p> <ul style="list-style-type: none"> • Supervise the implementation of environmental and social management regulations; • Ensure the incorporation of ESMP measures into the contracts; • Hire supervision engineers to supervise project and environmental performance; • Supervising the mitigation measures to be performed by contractors; • Organize environmental management training; • Handle complaints received and maintain a log system • Preparing implementation reports for ESIA; • Reporting to the Provincial PMO on the progress of the ESIA. 	1-2
Supervision	Environmental Protection Bureau (EPB)	<p>Responsible for the whole -process environmental supervision including:</p> <ul style="list-style-type: none"> • Examination and approval of site investigations, risk assessment, technical schemes and acceptance inspection reports for remediation of the sites; • Supervision of construction and operation of the project. 	1
	Third party Supervisor (representatives from villages)	<ul style="list-style-type: none"> • Conduct supervision on project implementation; • Assist county PMO on data collection 	Several

Implementation	Civil work contractors, implementation entities and farmers	<ul style="list-style-type: none"> • Implement environmental and social mitigation measures • Receive supervision by various PMOs and World Bank 	Several
Consultants	Environmental impact assessment consultant	<ul style="list-style-type: none"> • Conduct environmental assessment at preparation stage; • 	3
	Environmental and social supervision consultant	<ul style="list-style-type: none"> • Provide external environmental and social monitoring on construction sites • Provide regular report to provincial PMO on the monitoring performance and recommendations 	Several
	Environmental monitoring consultant	<ul style="list-style-type: none"> • Provide environmental quality and pollution monitoring services 	Several

8.2 Mitigation Measures

Comprehensive mitigation measures have been developed, including a set of generic mitigation measures (Annex 1 of this Executive Summary), supplemented by a set of additional ECOPs and management plans (as Annexes of the ESIA), including:

- ECOP for Small-scale Civil Works
- ECOP for Irrigation Facility Construction
- ECOP for Agronomic Activities
- Site-specific Environmental Mitigation Measures
- Detailed Dam Safety Action Plan
- Pest Management Plan

8.3 Monitoring Plan

A specific monitoring plan is prepared to cover all of the primary concerns for each county under the project, including water quality, sediments of water sources and sedimentation tanks, soil, agricultural products, organic fertilizer, pesticide, liquor brewery residues etc. National relevant protocols for sampling and analysis have been considered in the

preparation of the monitoring plan, and the applicable standards to evaluate the analysis results have been confirmed. Monitoring results will be reported from county PMO to PPMO and EPBs on a quarterly and annual basis.

8.4 Grievance Redress Mechanism

The same grievance redress system as was established for batch 1 will be established for batch 2 counties for redressing grievance for affected people and environment. Each county PMO will establish a leading group for grievance redress, headed by PMO leaders, under which an in-house grievance redress unit be established within county PMO. Grievance contact information (telephone, fax, address, e-mail etc.) will be disclosed through bulletin boards at local villages. The unit will collect public complaints on daily basis, with dedicated staff to record all complaints received. Grievances can be filed both orally and in writing. Starting at village and neighborhood committee level grievances can be elevated to PMOs at county/district, city and provincial levels if they are not satisfied with the resolution at the lower level. The affected people could also file their cases in court if they are not happy with the resolution by the project authority.

The detailed procedures of GRM are as follows:

- Stage 1: Project affected people (PAP) can express their complaints (orally and in writing) to the village committee/community committee or township government, which must keep a written record of received complaints and provide clear responses within two weeks;
- Stage 2: If PAP is not satisfied with the resolution from stage 1, they can file an appeal in county PMO or other county government organizations, which must provide responses within two weeks;
- Stage 3: If PAP is not satisfied with stage 2 resolution, they can file an appeal in Provincial PMO, which shall provide responses within two weeks;
- Stage 4: If PAP is satisfied with Stage 3 results, they can appeal to the administrative organ with jurisdiction for arbitration according to the Administrative Procedure Law of the People's Republic of China; and
- Stage 5: If the affected person is still dissatisfied with the arbitration decision, they may sue to the civil court in accordance with the Civil Procedure Law after receiving the arbitration decision.

All grievances and their resolution will be recorded. This mechanism has been disclosed to the local population and will be maintained throughout the project life-cycle to deal with any public concerns in environmental and social management.

In addition to the grievance redress mechanism established for the project, there is a comprehensive GRM system in place for all government departments (such as city/county government, EPB, Agricultural Bureau, Civil Affair Bureau etc.) with a dedicated complaints-receiving office established within each department.

8.5 Budget Estimation for ESMP

The total cost estimate for environmental and social management measures is RMB 62,662,500 yuan, as shown in Table 5.

Table 5 Cost Estimate for ESMP

No.	Environmental and social elements	Measures	Cost estimate (RMB yuan)
1	Noise	Equipment foundation or noise-reduction support	1,200,000
2	Air pollution	Cover of materials; water spraying etc.	1,200,000
3	Water environment	Temporary sedimentation tank, septic tanks, water and soil conservation measures etc.	10,800,000
4	Solid waste	Transportation of spoil and backfilling/land leveling; collection of garbage and disposal in landfills; dredging material transportation and disposal etc.	6,000,000
5	Monitoring	Monitoring of irrigation water, sediments of channels and sedimentation tanks, soil agricultural products, organic fertilizer, pesticide, liquor brewery residues etc.	22,054,700
6	Control of standard-exceeding rice	Subsidies for procurement of polluted rice products	13,200,000

7	Adjustment of crops structures	Subsides	7,611,800
8	Dam safety	Improvement of dam safety	596,000
Total			62,662,500

Annex 1 Generic Environmental and Social Mitigation Measures

Environmental and social elements	Mitigation Measures	Implemented by	Supervised by
noise	<ul style="list-style-type: none"> • No-horn sign shall be set up in sensitive spots and measures shall be adopted to reduce noise, such as using low-noise equipment, control noise source, transmission and traffic noise. • Schedule construction activities to avoid noon and night; • Cushion devises should be provided to the equipment making high noise; • Schedule material transportation time; • All equipment should be maintained regularly to reduce the noise; 	County PMO	Hunan Provincial EPB and County EPB
Air	<ul style="list-style-type: none"> • The earth excavated should be used for grade filling in other contracts of the project ; • Such activities as excavation and filling should be banned in windy and raining days; • The powder materials such as sand, cement and lime, should be carefully stockpiled and covered, water spray will be applied where necessary; • The construction works should be divided into several sections to reduce dust. Water spray should be applied on the site; • Mixing stations should be enclosed; • Equipment and vehicles should be maintained in good condition; • Construction vehicles should be inspected and maintained regularly. 	County PMO	Hunan Provincial EPB and County EPB

Environmental and social elements	Mitigation Measures	Implemented by	Supervised by
Water	<ul style="list-style-type: none"> • Rehabilitation or construction of irrigation ditches should be scheduled to avoid the irrigation season, and temporary by-pass ditches should be provided as necessary; • Settling tanks should be set up at construction sites to treat the construction wastewater for reuse on site; • Temporary lavatories should be provided within the construction site and the waste should be cleaned regularly; • Construction management should be enhanced to avoid the leakage of fuel from equipment; the drainage system should be established in the spoil stockpile area; • Contractors should carry out the mitigation measures for construction wastewater and domestic wastewater; • The works contractor should be trained on environmental protection. 	County PMO	Hunan Provincial EPB and County EPB
Solid waste	<ul style="list-style-type: none"> • Domestic solid waste on construction site should be collected and transported off site to local landfill facility for landfill; • The heavy metal content in the sediments should be sampled and analyzed, and corresponding measures taken to dispose of the sediment properly; • Dredging material will be disposed of in forest lands or landfills according to pollution level. 	County PMO	Hunan Provincial EPB and County EPB
Physical cultural resources	<ul style="list-style-type: none"> • Once physical cultural objects are found during construction the local cultural department should be informed immediately; the site should be protected by contractors; the construction should not be resumed before a permit is issued by the cultural department. 	County PMO	Provincial PMO

Environmental and social elements	Mitigation Measures	Implemented by	Supervised by
Social	<ul style="list-style-type: none"> • The local traditions and customs should be respected, especially in ethnic minority communities; • The ethnic and other vulnerable people should be protected by providing adequate opportunities, compensation and assistance as applicable. • The policy and standard for compensation for those affected by land loss, reduced yield and income loss should be applied, through the public consultation with the agricultural departments, environmental protection agency, affected villages and farmers. • The plan for training and subsidies should be implemented; • Detailed technical specifications should be developed; • Institutional capacity for supervision and implementation of the project should be enhanced; • Environmental awareness of farmers should be enhanced by launching comprehensive awareness outreach plans. 	County PMO	Provincial PMO

Annex 2 Description of Key National Laws, Regulations and Standards

Environmental Protection Law of the People's Republic of China (2014): Article 32 “China will intensify protection for the air, water, soil and so on, establish and improve the system for investigation, monitoring, evaluation and restoration”. Article 42 “the enterprises and other manufacturers discharging pollutants shall take proper actions to prevent and control pollution and hazards to the environment caused by the waste gas, waste water, waste residues, medical waste, dust, foul gas, radioactive substances as well as noise, vibration, optical radiation, electromagnetic radiation and so on generated during production, construction and other activities. The enterprises discharging pollutants shall establish an environmental protection responsibility system, and define the responsibilities of the person in charge of the enterprise and the personnel related”.

Environmental Impact Assessment Law of the People's Republic of China (2002): Article 16 “China adopts classified management for environmental impact assessment of construction projects based on the extent of impact on the environment. Article 25 “Where the environmental impact assessment documents of a construction project has not been examined by the competent authority defined in applicable laws or fails to pass the examination, the authority in charge of examination and approval of the project shall not approve and make it eligible for construction, and the construction unit may not commence”.

Land Administration Law of the PRC (2004): Article 27 “The State shall establish a land survey system. People's governments at or above the county level in company with relevant departments at the same level shall carry out land investigation. Land owners or users should cooperate with the investigation and provide relevant information”. Article 47 “For land acquisition, compensation should be given according to the land original use”. Article 48 “After the land compensation and resettlement plan is finalized, the local government shall hear the opinions of rural collective economic organizations and farmers through announcement”.

Agricultural Products Quality Safety Law of the PRC (2006): Article 17 “the activities for producing, collecting and fishing agricultural products or establishment of agricultural products production centers shall be prohibited from the areas where the hazardous and toxic substances exceed the applicable standards”. Article 18 “wastewater, solid waste, waste gas or other hazardous and toxic substances shall be prohibited from discharging into the areas for production of agricultural products

The regulation and official documents issued including:

- In June 2008, MEP issued an official document entitled “Recommendations on Strengthening Soil Contamination Prevention and Remediation.”
- In 2011, the State Council issued “Opinions on Strengthening Key Tasks on Environmental Protection”, which requires that environmental assessment and environmentally sound management should be carried out for contaminated sites before they can be redeveloped.
- In April 2014, the MEP and Land Resource Ministry jointly issued the Soil Contamination Situation Investigation Communique for the Whole Country, which indicate that the overall percentage of sample points exceeding the screening threshold in the country is estimated at 16.1%, involving 19.4% of arable land. More than 80% of the surveyed pollution points result from inorganic toxins, with the top three heavy metal contaminants identified as cadmium (Cd), nickel (Ni) and arsenic (As).
- In January 2013, the State Council further issued “Work Arrangement on Soil Protection and Comprehensive Treatment in Near Future”.
- Based on the Integrated Prevention and Control of Heavy Metal Pollution 12th Five Year Plan issued by the Ministry of Environmental Protection in early 2011, the first national plan for addressing heavy metal pollution. The key guiding principle of the Plan is to prevent new pollution and remediate contaminated water and land by focusing on top control of pollution sources - cleaner production, and end treatment of soil contamination, a concept of whole- process pollution prevention and control.
- Based on the Soil Contamination Prevention and Control Action Plan, issued by the State Council, 31 May, 2016. This action plan sets out an ambitious and urgent target for soil contamination control: by year 2020 the trend of soil contamination will be curbed and the safety of soil used for agricultural and construction developments will be basically guaranteed; and by year 2030 the ambient soil quality nation-wide will be gradually restored; by the middle of this century, the ambient soil quality will be thoroughly recovered and the sustainable development of ecological environment will be achieved; while the target for soil quality is by year 2020, over 90% of the contaminated farmland will be used in a safe manner; by year 203, the target is over 95% for the contaminated farmland. An integrated approach is promoted and promised by the plan to address the imminent challenge of soil contamination through legislation and standard system development, categorization of agricultural land use, monitoring of pollution sources and strengthening relevant studies and research.

Ambient Soil Quality Standard (GB 15618-1995)

The quality of the ambient soil is classified into three categories as follows:

- Category One: the natural soil, for areas zoned for natural reserves, concentrated drinking water sources, tea gardens, ranches and other protected areas;
- Category Two: the soil for the general agricultural land, vegetable land, tea garden, fruit garden, ranches, which could not damage or pollute the plants and environment;
- Category Three: the soil for the woods land, and agricultural land near mineral resources or with high contamination background (excluding vegetable farm).

The Standard is classified into three Classes according to the above three categories of soil:

- Class I: the soil quality limit for sustaining the natural eco-system and the natural soil in the protected areas;
- Class II: the soil quality limit for safeguarding the agricultural production and human health;
- Class III: the soil quality limit for safeguarding the production of forestry and agricultural, and growth of plants.

Soil Quality Standard

mg/kg

Class	I	II			III
pH of soil	Natural background	<6.5	6.5~7.5	>7.5	>6.5
Item					
Cd ≤	0.20	0.30	0.60	1.0	
Hg ≤	0.15	0.30	0.50	1.0	1.5
As Paddy ≤	15	30	25	20	30
Dry land ≤	15	40	30	25	40
Cu farmland ≤	35	50	100	100	400
Fruit garden ≤	—	150	200	200	400
Pb ≤	35	250	300	350	500

Cr paddy ≤	90	250	300	350	400
Dry land ≤	90	150	200	250	300
Zn ≤	100	200	250	300	500
Ni ≤	40	40	50	60	200
HCH ≤	0.05	0.50			1.0
DDT ≤	0.05	0.50			1.0