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Report No: PAD1253

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$150 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

ZHUZHOU BROWNFIELD REMEDIATION PROJECT

March 10, 2016

Environment and Natural Resources Global Practice
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective August 25, 2015)

Currency Unit	=	CNY renminbi (RMB)
RMB 1	=	US$0.156
US$1	=	RMB 6.40

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ASTM	American Society for Testing and Materials
CPS	Country Partnership Strategy
DA	Designated Account
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
EPB	Environmental Protection Bureau
ESMF	Environmental and Social Management Framework
FM	Financial Management
FMM	Financial Management Manual
FSR	Feasibility Study Report
GDP	Gross Domestic Product
HPAO	Hunan Provincial Audit Office
HPFB	Hunan Provincial Finance Bureau
MEP	Ministry of Environmental Protection
MOF	Ministry of Finance
OP	Operational Policy
PDO	Project Development Objective
PIU	Project Implementation Unit
PLG	Project Leading Group
PMO	Project Management Office
QIZ	Qingshuitang Industrial Zone
RAP	Resettlement Action Plan
RP	Resettlement Plan
RPF	Resettlement Policy Framework
SDG	Shifeng District Government
SOE	Statement of Expenditure
SS	Summary Sheets
S/S	Solidification/Stabilization
TOR	Terms of Reference
USEPA	United States Environmental Protection Agency

ZDRC	Zhuzhou Municipal Development and Reform Commission
ZFB	Zhuzhou Municipal Finance Bureau
ZMG	Zhuzhou City Municipal Government
ZREIDC	Zhuzhou Recycling Economic Investment & Development Group Co., Ltd.
WA	Withdrawal Application

Regional Vice President (Acting):	Antonella Bassani
Country Director:	Bert Hofman
Senior Global Practice Director:	Paula Caballero
Practice Manager:	Iain G. Shuker
Task Team Leader(s):	Frank van Woerden / Ning Yang

CHINA
Zhuzhou Brownfield Remediation Project

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Zhuzhou Brownfield Remediation Project (P147381)

PROJECT APPRAISAL DOCUMENT

EAST ASIA AND PACIFIC

Environment and Natural Resources Global Practice

Report No.: PAD1253

Basic Information		
Project ID P147381	EA Category A - Full Assessment	Team Leader(s) Frank van Woerden, Ning Yang
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ] Financial Intermediaries [ ] Series of Projects [ ]	
Project Implementation Start Date 7-Apr-2016	Project Implementation End Date 30-June-2021	
Expected Effectiveness Date 01-May-2016	Expected Closing Date 31-Dec-2021	
Joint IFC No		

Practice Manager/Manager	Senior Global Practice Director	Country Director	Regional Vice President
Iain G. Shuker	Paula Caballero	Bert Hofman	Axel van Trotsenburg

Borrower: People's Republic of China			
Responsible Agency: Zhuzhou Project Management Office			
Contact:	Jianguang Zhou	Title:	Director, Zhuzhou Development and Reform Commission
Telephone No.:	0086-731-28686338	Email:	zhoujg2012@163.com

Project Financing Data(in USD Million)					
[X] Loan	[ ] IDA Grant	[ ] Guarantee			
[ ] Credit	[ ] Grant	[ ] Other			
Total Project Cost:	244.74		Total Bank Financing:	150.00	
Financing Gap:	0.00				

Financing Source	Amount
Borrower	94.74
International Bank for Reconstruction and Development	150.00
Total	244.74

Expected Disbursements (in USD Million)

Fiscal Year	2016	2017	2018	2019	2020	2021	2022	0000	0000	0000
Annual	0.00	14.75	30.00	42.25	38.50	13.50	11.00	0.00	0.00	0.00
Cumulative	0.00	14.75	44.75	87.00	125.50	139.00	150.00	0.00	0.00	0.00

Institutional Data

Practice Area (Lead)

Environment & Natural Resources

Contributing Practice Areas

Cross Cutting Topics

[ ] Climate Change

[ ] Fragile, Conflict & Violence

[ ] Gender

[ ] Jobs

[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Industry and trade	General industry and trade sector	50		
Agriculture, fishing, and forestry	General agriculture, fishing and forestry sector	20		
Water, sanitation and flood protection	Solid waste management	30		
Total		100		

☑ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)		
Major theme	Theme	%
Environment and natural resources management	Pollution management and environmental health	70
Urban development	Urban Economic Development	20
Environment and natural resources management	Environmental policies and institutions	10
Total		100

Proposed Development Objective(s)

To reduce public exposure to contaminated land in the Project Area using risk-based remediation approaches.

Components

Component Name	**Cost (USD Millions)**
Component 1: Remediation of contaminated plots	137.43
Component 2: Associated treatment and disposal works	46.80
Component 3: Capacity building and knowledge management	8.23
Component 4: Project Management, monitoring and evaluation	20.98
Contingencies	21.19
Interest during construction, front-end fees and commitment fees	10.18

Systematic Operations Risk- Rating Tool (SORT)

Risk Category	**Rating**
1. Political and Governance	Low
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	
OVERALL	Substantial

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

Safeguard Policies Triggered by the Project	**Yes**	**No**
Environmental Assessment OP/BP 4.01	**X**	
Natural Habitats OP/BP 4.04	**X**	
Forests OP/BP 4.36		**X**
Pest Management OP 4.09		**X**
Physical Cultural Resources OP/BP 4.11	**X**	
Indigenous Peoples OP/BP 4.10		**X**
Involuntary Resettlement OP/BP 4.12	**X**	
Safety of Dams OP/BP 4.37		**X**
Projects on International Waterways OP/BP 7.50		**X**
Projects in Disputed Areas OP/BP 7.60		**X**

Legal Covenants

Name	**Recurrent**	**Due Date**	**Frequency**
Project Operations Manual	X		

Description of Covenant

Project Agreement, Section I.A.4 of Schedule: Throughout the project implementation, the Project Implementing Entity, through Zhuzhou Municipality, shall apply, and shall cause ZREIDC to apply, the POM in a timely and efficient manner satisfactory to the Bank. The Project Implementing Entity shall not amend, suspend, or waive said POM without the prior written agreement of the Bank.

Name	**Recurrent**	**Due Date**	**Frequency**
Mid-Term Review		September 1, 2018	

Description of Covenant

Project Agreement, Section II.A.2 of Schedule: The Project Implementing Entity shall prepare, under terms of reference satisfactory to the Bank, and furnish to the Bank no later than September 1, 2018, a consolidated mid-term review report for the Project, summarizing the results of the monitoring and evaluation activities carried out from the inception of the Project, and setting out the measures recommended to ensure the efficient completion of the Project and to further the objectives thereof.

Name	**Recurrent**	**Due Date**	**Frequency**
Annual Work Plan	X		Yearly

Description of Covenant

Project Agreement, Section I.A.5 of Schedule: The Project Implementing Entity shall, or shall cause

Zhuzhou Municipality to (a) prepare and furnish to the Bank by November 30 in each year, beginning in 2016, a draft Annual Work Plan; (b) taking into account the Bank's comments, finalize and furnish to the Bank no later than December 15 in each year, the Annual Work Plan; and (c) thereafter ensure the implementation of the Project during the following calendar year in accordance with the Annual Work Plan.

Conditions

Source Of Fund	Name	Type
IBRD	Subsidiary Agreement	Effectiveness

Description of Condition

Loan Agreement, Article 5.01: The Subsidiary Agreement has been executed on behalf of Shifeng District and ZREIDC.

Team Composition

Bank Staff

Name	Role	Title	Specialization	Unit
Frank van Woerden	Team Leader (ADM Responsible)	Lead Environmental Engineer		GENDR
Ning Yang	Team Leader	Senior Environmental Specialist		GENDR
Guoping Yu	Procurement Specialist	Senior Procurement Specialist		GGODR
Yi Dong	Financial Management Specialist	Sr. Financial Management Specialist		GGODR
Min Zhao	Team Member	Senior Economist		GGODR
Nina Queen Irving	Team Member	Senior Program Assistant		GENDR
Ning Yang	Safeguards Specialist	Senior Environmental Specialist		GENDR
Solvita Klapare	Team Member	Senior Environmental Economist		GENDR
Songling Yao	Safeguards Specialist	Senior Social Development Specialist		GSURR
Alejandro Alcala Gerez	Counsel	Senior Counsel		LEGES
Maya Port	Counsel	Counsel		LEGES

Zhuo Yu	Finance Officer	Finance Officer		WFALN

Extended Team

Name	Title	Office Phone	Location
Michael Feiss	Geotechnical/Mining Engineer		Germany
Ning Wu	Institutional and Financial Specialist		Beijing

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
China	Hunan Province	Zhuzhou Municipality	X		

I. STRATEGIC CONTEXT

A. Country Context

1. China's socioeconomic development since the 1980s has been remarkable, making the country the second largest economy in the world. However, China's growth has been capital- and resource-intensive, with significant environmental consequences. To achieve more sustainable growth going forward, China faces a tough challenge in shifting the economy onto a more balanced path, which requires the country to address among other strategic issues, natural resource depletion and environmental degradation. These topics are placed high on the Government's agenda.

2. China's industrialization and modernization process started in the 1950s and has left a legacy of vast contaminated sites, often referred to as "brownfields." Contaminated brownfields pose two categories of problems: firstly, pollutants in soil, water, groundwater, and disposed waste cause environmental and public health risks; secondly, they form obstacles to urban and local economic development. In the past decade, industrial restructuring, urban upgrading, and rising environmental awareness have made brownfield remediation and redevelopment an increasingly urgent need for China. Thousands of old industrial polluting enterprises have been shut down, their production suspended, or their facilities relocated out of urban areas due to cities' needs for building more modern and greener metropolitan areas, meeting public demand for a cleaner environment, and obtaining land for high-return development. In recent years, the Chinese government has begun to take actions to remediate brownfields to improve environmental and public health conditions and support sustainable urban development.

B. Sectoral and Institutional Context

3. Zhuzhou Municipality is located at the mid-low reach of the Xiangjiang River in the eastern part of China's Hunan Province. It has a population of 3.99 million, with an urban population of 2.37 million, gross domestic product (GDP) of RMB 19.48 billion, and a public fiscal revenue of RMB 26.4 billion in 2014. The city was one of the eight heavy industry bases developed since the First Five-Year Period of the People's Republic of China in the 1950s. For more than 60 years its Qingshuitang Industrial Zone (QIZ) has been exposed to the emissions of major national industries, particularly from nonferrous metallurgical and chemical activities. Environmental site surveys show that heavy metal pollution is the major environmental issue in the area. This poses both environmental and development concerns, since the Qingshuitang area—lying in the heart of the Zhuzhou build-up area and the Changsha-Zhuzhou-Xiangtan city cluster, and neighboring the largest rail transport hub in mid-south China—is a strategic location with strong opportunities for economic development.

4. Since 2007, the central government has launched several national programs to promote industrial restructuring, the "circular" (resource efficient) economy, and contaminated land remediation, including in the QIZ. These programs intend to tackle the environmental, social, and economic issues posed by older industries and contaminated industrial sites by providing policy incentives or direct financing, including state-level grant funding. In 2011, the State Council approved the *Implementation Plan for Heavy Metal Contamination in Xiangjiang River Basin*, which listed the QIZ as a priority remediation area. Under this plan, registered

remediation projects are eligible to receive partial grant-based financial support from the central and provincial governments. In response, the Zhuzhou Municipal Government, through the state-owned Zhuzhou Recycling Economic Investment & Development Group Co., Ltd. (ZREIDC), has initiated several small-scale remediation activities in the QIZ.

5. While the management of contaminated sites has gained momentum in the QIZ, several challenges remain in dealing with the often complicated and costly brownfield remediation activities. China has adopted a risk-based approach for brownfield remediation that is widely accepted in most countries. Risk-based approaches tailor remediation interventions to control the current and future risks that potential exposure to contaminants in soils and groundwater pose to human health and the environment, rather than merely removing or reducing pollutants to reach preset limits. These approaches can substantially reduce costs compared to traditional concepts (often based on "excavate and remove") but require comprehensive information on site contamination, exposure paths between contamination and the public, applicable remediation techniques, proper monitoring and oversight schemes, and very importantly, strategic land-use and urban development plans that allow flexibility to respond to changing conditions. Yet in the QIZ and elsewhere in China, capacity and experiences on managing brownfield remediation in such an integrated manner are lacking.

6. Brownfield remediation and redevelopment encompass a range of issues that necessitate broad stakeholder and public engagement. The QIZ (47 km^2) contributes a considerable portion of Zhuzhou's total industrial GDP. Most of the QIZ's industrial enterprises lie within a core area of about 15 km^2 that has a mix of land uses (mainly industrial and commercial, but also residential and agricultural) and has been earmarked for redevelopment. Aligning differing interests and defining responsibilities and rights among government agencies, enterprises, and the public is critical for achieving these remediation and redevelopment objectives. A transparent decision-making process is essential to reach consensus among stakeholders and to overcome various obstacles in the brownfield restoration and redevelopment process.

7. China's brownfield management is characterized by the fact that often land contamination is caused by state-owned enterprises. As such, there is a greater responsibility on central and local governments to finance remediation efforts. While the Zhuzhou Municipality, through the ZREIDC, has obtained funds from the central and provincial governments for brownfield remediation in the QIZ, there are still considerable financing gaps. Without compromising the objective of protecting human health and environmental quality for the future, adequate funds have to be secured to support a well-designed remediation program that applies the most cost-effective and best-suited remediation techniques. This brownfield remediation approach and the development of a sustainable mechanism to finance it should draw upon good international experiences.

8. The strategy of the Government is to make use of a World Bank loan and to mobilize international know-how for risk-based brownfield remediation of the QIZ's core area. A strategic plan for the core area is already in place that foresees redevelopment of the area with mixed industrial, commercial, and residential land uses. An 8.48 km^2 portion of the QIZ core area was selected as the Project Area because some large industries, such as a major lead-zinc smelter complex, will probably remain active in the core area during the next decade and therefore

cannot be remediated under the current project. The Government expects that the project will bring international best practices to the remediation of brownfields that later can be replicated in other parts of the QIZ and elsewhere in China.

9. Environmental site investigation and risk assessment for the project area —carried out during project preparation following national technical guidelines as well as internationally acknowledged tools and data sources developed by the U.S. Environmental Protection Agency (USEPA) and the American Society for Testing and Materials (ASTM)— revealed that human exposure paths have included airborne emissions, waste disposal, and wastewater discharge. The primary pollutants of concern are heavy metals, including lead (Pb), arsenic (As), and cadmium (Cd), with a typical depth of contamination of less than 0.50 meters (but in some locations more than 0.60 meters) in soils, pond and channel sediments, and waste piles. Some localized groundwater contamination has been detected as well.

10. Taking into account the planned land use and potential contaminants' impact on human health, the investigation results revealed that 2.73 km^2 of the project area presents unacceptable risk levels and requires immediate remediation action. The risks in the remaining part of the project area are within acceptable or controllable levels for designated land uses either because pollution is below any level that could cause environmental or health risks, they are covered with structures and pavement, or they are within industrial sites with operations that meet national environmental standards. Proposed actions in the remediation area include various in-situ and off-site technologies, reuse of materials and post-cleanup rehabilitation. Treatment facilities will be used to treat sediments, contaminated soils, and industrial solid wastes. A landfill will be built on an abandoned quarry in the project area for receiving treated residues and structure demolition wastes. The remediation technologies and treatment/disposal works were selected through careful alternative analysis, tailored to site-specific contamination risk levels, land use plans, and cost effectiveness considerations.

C. Higher Level Objectives to which the Project Contributes

11. The proposed project is consistent with Zhuzhou city's master plan, regulatory planning for the QIZ core area, and the World Bank Group's County Partnership Strategy (CPS) for FY2013–16 (Report No. 67566-CN) discussed by the Board of Executive Directors on November 6, 2012, and is in line with the Strategic Theme One of the CPS, Supporting Greener Growth. The proposed project could contribute to several outcomes under this theme: demonstrating pollution management, sustainable natural resource management approaches, and enhancing urban environmental services. It is also expected that the proposed project will contribute to China's efforts to improve the management and redevelopment of industrial zones and contaminated sites in urban areas.

12. By reducing exposure to pollution, improving health conditions, and increasing access to information, the project will also contribute to the World Bank Group's corporate goals of ending extreme poverty by 2030 and boosting shared prosperity, including the overarching theme of sustainability that frames both these goals. The world's bottom 40 percent in terms of income generally live closer to degraded or highly polluted areas than higher-income population groups and therefore are more exposed to industrial pollution, including waste, soil, and groundwater contamination. Poor people are the least able to protect their children from the

harmful impacts of pollution on health and educational outcomes, the accumulated impacts of which can reduce earnings and quality of life across generations.

II. PROJECT DEVELOPMENT OBJECTIVE

A. PDO

13. The development objective of the project is to reduce public exposure to contaminated land in the Project Area using risk-based remediation approaches.

B. Project Beneficiaries

14. The proposed project will target a portion of the QIZ in Zhuzhou's district of Shifeng in the northern part of the city adjacent to the Xiangjiang River. The project area covers 8.48 km^2 within the 15.15 km^2 core area of the QIZ (which has a total area of 47 km^2).[1] According to the social survey 6,237 people live in the project area, of which about 1,000 live within the 2.73km^2 area in which the actual remediation will be carried out. Residents in both the remediation area and the surrounding project area will benefit directly from reduced potential risk of exposure to contaminated land and the corresponding reduction in potential health impacts. Direct project beneficiaries also include 262,000 local residents of Shifeng District, as many of them work in the project area. Additionally, 300,000 people living in and around Zhuzhou Municipality will benefit from improved food safety, as currently the produce grown in proximity of contaminated land is likely entering the food chain.

15. The local government and project implementation agencies staff will also benefit from the training under the project for improvement of their knowledge in site remediation and restoration and strategic planning. Generally, the entire population of Zhuzhou, and Shifeng District in particular will benefit from the overall improvement of environmental conditions in terms of likely rise of land prices and increased economic development opportunities that come with the gradual cleanup of the QIZ, and the gradual phase-out of heavy industry from the central part of the city that the project supports.

C. PDO Level Results Indicators

16. Progress towards achievement of the PDO will be measured by the following key outcome indicators (for details see Annex 1):

(a) Area of contaminated land managed or dump sites closed under the project [hectares, core sector indicator];
(b) People in the Zhuzhou's Qingshuitang core industrial area with reduced potential risk of exposure to contaminated land [number];

[1] Adjacent to the project area are major industrial complexes including Zhuzhou Smelting Co., and Zhuzhou Chemical Co., These two industrial complexes are located in the Core Area as well, but outside the project area since these complexes will remain in operation in the medium to long term.

(c) Direct project beneficiaries [number; core sector indicator], of which female beneficiaries [percentage];
(d) Share of people living in the Zhuzhou's Qingshuitang core industrial area indicating that sufficient information is available regarding the area's remediation process and grievance redress mechanism [percentage];
(e) Verified remediation works implemented per risk-based design [hectares]

III. PROJECT DESCRIPTION

A. Project Components

17. The project design is informed by the recent and ongoing analytical work on soil remediation in China. The project will finance investments for environmental remediation of a brownfield area in the Qingshuitang Industrial Zone (QIZ), Shifeng District of Zhuzhou Municipality. A risk-based approach has been applied to determine remediation concepts achieving acceptable levels of environmental risks and risks against human exposure to pollutants at minimum cost. Following this approach, the selection of remediation targets and technologies depends on current site contamination levels, site properties, and existing and planned land uses, resulting in a variety of remediation techniques tailored to the specific site conditions. The project will also support technical assistance. The project will be implemented over a period of six years.

18. **Component 1: Remediation of contaminated plots** (total cost US$137.43 million, of which IBRD loan US$103.96 million). This component will support cleanup and remediation of 2.73 km^2 of contaminated plots and 0.11 km^2 of dispersed open soil plots in residential areas. The specific activities will include: (a) site preparation, including land clearance, demolition and removal of structures of households in remediation area and closed plants; (b) materials transport, including road construction to enable transport, as needed; (c) soil and sediment treatment in closed plants, remediation of contaminated soil plots, ponds and channels; (d) cleanup of industrial waste piles; and (e) soil exchange programs for open soil plots in residential areas.

19. **Component 2: Associated treatment and disposal works** (total cost US$46.80 million, of which IBRD loan US$39.67 million). This component will support investments in associated remediation and disposal facilities that are required to treat contaminated materials and thus enable the remediation of certain plots or to make sure that the remediation is sustainable under Component 1, including: (a) Xinqiao dewatering site; (b) Xinqiao Solidification/Stabilization (S/S) facility; (c) wastewater treatment facilities; and (d) development of an industrial solid waste landfill in the project area.

20. **Component 3: Capacity building and knowledge management** (total cost US$8.23 million, of which IBRD loan US$4.54 million). The project will support Zhuzhou Municipality's and Shifeng District's capacity to build and operationalize the technical and management knowledge gained from the project implementation, engage the public, and manage remediation and redevelopment strategic planning. It will include: (a) an environmental information and demonstration center, which will serve as an environmental education platform for the public, a data monitoring center, and a place for nation-wide knowledge dissemination events; (b) public

disclosure activities, including disclosure of monitoring reports, pollution maps, and other environmental information; (c) a study on Qingshuitang brownfield remediation and strategic planning; and (d) a study on the compliance framework for Qingshuitang environmental quality and industrial pollution control.

21. **Component 4: Project management, monitoring, and evaluation** (total cost US$20.98 million, of which IBRD loan US$1.45 million). The project will support the Project Management Office (PMO) and Project Implementation Unit (PIU) to enhance management capacity through training, study tours, and outsourcing of consulting services, including contracts for: (a) project management capacity building; (b) project management; and (c) external environmental and social monitoring.

B. Project Financing

22. **Lending Instrument**. The lending instrument for the project is Investment Project Financing. The Borrower has selected a US Dollar denominated, repayment-linked variable spread loan, based on six-month LIBOR plus an additional variable spread. It has also selected all conversion options, a level repayment profile, payment of the front-end fee, interest rate cap or collar premium with IBRD loan proceeds, and a final maturity of 26 years, including a six year grace period.

23. **Project Cost and Financing.** The estimated total project cost, including financial costs during construction is US$244.7 million, to be funded by an IBRD loan of US$150 million and counterpart funds of US$94.7 million equivalent. The table below indicates the project cost by components. The counterpart funds will be provided by the local governments of Zhuzhou Municipal and Shifeng District Governments, using their budget revenues, as well by attracting grant financing from the central and Hunan provincial governments for implementation of special program of heavy metal pollution control for Xiangjiang River basin (see Financial Analysis of the Appraisal Summary and Annex 5).

Project Component	**Project Cost, US$ million**	**IBRD Financing, US$ million**	**%**
1. Remediation of contaminated plots	137.430	103.956	76
2. Associated treatment and disposal works	46.803	39.671	85
3. Capacity building and knowledge management	8.230	4.545	55
4. Project management, monitoring and evaluation	20.981	1.453	7
Total Baseline Cost	**213.444**	**149.625**	**70**
Contingencies	21.118	0	
Total Project Cost	**234.562**	**149.625**	**64**
Interest during construction	9.596	0	
Front-end fees	0.375	0.375	100
Commitment fees	0.212	0	

Total Financing Required	**244.745**	**150.000**	**61**

C. Lessons Learned and Reflected in the Project Design

24. The project design incorporates lessons learned from international and domestic experiences and the Bank's global and China operations as described below. Specific references in this respect are multiple Bank-funded land remediation projects in the Europe and Central Asia Region, the experience gained from preparation of the recently approved Bank-funded Huainan Mining Area Rehabilitation project, and the conclusions and recommendations of two recent Bank studies on brownfield management and redevelopment: (a) *Overview of the Current Situation on Brownfield Remediation and Redevelopment in China*[2]*;* and (b) *China – International Experience in Policy and Regulatory Frameworks for Brownfield Site Management*[3]. The first paper provides a brief history and preliminary assessment of the progress made in brownfield remediation and redevelopment, highlighting the huge challenges faced by the governments at different levels. The second paper focuses on relevant international experiences and lessons and recommendations for China. Key experiences are summarized below.

25. **Risk-based remediation approach**. In line with good international practice, the project area has been divided into hundreds of smaller plots, with plot analyzed according to a standardized profile of pollution levels, current land use, and projected future land use to determine in a risk-based manner the most suitable approach for cleanup and restoration for redevelopment. With this concept, seven different remediation technologies have been adopted that would be applied in the overall remediation plan. This approach is highly cost-efficient and at the same time provides a flexible concept to adopt to future changes in the strategic plan of the project area and to apply to future industrial relocations outside the project area. This approach has allowed for proposing cost-saving changes to the existing strategic plan, which, for instance, initially projected sensitive land uses (recreation) in one of the most polluted parts of the project area.

26. **Realistic counterpart financing plan**. In recent years, a considerable number of urban development projects implemented by subnational governments in China had difficulties with timely provision of adequate counterpart funds. In particular, after the central government's 2014 directive on curbing local government debt, the channels for local governments to borrow from commercial banks were virtually closed. During project preparation, much attention was given to the review and optimization of the proposed counterpart funding plan that can now largely rely on central and provincial grant funding for contaminated site remediation with limited need (estimated at around 10 percent of project budget) to supplement project investments from district and municipal government budget funding.

27. **Interventions focus on remediation and restoration.** In addition to improvements of public health and environmental conditions, an important strategic goal of the project is to enable redevelopment of the Qingshuitang area. The remediation concept as explained has been closely

[2] https://openknowledge.worldbank.org/handle/10986/2933
[3] https://openknowledge.worldbank.org/handle/10986/2927

prepared in view of future land uses. It can be tempting to include redevelopment elements into the project scope. However, it was decided to limit project interventions to site remediation and restoration only. Site redevelopments, such as construction of a controlled wetland were considered but not included as these in most cases can be done more efficiently as part of more comprehensive redevelopment schemes with alternative and possibly private funding. This approach also reduced co-financing requirements.

28. **Remediation liabilities and financial benefits**. Close attention was paid to determine whether a party, in this case the municipal government, who ultimately pays for the cleanup, also benefits in the future from the subsequent increase in land value. It was also investigated whether polluters that once caused site contamination can be held liable for the cleanup costs. International practice demonstrates time and again how difficult it is to make known polluters pay for cleanups outside factory boundaries. In addition, the soil and groundwater pollution in the Qingshuitang area were caused over many decades by state-owned companies and remediation is considered a public liability. Procedures in place apply to future sales of remediated land in the project area, which is mainly community- or state-owned land with only limited parts owned by ZREIDC or the municipal government. These procedures, which require that for all future land sales the municipal government controls the transactions and compensation of communities, assure that the party that ultimately pays for the cleanup, namely the municipal government with support from national and provincial grant funding, will also gain the revenues from these investments that will allow at least some cost recovery from the investment. None of the gains would accrue to former polluters.

29. **Financing options.** Research during project preparation confirmed that there is no serious alternative other than to mobilize public funding for remediation and restoration of the Qingshuitang area. The current poor market for land sales provides little basis for alternative funding from land transactions or developer contributions. However, despite the poor land transaction market at present, there is little doubt that in the longer term the development potential of Qingshuitang, situated at the heart of the Zhuzhou urban area, will allow some cost recovery by the municipal government from land transactions.

30. **Risk of recontamination**. Cleanup operations are only cost-effective when sources of contamination have stopped polluting or will be stopped as part of the cleanup interventions. It was investigated and confirmed that the historic sources of contamination, mainly dust deposits containing heavy metals, have been halted and that the risk of recontamination of soil through other mechanisms, such as migration of polluted groundwater into the cleanup site area, is very limited. The project design includes activities under Component 3 to monitor this risk as well.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

31. The project management structure consists of the Project Leading Group (PLG), Project Management Office (PMO), and Project Implementation Unit (PIU).

32. The Zhuzhou City Municipal Government (ZMG) has established a Project Leading Group chaired by the executive vice mayor of the ZMG to steer the implementation of the project. A Project Management Office (PMO) has been set up by the PLG, responsible for executing the decisions made by PLG and coordinating with the Bank. The PMO will also implement the studies under Component 3, which will involve government agencies and give policy recommendation to the ZMG.

33. The Project Implementation Unit (PIU) responsible for daily implementation of the remediation program is housed in the Zhuzhou Recycling Economic Investment & Development Group Co., Ltd. (ZREIDC), a state-owned enterprise. It will be responsible for project implementation activities, such as procurement, contract management, and accounting and reporting. The PIU has set up six groups and each group has been assigned a coordinator to deal with requirements related to project implementation. The groups include: (a) project management; (b) technical; (c) procurement; (d) contract management; (e) planning and accounting; and (f) environment and resettlement.

B. Results Monitoring and Evaluation

34. The monitoring and evaluation system for the project includes two parts: project progress and results monitoring, and specialized monitoring. The tasks will be undertaken by both project implementation and external teams. Progress towards the PDO will be monitored using the outcome indicators in Annex 1. Evidence or data of these indicators will be collected by the PMO and the PIU from project beneficiaries, stakeholders, works supervising consultants, and contractors. Additional studies will be carried out if necessary in order to obtain effective data for measuring achievement of the PDO. The monitoring and evaluation (M&E) system of the project includes: (a) annual work plans and budgets; (b) periodic on-site inspection and verification by PMO and PIU staff; (c) consolidated semiannual project progress reports compiled by the PMO to the World Bank; (d) consolidated semiannual unaudited interim financial reports (IFRs) on use of funds provided by PMO to the World Bank; (e) annual financial audits of the sole project account set in the Ministry of Finance (MOF). Specialized monitoring, including environmental quality monitoring and monitoring of resettlement action plan implementation will be undertaken by specialized external consultant teams. The costs of M&E have been included in the related activities of the three project components.

C. Sustainability

35. The project proposes a cost-effective approach for industrial site remediation in a complex environment with mixed economic activities (industrial, residential, agricultural, etc.) and where industrial redevelopment (closure, relocation) can be found in all stages from having already happened to being scheduled for the distant future. The most important focus of ensuring the sustainability of the project is on the risk of recontamination and avoiding substandard or inefficient remediation approaches and adverse environmental and social impacts, not only from project activities but also for other developments in the project area.

36. The environmental assessment includes due diligence of industrial emissions over the past three years and found that environmental compliance has been improving. The latest monitoring results of early 2015 show overall compliance of industry emissions, including dust

control measures with the local metallurgical industries, eliminating the source of pollution that created the soil contamination in previous decades. Thus the recontamination risk of the Project Area has become minimal. The project Component 3 includes a study on the compliance framework for environmental quality and industrial pollution control in order to build capacity for monitoring and managing the risks. Furthermore, it was agreed that the remediation approaches and environmental and social safeguards frameworks developed for the project apply to the whole project area, including areas outside the remediation plots.

37. The remediation approaches (technologies and associated works) should result in a robust long-term solution that either fully cleans up the targeted sites or requires little to no follow-up maintenance and monitoring after the project closes.

V. KEY RISKS

A. Risk Ratings Summary Table

Risk Categories	Ratings (H, S, M or L)
1. Political and Governance	Low
2. Macroeconomic	Moderate
3. Sector strategies and policies	Moderate
4. Technical design of project or program	Moderate
5. Institutional capacity for implementation and sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and social	Substantial
8. Stakeholders	Substantial
9. Other	
Overall	Substantial

B. Overall Risk Rating Explanation

38. Based on the assessment of the main risks identified during project preparation, the overall risk is rated as "Substantial." The key risks and mitigation measures have been identified. The three main (Substantial) risks to the successful achievement of the project objectives or potentially causing unintended results are: (a) inadequate experience and capacity of the PMO and PIU in managing and implementing Bank-financed projects; (b) unintended environmental and social (resettlement) impacts; and (c) stakeholder risk given the need for significant co-financing and limited fiscal revenues at the city and district level.

39. The first risk (institutional capacity) has been and will further be mitigated through equipping the PMO and PIU with a sufficient number of competent staff, and providing them with targeted training on Bank policies, procedures, project management, and related technical skills during project preparation and the early stage of implementation. During project implementation, staff capacity will be enhanced by competent implementation support consultants and specialized firms for detailed design, project management, construction

supervision, monitoring, and studies. The second risk (environmental and social) is mitigated through targeted training of PIU/PMO environmental and resettlement management staff on related Bank policies and procedures, involvement of affected communities in development and implementation oversight of the environmental management plan (EMP) and resettlement action plan (RAP), and engagement of independent monitoring consultants. The stakeholder risk, in particular the project counterpart financing risk with funding substantially relying on year-by-year approvals of grants from central and provincial government funding for soil remediation projects, has been mitigated through reduction of counterpart financing needs during project preparation by means of scope reduction and cost-saving measures and will be managed during project implementation through careful annual budgeting, securing provincial and central government grant funding for site remediation, and municipal and district government commitments to secure counterpart financing requirements.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

Economic analysis

40. Implementation of the project would help the national and local governments implement their strategic plans for addressing heavy metal contamination issues, including the *Twelfth Five-Year Plan for Comprehensive Heavy Metal Pollution Prevention and Control* by the State Council and the *Implementation Plan for Heavy Metal Contamination Prevention and Treatment for Xiangjiang River Basin* by the Hunan provincial government.

41. Implementation of the project would help reduce direct exposure to heavy metals of at least 6,237 people currently living in the project area, and improve the living environment of 262,200 local residents of Shifeng District. It would also help improve food safety and quality for 300,000 people residing in and around Zhuzhou Municipality.

42. In addition to the above unquantified benefits, the key quantifiable benefit of the project, for the purpose of the economic analysis, is the increase in land value in Shifeng District, which is used as a proxy for the market value of the benefits of the cleanup and the benefits and appreciation of a clean environment for both current and future land uses. Land prices in Shifeng District have been depressed due to the poor environmental conditions in the Qingshuitang Industrial Zone. While the market for land sales is currently weak, there is little doubt of the development potential in the QIZ and in Shifeng District as a whole, which is located at the heart of Zhuzhou. Hence, it is estimated as part of the economic analysis that the land value in the district would increase by the time remediation of the QIZ is completed, although the project would not directly cause land transactions. Due to the remediation activities of the project, the land remediated would be clean, healthy, and more suitable for working and living and would increase the land and property prices in adjacent areas.

43. Without- and with-project scenarios were considered. Under the without-project scenario, the local market price of land in Shifeng District was used to estimate the value of land. The average land prices over the past three years within the project area have been used to calculate the current land value. Since there is no existing land price for remediated land in QIZ, the

average land prices in Tianyuan District, which is adjacent to the QIZ and much less polluted than Shifeng District, are used to estimate the land value under the with-project scenario. The land prices in Tianyuan District are also scaled up to account for the district's lower economic development in terms of gross domestic product (GDP) relative to Shifeng District.

44. The economic internal rate of return (EIRR) has been calculated for the whole project, over a 25-year period at 38 percent, which covers all costs of the project, including the costs for the knowledge and public information / environment demonstration center. This EIRR is greater than the social discount rate, which means the investment is economically justified.

45. Sensitivity analysis was also conducted. Under the assumption that the investment would increase by 20 percent, the EIRR was 32.5 percent; if land value decreased by 20 percent, the EIRR was 31.3 percent; and if both occurred simultaneously, the EIRR was 26.1 percent. For more details, see Annex 5.

46. The least-cost analysis to compare three remediation approaches was also conducted and the option with least cost was selected as the technical option for the project. These technical options includes the more traditional approaches of off-site stabilization and off-site washout, and the risk-based approach combining nine different technical options as selected for project implementation.

Financial analysis

47. The financial analysis was carried out to assess financial viability of the project, including a review of the financing plan, fiscal impact of the project, and cash-flows for project stakeholders. The sources of project funds include the World Bank loan and counterpart funds provided by central, provincial and local governments. The following table shows the project investment and financial plan:

Project Investment and Financing Plan

	Financing amount (RMB, million)	
Source	**Project implementation**	**Financing obligations (15 years)**
1. Central and provincial governments	458.75	
2. Local governments	147.61	1,057.20
3. World Bank	958.50	
Application		
1. Project investment	1,566.36	
2. Debt servicing		1,075.20

48. For CY2016, the counterpart financing in the amount of RMB 121 million from central and provincial government grants designated to co-finance special programs of heavy metal pollution control in Xiangjiang River basin, have already been secured. Since these grants are only committed by the central and provincial governments on a yearly basis, ZREIDC will apply

for grant co-financing every year to secure counterpart funding during CYs 2017-2022. At present, total grant amounts typically reach 30 percent of the total investment cost identified in the grant applications. The remaining project cost would be financed by the local governments, including Zhuzhou Municipal and Shifeng District Governments from their budget revenues. The Zhuzhou Municipal and Shifeng District Governments will also service the World Bank loan debt and secure counterpart financing in case the grants from central and provincial governments cannot be adequately and/or timely secured. The analysis (see details in Annex 5) shows that the fiscal impact for the two local governments of providing counterpart funds and paying debt service are insignificant, even if the two local governments would need to secure the entire counterpart funding starting from 2017.

49. The stakeholders of the project include: (a) the World Bank, which provides 61 percent of the financing to the project; (b) governments (i.e., central, provincial and local), which provide counterpart funds to the project; (c) the ZREIDC, which is the implementing agency of the project; (d) villagers, who can no longer use the land for farming due to its contamination and will be able to allocate this land to local government for project purposes and receive compensation; (e) industrial enterprises, which similarly to villagers in the future may benefit from increase in land prices; and (f) future real estate developers. The analysis of the project cash flows, as detailed in Annex 5, shows that all stakeholders will benefit from increase in land value as a result of the remediation activities completed under the project.

B. Technical

50. Beside a minor amount of standard demolition and construction works, main interventions of project implementation require a set of remediation technologies. The remediation solutions to be applied and the specific quantities are listed in the table below. The different technologies were selected during project preparation and design in a comprehensive feasibility study that included conceptual designs based on robustness, availability, cost-effectiveness, nature and extent of contamination, site characteristics and envisaged future land uses. All technologies have proven to be suitable under consideration of the specific selection conditions under similar projects and purposes. It is noted that the innovativeness of the project comes with the flexible and risk-based application of technologies, rather than the technologies themselves. In addition, standard earth moving works, landfill construction and establishment of contaminated soil, sediment and water treatment facilities using well established design and technology will also be undertaken.

Remediation Technologies Applied under the Project

Remediation Technology	**Remediation Area/m^2**	**Remediation Volume/m^3**
In-situ stabilization + capping	738,968	443,381
In-situ stabilization + phytoremediation	128,054	76,832
Ex-situ solidification/stabilization (S/S)	474,202	284,521

Reused at planned non-sensitive areas	622,937	373,762
Phytoremediation	229,266	137,560
Bio-interception barriers	98,030	58,818
Contaminated sediments dredging and treatment	172,986	172,986
Excavation and backfill for 6 closed industrial facilities	191,579	90,861
Removal of waste piles	16,815	84,652
Clean soil exchange for residential areas	110,855	55,428

C. Financial Management

51. The Bank loan proceeds, including overseeing the designated account (DA), will be managed by the Hunan Provincial Finance Bureau (HPFB). The primary FM responsibilities of the PMO will be finalizing and submitting financial reports to the Bank, ensuring counterpart funds included in the project annual plan are committed by the Municipality and reviewing PIU expenditure reporting. The primary FM responsibilities of ZREIDC (PIU) include preparing the annual plan and Bank withdrawal applications, payments to contractors, accounting and financial reporting. Neither the PMO nor the PIU has prior experience managing World Bank-financed projects. An action plan to strengthen FM capacity has been agreed with the implementing agencies, including preparation and distribution of an FM manual, provision of extensive training, and establishment of a systematic monitoring mechanism. The FM assessment concluded that with the implementation of the proposed actions, the project's FM arrangements satisfy the Bank's requirements under OP/BP 10.00. More details on Financial Management arrangement are presented in Annex 3.

D. Procurement

52. The PMO will be responsible for overall oversight of the procurement under the project. The PIU will be responsible for carrying out the day-to-day procurement under the project, including signing all contracts and will be responsible for management and administration of all contracts under the project. Zhuzhou City has implemented several Bank-financed projects, but, as mentioned above, neither the PMO, nor PIU (ZREIDC) have previous Bank project experience. However, ZREIDC was set up in 2008, including the Engineering Management Department, Comprehensive Management Department, Planning and Financial Department, Project Management Department, Audit and Legal Department etc. with a total staff of over 50, and has rich domestic project experience with five completed similar projects financed by domestic funds with a total investment of about RMB 600 million.

53. The PIU has designated a full-time procurement staff from the Engineering Management Department, who has domestic project procurement experience and has previously worked for a contractor in works contracts financed by the Bank. The PIU staff will attend the procurement

training workshops organized by the Bank and MOF, or institutions acceptable by the Bank, and visit some other PMOs, which are implementing Bank-financed projects, to gain expertise in Bank procurement procedures. In addition, to strengthen the implementing agency's capacity, a procurement agent with Bank project experience will be selected by ZREIDC. The Procurement Manual and the Procurement Plan have been finalized. More details on procurement arrangements are presented in Annex 3.

E. Social (including Safeguards)

54. The project will improve the natural environment and benefit the local population, however it will likely cause some adverse social impacts due to potential house/structure demolition and land use, which will need to be mitigated. The project will, therefore, trigger the World Bank's Operational Policy (OP) 4.12 Involuntary Resettlement. In addition, project activities will include cleanup of land occupied by six closed enterprises. A socioeconomic survey and analysis was conducted in the Qingshuitang district and Tongtangwan area. Results show strong support for the project from all stakeholders. The analysis also recognized concerns of various stakeholders about resettlement as well as temporary impacts on enterprise/business operation.

55. **Socioeconomic Survey and Analysis**. To identify the impacts and to design a socially sustainable project, a socioeconomic survey and analysis was conducted and is documented in the Resettlement Plan (RP). A broad stakeholder consultation in the Qingshuitang district, where the project is located, revealed strong support for the project. Furthermore, a socioeconomic survey and meaningful consultation was conducted in the project area in Tongtangwan, including a random sampled study involving 232 persons as well as meetings with the affected enterprises. The research showed that all involved are aware of the pollution problem and strongly desire to get the pollution issues resolved. The survey also shows that 98 percent of the participants hope to relocate outside the area unless the pollution issue is addressed; 89 percent think that pollution decrease would have no adverse impacts but positive impacts on income generation; and 93 percent fully support the project. The analysis also recognized concerns of various stakeholders, especially in relation to resettlement as well as temporary impacts on enterprise/business operations. Forty-eight households among the directly affected by the resettlement activities also participated in the study and their concerns have been reflected in the RP/Resettlement Policy Framework (RPF) with adequate mitigation measures proposed.

56. **Involuntary Resettlement.** The project covers an area of 8.48 km^2, of which 2.73 km^2 will be remediated. The project remediation activities will likely entail relocation of households and enterprises, as well as land acquisition. The main resettlement impacts include relocation of 94 households, structure demolition of three enterprises, about 273 mu permanent land acquisition and 4,190 mu temporary land acquisition. The Resettlement Plan has been prepared, and foresees that the land compensation rates will follow the national land law while house/structure compensation will be based on replacement cost. The RP also elaborates on measures pertinent to institutional, participation and financing arrangements; the monitoring system; and grievance redress. The total resettlement cost is estimated to be about RMB212 million to be funded by counterpart financing. A letter of commitment for the resettlement financing was already provided by the district government. In addition to the RP, a Resettlement Policy Framework (RPF) has been prepared.

57. In addition, two activities in the project area were identified with linkage to the project, i.e., Tongxia Road II construction and formerly implemented soil pollution treatment. A due diligence review was conducted for the implemented resettlement under the two activities, as an Annex II of the RP. It found that all land was compensated upon written contracts with village committees in line with national land regulations. Also, all household relocations were conducted after full and timely compensation to the affected people and upon written agreements with each household based on commercial assets evaluation in line with the national regulations. The random interviews of the review found high satisfaction from the affected households. The replacement houses are under construction and will be completed and transferred to the households in early 2016. The replacement house construction and allocation among the affected people will be monitored during project implementation.

58. **Due Diligence Review on Worker Settlement in Closed Enterprises**. The project will aim to clean up land of six enterprises, which were already closed by the Government due to environmental non-compliance. The works will include the demolition of the structures in three enterprises, and will require leasing of the contaminated land during the period of project implementation from the communities that own the land to enable remediation. A due diligence review on worker settlement in the closed enterprises was conducted by the PMO and concluded that the enterprises closure and the worker settlement followed relevant national and provincial laws/regulations, and that the workers got proper compensation, training and social security program based on contracts or agreements and in line with relevant regulations.

59. **Gender**. The gender-differentiated socioeconomic analysis revealed that more men are directly impacted by pollution when compared to women, because more men are employed in the affected enterprises. Women are mostly impacted because of illness or even death of their husbands caused by pollution. Pollution affects the vulnerable, including women to a higher degree, because they have limited financial capacity to move out of the area; women are also known to work within neighborhood of the project area. While project activities will reduce impacts on both women and men caused by pollution, it will also affect both men and women due to resettlement and land acquisition. The RP proposes actions to ensure women's property investment and compensation rights are duly protected. While mostly men are working in the closed enterprises and women are less directly affected, they will nevertheless have the same opportunities as men to receive the training and alternative job opportunities. The external monitoring will be conducted to track women's inclusion in the resettlement implementation. An indicator on reduced impact of women from the pollution and provision of training opportunities will also be monitored as part of project Results Framework.

60. **Citizen Engagement and Participation** has been and will continue to be ensured during project preparation and implementation. As part of the socioeconomic analysis, the information on proposed project activities was disseminated and interviews conducted with a number of affected households and the six enterprise owners. The consultations with stakeholders and the affected citizens will continue as project preparation progresses. The knowledge and public information/environmental demonstration center for urban redevelopment and site remediation established under the project will serve as a point of information on the district's redevelopment plans, and will allow residents to continuously express their opinions, as well as serve as a center

for grievance redress, allowing the affected to submit the complaints. The RP further details a participation plan and a resettlement booklet for the project implementation stage. It also details procedures for addressing the complaints, tracking and reporting of the complaints.

61. **Institutional Capacity**. As the first Bank-financed project implemented by the PMO and PIU, the institutional capacity for Bank's safeguard policy implementation needs strengthening. There is an Environment and Resettlement Group established as part of the PIU with dedicated staff to be responsible for ensuring compliance with social safeguards policies. A qualified safeguards consultant has been hired to assist the PIU during preparation of social safeguards documents and train PIU staff. Additional training was provided by the Bank team during preparation missions.

62. The social safeguards, including RP and RPF and Worker Settlement of closed Enterprises review report documents were disclosed locally on June 4, 2015 and were disclosed in the Bank's InfoShop on August 13, 2015.

F. Environment (including Safeguards)

63. The project is assigned Category A for environmental purposes due to the complex contamination situation and land use patterns, human health and agricultural products contamination concerns, industrial pollution issues, and high demand for technical efforts throughout the remediation process. Three environmental safeguards policies are triggered, i.e., OP4.01 Environmental Assessment, OP4.04 Natural Habitats and OP4.11 Physical Cultural Resources.

64. The Environment Assessment (EA) was prepared by an accredited EA consultant in accordance with the national requirements and the World Bank's OP/BP 4.01. The EA Reports include: (a) Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP); (b) Environmental and Social Management Framework (ESMF); and (c) EA Executive Summary. Applicable World Bank Group Environmental, Health and Safety Guidelines have been incorporated into the EA. Environmental and social considerations are incorporated into the scope of work and terms of reference (TORs) of technical assistance activities. These documents have been reviewed by the Bank and are considered in compliance with the Bank safeguards requirements.

65. The project is an environmental cleanup project by nature, thus it will have significant environmental and social benefits by cleaning polluted soil and improving ambient environmental quality. Anticipated key environmental and social issues are associated with the following activities: (a) excavation and transport of contaminated soils and wastes; (b) dredging and dewatering of sediments; and (c) building and operation of treatment and disposal facilities.

66. These activities may result in negative environmental and social impacts, including: (a) impacts on air quality during excavation, transport, treatment and disposal of soils/wastes; (b) impacts on surface water quality during landfill preparation (i.e., discharging accumulated water in an existing quarry pit), sediment dewatering and from construction wastewater; (c) impacts on groundwater during construction and operation of treatment/disposal facilities; (d) impacts on ecology during land clearance for site preparation and dredging of contaminated ponds; (e)

impacts of solid waste such as the demolition of structures in closed plants; (f) social impacts such as land acquisition, disturbance to facilities, traffic, visual, and worker camp; and (g) health and safety concerns during construction and operation. These impacts have been adequately assessed and mitigation measures developed in the EMP, which can effectively avoid, minimize or mitigate potential negative environmental and social impacts. To summarize, the project includes adequate treatment and disposal facilities to manage contaminated soils, solid wastes and wastewater; mitigation measures have been developed for the construction, operation and decommissioning/closure of disposal facilities and the landfill; environmental mitigation measures were developed for the clean-up, demolition, excavation, recycling, transport and disposal activities to minimize impacts on ambient air, surface water, groundwater quality and local communities; post-construction site restoration were considered; environmental specifications, including health protection and safety measures were included in the EMP as well. In addition, close environmental monitoring and supervision will be carried out throughout project implementation to ensure remediation targets are met and impacts on air, surface water, groundwater, acoustic environment and communities are effectively mitigated.

67. Two rounds of public consultation were carried out during EA preparation; one at TOR stage and the other at draft EA stage. Questionnaire survey, interviews, and group meetings were employed. Public opinions have been incorporated into project design and EA. The draft full EA was disclosed locally through the website of Zhuzhou Municipal Government and hardcopies were provided to communities on April 27, 2015. Disclosure of the Environmental Impact Assessment, EMP and EA Executive Summary in the Bank's Infoshop took place on August 19, 2015. The project appraisal stage Integrated Safeguard Datasheet (ISDS) was approved and disclosed in the Bank's Infoshop on October 14, 2015.

G. World Bank Grievance Redress

68. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB noncompliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

Annex 1: Results Framework and Monitoring

Country: China

Project Name: Zhuzhou Brownfield Remediation Project (P147381)

Results Framework

Project Development Objectives

PDO Statement:

To reduce public exposure to contaminated land in the Project Area using risk-based remediation approaches.

The results are at	**Project Level**

Project Development Objective Indicators

Indicator Name	Baseline	Cumulative Target Values						
		YR1	YR2	YR3	YR4	YR5	YR6	End Target
Area of contaminated land managed or dump sites closed under the project (Hectare(Ha)) - (Core)	0	0	0	80	80	168	284	284
People in the Project Area with reduced potential risk of exposure to contaminated land (Number)	0	0	0	1,709	1709	3,975	6,237	6,237
Direct project beneficiaries (Number) - (Core)	0						262,000	262,000
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	0						50	50
Share of people living in the Zhuzhou's Quingshuitang core industrial area indicating that sufficient information is available regarding the area's remediation process and	0		65	70	70	80	80	80

grievance redress mechanism. (Percentage)								
Verified remediation works implemented per risk-based design (Hectare(Ha)]	0	0	0	80	80	168	273	273

Intermediate Results Indicators

Indicator Name	Baseline	Cumulative Target Values						
		YR1	YR2	YR3	YR4	YR5	YR6	End Target
Project sites in the Zhuzhou's Qingshuitang core industrial area remediated and meet contamination levels based on their intended future land use (Number)	0	0	0	2	4	5	6	6
People trained in contaminated site remediation (Number)	0		75	100	150	200		200
Environmental monitoring reports publicly disclosed (Yes/No)	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industrial or municipal solid waste reduced or recycled under the project (Tones) - (Core)	0					600,000	1,100,000	1,100,000
Project activities related to relocation of manufacturing sites and compensation of workers fully comply with national standards (Yes/No)	No activities initiated	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Updated spatial zoning plan for Qinghuitang Core Area tailored to remediation concepts and brownfield redevelopment requirements (Text)	Spatial zoning plan does not take into account site investigati				Spatial zoning plan updated taking in consider ation			Spatial zoning plan updated taking in consideration risk assessment and cost effectiveness

	on and risk assessment results				risk assessment and cost effectiveness			

Indicator Description

Project Development Objective Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Contaminated land managed or dump sites closed under the project (Hectare (Ha))	This indicator measures the cumulative size of industrial or municipal dump sites that are closed or contaminated land that is managed as a result of the project. The baseline for this indicator is zero.	Semi-annual	Environmental/construction supervision reports, Site remediation completion reports – the targets account for 6 remediation sites covering 273 ha plus 11 hectares of land improved by soil exchange program	PIU
People in the Zhuzhou's Qingshuitang core industrial area with reduced potential risk of exposure to contaminated land (Number)	This indicator measures site cleanup and remediation results in terms of how many people will be positively affected by reduction of source of contamination (reduced exposure to pollution). The baseline is zero.	Semi-annual	Environmental site investigation reports, Social impact assessments, Site remediation completion reports	PIU
Direct project beneficiaries	Direct beneficiaries are people or groups who directly derive benefits from an intervention. Please note that this indicator requires supplemental information. The number of project beneficiaries include people living in Shifeng District. Supplemental Value: Female beneficiaries (percentage). Based on the assessment and	Semi-annual	Project and activity reports – the target accounts for number of people currently living in Shifeng District	PIU

	definition of direct project beneficiaries, specify what proportion of the direct project beneficiaries are female. This indicator is calculated as a percentage.			
Share of people living in the Zhuzhou's Qingshuitang core industrial area indicating that sufficient information is available regarding the area's remediation process and grievance redress mechanism (Percentage)	This indicator will monitor citizen engagement in project activities. Newly established Knowledge center is expected to include such services as provision of information on area's redevelopment plan and process, as well as acceptance of complaints from the affected.	Annual reports	Sample-based perception surveys of visitors and residents	PIU
Verified remediation works implemented per risk-based design (Hectare(Ha)]	Risk-based approach in brownfield redevelopment planning introduced by including such criteria as baseline conditions, geological / hydrogeological factors, the source-pathway-receptor model, the proposed future land use, economic effectiveness of remediation, in planning process.	As needed	Updates of spatial zoning plan of Shifeng District, Site redevelopment plans, Site remediation completion reports	PMO, Zhuzhou City Municipality, Shifeng District authority

Intermediate Results Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Project sites in the Zhuzhou's Qingshuitang core industrial area remediated and meet contamination levels based on their intended future land use	Number of sites remediated under the project.	Semi-annual	Semi-annual project progress reports, Site remediation completion reports	PIU, PMO
People trained in contaminated site	Persons trained in contaminated site remediation, including management,	Semi-annual	Records and report from training provider(s)	PIU, PMO

remediation	remediation, restoration of contaminated (former) industrial sites, and strategic planning for contaminated / brownfield areas.			
Environmental monitoring reports publicly disclosed	This indicator will track progress towards population's increased access to information. The reports to be disclosed will include: dust, ground- and surface-water monitoring, monitoring plans for site after-care, Resettlement Action Plan Completion Audits	Semi-annual	Semi-annual project progress reports	PIU, PMO
Industrial or municipal solid waste reduced or recycled under the project	This indicator measures the municipal or industrial solid waste disposal capacity created as a result of the project. The baseline for this indicator is zero.	Semi-annual	Semi-annual project progress reports, Detailed landfill design/ Landfill completion report	PIU, PMO
Project activities related to relocation of manufacturing sites and compensation of workers fully comply with national standards	This indicator will show whether project activities related to relocation of manufacturing sites, and compensation of workers comply with national standards and procedures described in project's safeguards documents.	Semi-annual	Semi-annual project progress reports, Safeguards compliance reports	PIU, PMO
Updated spatial zoning plan for Qinghuitang Core Area tailored to remediation concepts and brownfield redevelopment		Annual	Project reports	PIU, PMO, Zhuzhou City Municipality

Annex 2: Detailed Project Description

CHINA
Zhuzhou Brownfield Remediation Project

1. The project design has been to a large extent informed by recent and ongoing analytical work, including economic sector work report '*Current Situation of Brownfield Remediation and Redevelopment in China*', which compiled the key lessons and proposed options to address some of the considerable challenges implementation of soil remediation projects/programs in China face, including (a) fragmentation of the legal framework for the site contamination; (b) confusion over the roles and responsibilities of the multiple stakeholders involved; (c) lack of existence and enforcement of national and local level technical standards and guidelines for pollution control and treatment; (d) lack of appropriate financial and economic instruments; (e) selection of suitable and cost effective soil remediation technologies; and (f) lack of public awareness. In some of the areas, there has been a notable progress over the past five years. The first national soil pollution survey has been carried out and results released revealing pollution extent for different types of land use; several regulations have been issued, most notably amendments to the Environmental Protection Law (January 1, 2015). The law requires detailed investigations and assessments of environmental and health impacts for new developments. The Soil Pollution Prevention and Control Law is likely to be approved by the Council in the short term. Public awareness of the environmental situation has also increased, which naturally puts a pressure on enforcement agencies. The environmental authorities are publicizing a handful of high profile remediation cases, which have accumulated extensive remediation experience in technology selection and in remediation project implementation, but are not necessarily sustainable pilots for replication of financing mechanisms. This project will be the first large scale brownfield project financed by the Bank in China with a risk-based concept, monitoring and oversight elements and integration with spatial planning.

2. The Qingshuitang Industrial Zone (QIZ), an old industrial base in in the Shifeng District of Zhuzhou City, Hunan Province, was established in the 1950s. The major industries included lead and zinc smelting, and heavy chemical production. Long-term release of wastewater, air emissions and waste residue discharges from the industrial facilities, combined with the use of contaminated surface water for agricultural irrigation and application of ash trash as fertilizers, has resulted in significant environmental pollution that has threatened the human health of surrounding residents and drinking water source of Xiangjiang River. The remediation of heavy metal contaminated area in QIZ has become an urgent issue to improve the living environment and potential health impacts of local residents, and to eliminate the potential contaminants entering Xiangjiang River.

3. In 2011, driven by the national-level heavy metal pollution control plan, Hunan province issued *an Implementation Plan for Heavy Metal Contamination Prevention and Treatment for Xiangjiang River Basin*, which listed QIZ as a priority for site remediation. The project area is located in the southern part of QIZ, with an area of approximately 8.48 km^2. The project area is divided into seven sub-areas, including Xiangshiling, Qingshi, Tongtangwan, Tongxia, Qingshui, Yinfeng, and Qingshuihu.

4. Since 2011, environmental site investigation and risk assessment have been carried out for each of the seven sub-areas. According to the risk assessment, the project area is divided into risk acceptable, risk controllable and risk unacceptable area. A Feasibility Study Report (FSR) was carried out as part of project preparation to provide the analysis of the current and planned land use and site investigation data, and to delineate the nature and extent of contamination in soil, groundwater, surface water and sediment. The risk-based remedial goals for both sensitive (i.e., residential) and non-sensitive (i.e., non-residential) land uses were developed by conducting risk assessment to prevent excessive remediation on the basis of risk control.[4] As a result of the FSR, 2.73km² contaminated plots and 0.11 km^2 dispersed open soils have been determined as exceeding contamination levels and thus requiring remediation. The contaminants that may potentially pose adverse risk within the project area include cadmium, lead and arsenic. Some other contaminants (such as nickel and PAHs) also exceed the permitted contamination levels, however their extent is limited to very localized and small areas.

5. The project area includes six industrial facilities that have been closed, including Zhuzhou Yongfa Metal Refining Co., Ltd. (Yongfa Refinery), Zhuzhou Brothers Industry Co., Ltd. (Brothers Industry), Zhuzhou Kangli Smelting Plant (Kangli Smelter), Zhuzhou Tiancheng Chemical Co., Ltd. (Tiancheng Chemicals), Zhuzhou Xinda Smelting Co., Ltd. (Xinda Smelter), and Zhuzhou Hehua Cement Plant (Hehua Cement).

The table below summarizes the remediation technologies used for the proposed contaminated plots:

Table 1 Estimation of Remediation Construction

Remediation Technology	**Remediation Area/m^2**	**Remediation Quantity/m^3**
In-situ stabilization + capping	738,968	443,381
In-situ stabilization + phytoremediation	128,054	76,832
Ex-situ Solidification/Stabilization (S/S)	474,202	284,521
Reused at planned non-sensitive areas	622,937	373,762
Phytoremediation	229,266	137,560
Bio-interception barriers[1]	98,030	58,818
Contaminated sediments dredging and treatment	172,986	172,986
Excavation and backfill for 6 closed industrial facilities	191,579	90,861
Removal of waste piles	16,815	84,652

4 Following internationally acknowledged practices and the MEP Risk Assessment Guidance, which was officially published in 2014

Clean soil exchange for residential areas	110,855	55,428

[1] Bio-interception barriers will be applied to the woody and mountain areas where development will not occur but contamination is evident. The barriers will intercept the migration of contamination from such areas.

6. The Project will support the following activities with a total cost of US$244.7 million, of which IBRD loan US$150 million.

Component 1 – Remediation of contaminated plots (total cost US$137.43 million, of which IBRD loan US$103.96 million).

7. The component will support cleanup and remediation of 2.73km^2 contaminated plots, and 0.11km^2 of dispersed open soil plots in residential area. The following activities will be undertaken:

(a) Site preparation. This will include demolition and removal of household structures in remediation area and six closed plants, and land clearance in 2.30km^2 remediation area (excluding the six closed plants, ponds and channels, and two waste pile sites). Around 45,843 m^3 of demolition/construction wastes and a considerable amount of vegetation residuals (including attached top soils) will be generated, which will be either reused or transported to a temporary construction waste storage site before being finally disposed of in the project landfill. For the six closed plants, washing demolition wastes and those buildings that do not need to be demolished (such as office buildings) will generate 6,742 m^3 of wastewater that require treatment.

(b) Transport routes. Twenty-one roads totaling 26 km are planned for the transport of contaminated soils, wastes or materials, among which four are major roads, 14 existing small roads that will be improved and three new small roads that will be built.

(c) Soil and sediment treatment in closed plants. This includes six closed plants that in total have a remediation area of 0.19 km^2. Around 90,861m^3 of contaminated soils in these closed industrial sites will be remediated through excavation and transported to treatment facilities. Around 74,313m^3 of heavy metal contaminated soils will be sent to the Xinqiao Solidification/Stabilization (S/S) treatment facility before being finally disposed of in the landfill built under the project; the remaining 16,458 m^3 contain organic contaminants and will be sent to Zhuzhou Zhongcai Cement Plant for treatment. After excavation, these industry sites will be backfilled, restored and revegetated.

(d) Remediation of contaminated soil plots. Apart from the closed plants, ponds/ channels and waste piles sites, about 2.3 km² of contaminated plots generating an estimated around 1.38 million m^3 of contaminated soils will need to be remediated using in-situ or ex-situ technologies. About 0.29 million m^3 will be excavated, transported to and treated at the Xinqiao S/S facility before being finally disposed of in the project landfill; about 0.37 million m^3 will be moved to planned non-sensitive area or the project landfill; the remaining 0.69 million m^3 will be remediated in-situ through physiochemical or ecological measures. These sites will be backfilled with clean soils, restored and revegetated.

(e) Cleanup of industrial waste piles. Two waste piles that amount to 84,700 m^3 (including contaminated soils beneath) in Tongxia sub-area and Hongxin Plant will be transported to the Xinqiao S/S site for treatment and finally disposed of in the project landfill.

(f) Remediation of contaminated ponds and channels. Twenty-six ponds that have a total area of 0.17 km^2 will be remediated following pumping water, dredging and dewatering of contaminated sediments, and restoration. In total, around 0.26 million m^3 of water will be pumped and treated by mobile treatment facilities before being discharged into drainage channels; around 0.173 million m^3 of sediments will be dredged and dewatered in Xinqiao or Xiawangang dewatering sites nearby, and moved to Xinqiao S/S site for treatment before being finally disposed of in the project landfill. Sediment dewatering will generate 79,800 m^3 of wastewater that will be treated by mobile treatment facilities and be discharged into drainage channels. After dredging, those ponds will be refilled with sand, cobbles (around 0.26 million m^3) to original elevation, and restored through structure stabilization and greening.

(g) Soil exchange program. Around 55,428 m^3 of contaminated soil in 0.11 km^2 dispersed plots outside the 2.73 km^2 remediation area will undertake clean soil replacement as the existing top soils pose a certain level of health risks. These contaminated areas include parks, playgrounds and other open spaces in residential areas. Around 26,759 m^3 of soils that meet non-sensitive land use soil quality will be moved to planned non-sensitive area; the remaining 28,669 m^3 will be moved to Xinqiao S/S site for treatment before being finally disposed of in the project landfill. After the replacement, these plots will be restored to their original conditions and covered with vegetation to prevent soil erosion.

Component 2 – Associated treatment and disposal works (total cost US$46.80 million, of which IBRD loan US$39.67 million).

8. This component will support associated works that are required to enable and support the remediation works under Component 1.

(a) Xinqiao dewatering site. This dewatering site has an area of 4,200 m^2, including dewatering area of 4,000 m^2 and storage area of 200 m^2. This site will provide for the treatment of sediments from the ponds nearby. Upon service completion, the site will be restored.

An existing Xiawangang dewatering site will be used for the treatment of sediment from Old Xiawangang Channel and adjacent ponds. The site has an area of 5,500 m^2, including dewatering area of 4,000 m^2 and storage area of 1,500 m^2. The site was built for the treatment of Xiawangang Channel in 2012 and is now idle.

(b) Xinqiao Solidificaiton/Stabilization (S/S) facility. The facility is located between the above-mentioned two dewatering sites in the middle area of the project area. The site was built for the solid waste treatment under previous projects, and was completed in December 2014. The project will upgrade the site to a S/S treatment facility. It is

estimated that around 584,693 m^3 of sediments, contaminated soil and industrial waste will be treated in the S/S facility. As the project supported landfill will be built by June 2018, a temporary storage in an area of 10,000 m^2 will be established to store around 0.15 million m^3 of waste and residue.

The Xinqiao S/S facility and temporary construction waste storage site will be located next to an existing major Tongxia Road in the project area. The site has an area of 108mu (7ha). In the same area, the project supported environmental information and demonstration center will be built.

(c) Wastewater treatment facilities. Four sets of mobile wastewater treatment facilities and on-site tanks for the wastewater generated from washing of demolition waste and pond sediment dewatering, amounting to around 87,000 m^3 will be established. In addition, surface water from the ponds, amounting to 260,000 m^3, will be monitored and discharged into nearby drainages. Upon service completion, the wastewater treatment tanks will be removed and site restored.

(d) Industrial solid waste landfill. A landfill with a capacity of 2 million m^3 will be built on an abandoned quarry pit of Zhuzhou Hehua Cement Plant in the project area. The volume of the estimated construction waste, together with the soil, sediment and waste residue after stabilization to be disposed in the landfill is about 0.689 million m^3. Currently, the pit contains around 2 million m^3 of water. Treatment facility and drainage will be built first to treat and drain the water. Upon landfilling of the waste generated by project activities, the landfill will be temporarily closed as per standard technical practice and will reopen to continue to provide services up to 2026.

Component 3 – Capacity building and knowledge management (total cost US$8.23 million, of which IBRD loan US$4.54 million).

9. The project will support Zhuzhou City and Shifeng District's capacity to demonstrate the technical and management knowledge gained from the project implementation, to engage the public, to manage remediation and redevelopment strategic planning. Specific activities will include:

(a) Environmental information and demonstration center. To maximize the demonstration impact of the project, an environmental information and demonstration center will be established, which will not only serve as an environmental education platform for the public to review the pollution history, display remediation achievements and anticipate the future development of environmental protection; but also as a monitoring data center to provide support for environmental management and green development. The center will also provide information on the area's redevelopment plans and serve as a point for the affected to file their complaints. The center will host nation-wide knowledge dissemination events, and will be tasked to disclose the environmental monitoring reports, including pollution maps that reflect the situation before and after project interventions. The center will consist of: (i) management building; (ii) environmental protection exhibition center; and (iii) experiment/demonstration base.

(b) Study on Qingshuitang brownfield remediation and strategic planning. The key project concept includes remediation that adopts a risk-based approach that integrates land contamination status and planned land use. In 2013, the Zhuzhou Municipality approved a regulatory urban development plan for the core zone which foresees an industrial restructuring and transformation of the land into commercial, residential and new industrial areas. In response to this dynamic process, this study intends to look into the following aspects: (i) recommendations for filling the potential gaps between the remediation results and future land use/urban development strategic planning, through defining remediation targets or refining the strategic planning; (ii) strategic environmental and social impact assessment for the remediation and redevelopment of Qingshuitang core zone that will address among other issues conversion of land use and its impacts on land value and beneficiaries; (iii) application of green remediation in the future remediation practices in Qingshuitang. The green remediation is defined by USEPA as the practice to consider all environmental effects of remediation implementation and incorporating options to maximize the net environmental benefits of cleanup actions; (iv) policy recommendations for addressing policy, regulation, financing and market issues in the remediation and redevelopment.

(c) Study on the compliance framework for Qingshuitang environmental quality and industrial pollution control. Outside the project remediation area but in the Qingshuitang core zone, there will be industrial facilities in operation in the coming years, such as the Zhuzhou Smelter Plant. Compliance monitoring of the industrial emissions and environmental quality is needed to mitigate the risks of recontamination. The study will include: (i) regional groundwater monitoring and modelling; and (ii) monitoring of industrial emissions, secondary pollution analysis and data analysis for environmental management.

Component 4 – Project Management, Monitoring and Evaluation (total cost US$20.98 million, of which IBRD loan US$1.45 million)

10. The project will support the PMO and PIU to enhance management capacity through training, study tours and contracting of consulting services. The specific activities will include:

(a) Project management capacity building. This sub-component will support: (i) training on procurement, financial management, safeguards, reporting, monitoring, etc.; (ii) domestic and international study tours; (iii) skills training for landless farmers, laid-off workers, and resettled households; and (iv) development of a project management information system for project implementation.

(b) Project management. This sub-component will include hiring of the project procurement agent, design institute, project management consultant, engineering supervision and environmental supervision.

(c) External environmental monitoring and social monitoring. These two activities will assist the PIU in monitoring the implementation of the project Resettlement Plan and Environmental Management Plan.

Annex 3: Implementation Arrangements

CHINA
Zhuzhou Brownfield Remediation Project

1. The project management system consists of the Project Leading Group (PLG), Project Management Office (PMO), and Project Implementation Unit (PIU).

2. The Zhuzhou Municipal Government (ZMG) has established a Project Leading Group chaired by the executive vice mayor of ZMG who is in charge of social development and finance. The PLG consists of municipal government agencies, such as the Zhuzhou Municipal Development and Research Commission (ZDRC), Zhuzhou Municipal Finance Bureau (ZFB), and Zhuzhou Municipal Land Resources Bureau. The key responsibilities of PLG include:

(a) Coordination of involvement of government departments;
(b) Supervision and monitoring of the quality and progress of project implementation;
(c) Solving the issues occurring during implementation of the project.

3. The Project Management Office has been set up by PLG, responsible for executing the decisions made by PLG and coordinating with the Bank. The PMO is led by the director of ZDRC, and a coordinator has been designated to coordinate its day-to-day work. The PMO has four working groups, including Comprehensive Planning Group, Procurement Group, Financial Management Group, and Environment and Resettlement Group.

4. In addition to its management function, PMO will also implement the studies under Component 3. These studies will provide policy recommendation to ZMG. The PMO will involve more government agents into the studies. These agencies are beneficiaries of the studies.

5. The Project Implementation Unit is housed in the Zhuzhou Recycling Economic Investment & Development Group Co., Ltd. (ZREIDC) and is responsible for project implementation activities, such as works supervision, procurement, contract management, and accounting and reporting. The PIU has set up six groups and each group has been assigned a coordinator to deal with requirements related to project implementation. The groups include:

(a) Project management;
(b) Technical;
(c) Procurement;
(d) Contract management;
(e) Planning and accounting;
(f) Environment and resettlement.

Financial Management, Disbursement and Procurement

Financial Management

6. The FM capacity assessment conducted at the PMO and PIU identified the lack of knowledge and experience in managing Bank-financed projects by the project FM staff as the principal risk. This could lead to misuse or inefficient use of project funds. Mitigation measures to address this risk are as follows: (a) preparation and distribution of an FM manual (FMM) to standardize project FM coordination and reporting procedures; and (b) provision of FM technical training and knowledge sharing workshops to be arranged by the Bank and HPFB. In addition, the risk of delayed delivery of counterpart funds by the Government will be mitigated by close Bank team monitoring during project implementation. The overall residual FM risk after mitigation measures is assessed as Moderate.

7. Funding sources for the project include the Bank loan and counterpart funds. A loan agreement will be signed between the World Bank and the People's Republic of China, represented by its Ministry of Finance (MOF). The on-lending agreement will be entered into by MOF and the Hunan Provincial Government. The Hunan Provincial Government will further on-lend loan proceeds to the Zhuzhou Municipal Government (ZMG). ZMG will on-lend the Bank loan to Shifeng District who will make the funds available to ZREIDC as a grant to implement the remediation activities. Counterpart funds are expected to largely come from central and provincial government grant funding and, where needed, from government fiscal revenue of the District and Municipal Governments.

8. **Audit Arrangements.** Hunan Provincial Audit Office (HPAO) has been identified as the auditor for the project. The annual audit report on the project financial statements will be issued by this Audit Office and will be due to the Bank six months after the end of each fiscal year of Hunan Province (by June 30 each year). HPAO has extensive experience with previous Bank projects and is deemed acceptable to the Bank. The audit report and audited financial statements will be publicly available onboth the World Bank and HPAO's websites.

9. **Budgeting.** The PIU is responsible for preparing the project annual plan and the PMO will be responsible for ensuring the required counterpart funds are committed in the municipal government's annual budget. The funds will be released to the PIU based on the approved annual plan and construction progress. Project annual plan variance analysis will be conducted regularly, thus enabling timely corrective actions to be taken.

10. **Funds flow.** HPFB will open and manage a segregated U.S. dollar designated account (DA) for the Bank loan proceeds in a commercial bank acceptable to the Bank. The PIU will prepare withdrawal applications that will be reviewed by the Shifeng District Finance Bureau and PMO before submission to the Municipal Finance Bureau for its review. HPFB will provide final approval and deliver funds to the Municipal Finance Bureau and then to the District Finance Bureau. The District Finance Bureau will transfer the reimbursed funds to the PIU for payment to contractors. Detailed disbursement application and funds flow arrangement are described in the project FMM.

11. The proposed funds flow arrangement and related processing period should ensure contractors receive payment within required dates stipulated in the signed contracts. The Bank will closely monitor disbursement efficiency during implementation. If material payment delays resulting from slow disbursement are noted, the Bank will guide the project to explore a more streamlined funds flow arrangement.

12. **Accounting and Financial Reporting.** The administration, accounting and reporting of the project will be set up in accordance with Circular #13: "Accounting Regulations for World Bank-financed Projects" issued in January 2000 by MOF.

13. The PIU will add an accrual based project accounting module to complement its institutional accounting management system ("User Friend") to manage, monitor and maintain project accounting records and prepare financial reports for project activities, for which it is responsible. This system has been widely used in other Bank-financed projects and is considered adequate. The PIU will prepare project financial statements. Based on the financial statements, the PMO will get DA information from HPFB to prepare consolidated project financial statements. The PMO will also prepare unaudited semi-annual project financial reports and furnish these to the Bank as part of the semi-annual Progress Report no later than 60 days following each semester.

14. **Internal Controls.** The related accounting policy, procedures and regulations have been issued by MOF and will be followed by related implementing agencies. Detailed internal controls procedures (most of them are the internal controls of PIU), including segregation of duties, review, approval, and reporting procedures as well as the safeguarding of assets have been established and documented in the project financial management manual.

Disbursements

15. Four disbursement methods: advance, reimbursement, direct payment and special commitment are available for the project. The primary Bank disbursement method will be advances to the DA. Withdrawal Applications (WAs) will be prepared to request Bank disbursements and to document the use of Bank financing. WAs will include supporting documents in the form of Statement of Expenditures (SOEs) and Summary Sheets (SS) (both of them are prepared on a cash basis) and source documents identified in the Disbursement Letter issued by the Bank. The Bank loan would disburse against eligible expenditures (taxes inclusive) as in the table below.

Eligible Expenditures

Disbursement Categories	**IBRD Loan**	
	Allocated Amount (in million US$)	**Percentage of Expenditures to be financed (inclusive of taxes)**
Goods, works, non-consulting services, consultant services, Training and Workshops under the Project	**149.625**	**100%**
Front-end Fee	**0.375**	**100%**

Total	**150.000**	

16. The Bank loan proceeds and counterpart funds will co-finance each component but for different activities and contracts. The main direct investments for infrastructure, goods and capacity building will be 100% financed by the Bank loan. All the Bank financed contracts and other contracts will be included in the procurement and activity plans submitted by PMO and approved by the Bank. The general costs for design, engineering supervision, as well as land acquisition and resettlement etc. will be financed 100% by counterpart funds.

17. *Retroactive financing*. Retroactive financing not to exceed US$30,000,000 equivalent has been agreed to finance payments made prior to the Loan Agreement signing date but on or after October 16, 2015 for Eligible Expenditures.

Procurement

18. **Mitigation Measures for Procurement Risks**. The procurement capacity assessment concluded that the procurement risk is Moderate. The PMO and PIU housed in ZREIDC lack Bank project and procurement experience. However they do have adequate capacity and experience in procurement under similar projects using domestic procedures. Key risks include: (a) possible misunderstanding between the PMO/ ZREIDC and the Bank and delays in processing procurement and non-compliance due to lack of familiarity with the Bank's procurement policies and procedures; (b) weak contract management; and (c) poor records management. Measures to enhance the procurement capacity of the PMO and ZREIDC and to strengthen procurement and contract management under the project and to mitigate potential procurement risks have been agreed upon as follows:

(a) A procurement agent with procurement experience in projects financed by the Bank or other multilateral financing institutions will be hired by ZREIDC to assist in procurement of goods, works and non-consulting services under international and national competitive bidding (ICB and NCB).
(b) A consulting firm with project management experience in projects financed by the Bank or other multilateral financing institutions will be hired by ZREIDC to provide project management and technical support, such as reviewing bidding documents, including designs, technical specifications and bill of quantities (BOQ), etc.; supervising contract implementation, including progress, quality, variations and other contract issues, and providing guidance and consulting services on financial management and procurement related issues.
(c) The PMO and ZREIDC will send their procurement staff and other key staff to attend workshops on procurement and contract management under Bank-financed projects, including procurement of goods, works and non-consulting services, as well as selection and employment of consultants.
(d) The Bank procurement specialist will continue to provide training on procurement as needed throughout project implementation.
(e) A procurement management manual has been prepared to provide guidance to both the PMO and ZREIDC on procurement under the project.

19. Procurement for the project will be carried out in accordance with the World Bank's "Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated January 2011 (revised July 2014); "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated January 2011 (revised July 2014); and the provisions stipulated in the Legal Agreements.

20. **Procurement Plan**. The Procurement Plan has been prepared by the PMO and the PIU, and finalized and approved by the Bank on January 13, 2016. It will be available in the PMO and ZREIDC, and will also be available in the project's database and in the Bank's external website during project implementation. The Procurement Plan will be updated, reviewed and agreed with the Bank annually, or as required, to reflect project implementation needs.

21. **Procurement and Selection Methods and Prior Review Thresholds**. The table below indicates the procurement and selection methods and prior review thresholds for goods, non-consulting services, works, and consulting services to be procured by ZREIDC under the project.

Thresholds for Procurement Methods and Bank Prior Review

Expenditure Category	**Contract Value (US$)**	**Procurement Method**	**Bank Prior Review**
Goods/IT Systems and Non-Consulting Services	≥ 10 million	ICB	All ICB contracts
	>=500,000 - < < 10 million	NCB Remarks: Where goods are not normally available from within China, the method of procurement will be ICB even if the contract value is less than US$10 million.	First NCB goods contract irrespective of value and all contracts >= USD 3 million
	< 500,000	Shopping	None
	N/A	DC	All DC contracts
Works/ Supply & Installation	≥ 40 million	ICB	All ICB contracts
	>=500,000 - < 40 million	NCB	First NCB works contracts irrespective of value and all contracts ≥ US$15 million.
	< 500,000	Shopping	None
	N/A	DC	All DC contracts
Consultants	≥ 300,000	QCBS, QBS	Firms: First contract for each selection

Expenditure Category	Contract Value (US$)	Procurement Method	Bank Prior Review
	< 300,000	QCBS, QBS, CQS	method and all contracts ≥ US$1 million; Firms: All SSS contracts >= USD 100,000; Individual Consultant: Only in Exceptional Cases; SSS for individual consultant: ≥ US$50,000
	N/A	SSS	
	N/A	IC	

Notes: ICB: International Competitive Bidding
NCB: National Competitive Bidding
DC: Direct Contracting
QCBS: Quality- and Cost-Based Selection
QBS: Quality-Based Selection
CQS: Selection Based on the Consultants' Qualifications
SSS: Single Source Selection
IC: Individual Consultant selection procedure
NA: Not Applicable

22. **Advance Contracting and Retroactive Financing.** The procurement plan sets forth those contracts, which are expected to be signed in advance of loan signing, together with the relevant Bank review procedures. Only payments made under such contracts procured in accordance with the applicable Bank procurement/consultant selection procedures will be eligible for reimbursement by the Bank.

Environmental and Social (including safeguards)

Environmental:

23. Three environmental safeguards policies are applicable to the project, i.e., OP4.01 Environmental Assessment, OP4.04 Natural Habitats, and OP4.11 Physical Cultural Resources. The project is assigned Category A per OP4.01 Environmental Assessment for environmental purpose due to complex contamination situation and land use patterns, human health and agriculture products contamination concerns, industrial pollution issues, and high demand for technical efforts throughout remediation process.

24. The Environment Assessment Reports have been prepared by an accredited EA consultant in accordance with the national requirements and the World Bank's OP/BP 4.01. The EA Reports include: (a) EIA and EMP; (b) ESMF; and (c) EA Executive Summary. Applicable World Bank Group Environmental, Health and Safety Guidelines have been incorporated into the EA. Environmental and social considerations are incorporated into the scope of work and TORs of technical assistance activities. These documents have been reviewed by the Bank and are considered compliant with the Bank safeguards requirements.

25. **Environmental Assessment**. Per OP4.01, the EA scope was determined to cover an area of 8.48km^2. It is a portion of 15.15 km^2 Qingshuitang core area, which holds 90% of industries of those in the 47km^2 Qingshuitang industrial zone (QIZ). While the core area is the focus of EA study, the EA study covers the entire Qingshuitang industrial area to present a full picture of historical and current industrial pollution emissions, and land and groundwater contamination. Due diligence review of industrial emissions is included in the EA. In addition, Xiangjiang River

that is located in the south of the project area is included in the EA study. During project preparation, a detailed land use survey and environmental site investigations were carried out, based on which risk assessment was conducted, a remediation plan developed, an environmental impact assessment prepared, and an impact mitigation plan defined.

26. **Environmental and Social Baselines.** The project is located in Qingshuitang Industrial Zone (QIZ), Shifeng District, Zhuzhou Municipality. Zhuzhou is located in the eastern part of Hunan Province and mid-low reach of Xiangjiang River. QIZ is a famous metallurgical and chemical industrial base in China, which started to house industries in the early 1950's. The project region belongs to subtropical monsoon humid area, with four distinctive seasons. The average temperature is 17.4^{o}C (min. -11.5^{o}C and max. 40.2^{o}C), and the average precipitation is 1442.7 mm, which mainly occurs during April-August. The dominant wind direction is NW, with annual average speed of 2.0 m/s. Zhuzhou is surrounded by mountains and rolling hills with a low river basin in the middle.

27. Xiangjiang River, a major tributary of Yangtze River, flows through Zhuzhou. The river has an annual average flow of 1,780 m^3/s. The project area is on the immediate north of the river and there are five small branches feeding to the Xiangjiang River through the project area.

28. Two geological structures dominate the project area. One is exposed bedrock with very scarce fissure and pore water; the other is alluvial material layer that lies in the south-middle of the project area, of which the upper section is dense silty-sandy clay with poor water permeability; the under layer is loose sands with rich groundwater. In the project area there is also thick fill soil on top of bed rock; both with deficient groundwater. Overall, the groundwater is deficient with poor migration in the project area. The groundwater flows NE-SW toward the Xiangjiang River. It is primarily replenished by precipitation and presents an annual variation of 0.5-1 m.

29. The project area is a portion of the QIZ and has a total area of 8.48 km^2. According to social survey, there are 10 communities and villages in or partially in the project area. There is a population of 6,237 in the project area. The farmland, mostly in the western part of the project area, is not suitable for farming due to soil contamination. In 2009 the central government issued a policy to turn the farmland into construction land and incorporate farmers in the project area into employment and social security system for urban residents.

30. **Land use**. According to the land use survey conducted during project preparation, the project area has a mix of land uses that can be categorized into 5 types, i.e., industrial/infrastructure, residential, farmland/idled land, waters and woodland. As mentioned above, the farmland was turned into construction land per central government's requirement. Accordingly, the farmers were turned into urban residents and incorporated into the corresponding employment and social security system. There is intensive road network, including a major road Tongxia Road traversing the project area.

31. **Environmental site investigation and risk assessment**. A detailed environmental site investigation was carried out and is summarized in the EA. During 2011-2014, environmental site investigation and risk assessment were carried out to cover soils, channels and ponds, waste

piles, closed industrial facilities, open soil plots in residential areas, and groundwater. Based on analysis results and risk assessment, the primary contaminants of concern are heavy metals including lead, cadmium and arsenic (Pb, Cd, As) in soils, sediments and wastes. In one closed industrial facility organic contaminants, such as aniline and benzo-pyrene were tested in soils. Groundwater contamination did not show a universal pattern across the area; latest monitoring conducted in November 2014 indicated exceedance of nitrate, nitrite and Beryllium, while historical monitoring show localized exceedance of other heavy metals against applicable groundwater standard. Sampling of agricultural products of the area showed exceedance of Cd, Pb and zinc (Zn) against applicable food products quality standards.

32. A risk assessment was conducted following national technical guidelines and internationally recognized tools and data sources developed by USEPA and ASTM. Based on the site investigation results and planned land uses, with the main objective of protecting human health, the project area risk levels were calculated and compared against thresholds, e.g., for carcinogenic risk, the acceptable level for a single pollutant is 10^{-6}. As a result, the project area is categorized into three parts, i.e., 2.02 km^2 risk acceptable area, 3.73 km^2 risk controllable area, and 2.73 km^2 remediation area that presents unacceptable risk levels and requires remediation actions. For groundwater, the results of risk assessment indicates that the potential groundwater contamination does not pose unacceptable risk levels to human health. Zhuzhou Municipal Environmental Protection Bureau has approved the risk assessment for the project area.

33. **Remediation plan**. Based on risk assessment results, a set of cleanup and remediation actions were designed, including in-situ phytoremediation, bio-interception, in-situ stabilization plus capping or revegetation, excavation, reuse soils in the project area. Dewatering and solidification/ stabilization treatment facilities will be used to treat sediments, contaminated soils and industrial solid wastes. A landfill will be built on an abandoned quarry in the project area and used to receive treated residues and structure demolition wastes. The remediation technologies and treatment/disposal works were selected through careful alternative analysis, tailored to site-specific contamination risk levels and land use plan. To support the remediation efforts, land clearing, limited access roads, and wastewater treatment facilities will be needed.

34. **Alternative analysis.** The project EA included a section addressing alternative analysis. The alternative analysis focused on selection of remediation interventions and technologies based on comprehensive economic, technical, environmental and social considerations. The main analysis of alternatives is summarized as follows:

(a) With/Without Project. The implementation of the project will bring significant positive environmental and social benefits by cleaning up the area, removing the contamination risk public health, and facilitating sustainable development of QIZ. The adverse environmental impacts during remediation process is manageable, and can be adequately avoided, minimized and mitigated through efficient implementation the EMP.

(b) Remediation of heavy metal contaminated soils. Several technologies were studied, including S/S, excavation and ex-situ landfill, phytoremediation and soil washing with consideration of technical feasibility, period of remediation, land use plan and economics. Finally, a combination of in-situ stabilization + capping, in-situ stabilization + vegetation

remediation, ex-situ S/S, removal to industrial land and phytoremediation interception barriers was selected.

(c) Remediation of organic contamination soil: three technologies were studied, including biodegradation, excavation and ex-situ landfill, and incineration. The incineration technology is selected due to consideration of proper scale, remediation time and cost. The Zhuzhou Cement Plant, about 18km from the project, has the appropriate process and emission treatment facilities that meet the national standards of *Technical Specifications for Co-incineration of Solid Waste by Cement Kiln (HJ662-2013)*, therefore, is selected for incineration treatment.

(d) Solid Waste Landfill. Two options were considered for the landfill: Option 1 to use an abandoned quarry pit in the area; and Option 2 is to construct a new above-ground tray-type landfill in the planned green space of the project area. Reuse of the quarry pit will avoid occupation of new land, fully utilize the non-usable industrial legacy site to accommodate the project waste as well as long-term disposal of solid waste for the city. New construction of above-ground landfill, though is easier for construction, will take large green space, require construction enclosure dams and will have more chance of public exposure. With comprehensive comparison, Option 1 is selected.

(e) Treatment of water in the quarry pit. The quarry pit water contains NH_3-N higher than applicable standards and requires prior treatment before discharge. Two treatment options were considered: Option 1 is to send the water to the existing Qingshuitang Industrial Treatment and Recycling Plant; Option 2 is chemical treatment by adding chemicals to remove NH_3-N (breakpoint chlorination method). Option 1 is limited by the capacity of existing plant and requires construction of a connection pipeline; while Option 2 only requires construction of one treatment tank near the pit (which will later be used as leachate collection tank for the landfill). Therefore, Option 2 is selected.

35. **Impact assessment and mitigation.** The project is an environmental cleanup project by nature, thus it will have significant environmental and social benefits by remediating site contamination and improve ambient environmental quality. Anticipated key environmental and social issues are associated with the following activities: 1) excavation and transport of contaminated soils and wastes, 2) dredging and dewatering of sediments and, 3) building and operation of treatment and disposal facilities.

36. These activities may result in negative environmental and social impacts, including: 1) impacts on air quality during excavation, transport, treatment and disposal of soils/wastes; 2) impacts on surface water quality during landfill preparation (i.e., discharging accumulated water in an existing quarry pit), sediment dewatering and from construction wastewater; 3) impacts on groundwater during construction and operation of treatment/disposal facilities; 4) impacts on ecology during land clearance for site preparation and dredging of contaminated ponds; 5) impacts of solid waste such as the demolition of structures in closed plants; 6) social impacts such as land acquisition, disturbance to facilities, traffic, visual and worker camp; and 7) health and safety concerns during construction and operation. These impacts have been adequately assessed and mitigation measures developed in the EMP, which can effectively avoid, minimize

or mitigate potential negative environmental and social impacts. To summarize, the project includes adequate treatment and disposal facilities to manage contaminated soils, solid wastes and wastewater; mitigation measures have been developed for the construction, operation and decommissioning/closure of disposal facilities and the landfill; environmental mitigation measures were developed for the clean-up, demolition, excavation, recycling, transport and disposal activities to minimize impacts on ambient air, surface water, groundwater quality and local communities; post-construction site restoration were considered; environmental specifications, including health protection and safety measures were included in the EMP as well. In addition, close environmental monitoring and supervision will be carried out throughout project implementation to ensure remediation targets are met and impacts on air, surface water, groundwater, acoustic environment and communities effectively mitigated.

37. **Associated works**. The project physical activities will mostly take place within the project area. Three main associated works were considered and included in the EA, 1) the project will need to backfill clean soils to excavated area. The project owner agreed with the municipal government that this need will be met by obtaining clean soils from other development activities in the city. The soil borrowing, transportation and backfilling are covered in the EMP and ESMF. 2) About 8,274 m^3 soils that contains organic contaminants in Tiancheng Chemical Plant will be moved to Zhuzhou Zhongcai Cement Plant for treatment. Due diligence of the cement plant was carried out. The plant is listed in National Key Emission Source List and has been under close inspection of local environmental authority. No non-compliance has been found. The volume of organic contaminated soils is tiny compared to the production of the cement plant and is not expected to affect the emission levels of the plant. 3) In addition, under the project, six enterprises were closed already and will not be relocated to other places. Impacted households will be resettled in an already-built resettlement area.

38. **A due diligence review of industrial emissions** was carried out and included in the EA. It is noted that in 2011 the State Council issued an Implementation Plan for Heavy Metal Pollution Treatment in Xiangjiang River Basin. Following the policy, in the Core Area some small enterprises have been shut down. Remaining industries in the Core Area include a major lead-zinc smelter complex and a chemical complex. They have undergone technical renovation, installed sophisticated pollution control facilities and are under close inspection of local environmental protection bureaus. However, they will remain active in the foreseeable future. These two major industrial complexes are located adjacent to the project area. Monitoring results show that over the past years emission compliance has been improved as a result of more stringent environmental enforcement. Latest monitoring in early 2015 show overall compliance of emissions from the industries in the QIZ.

38. **Cumulative impacts.** The redevelopment and urbanization of the QIZ core zone will be facilitated by the project. Therefore, there will be significant induced and cumulative impacts envisaged for the project area from a long-term point of view.

39. The Zhuzhou Municipal Government has developed a new urban plan for the QIZ Core Area. According to the plan, the main function of the core zone will include business, industries (rail industries and environmentally-friendly industries), logistics and a residential area. Preliminary assessment has been undertaken in the project environmental assessment, which

foresees a significant reduction of industrial land from 839 ha to 199 ha and corresponding cut of industrial emissions. Land for business, green space and residential area will increase. There will be no rural farmland in the region. With the redevelopment and urbanization of the area, positive impacts on regional hydrology, ecology and livelihoods are anticipated. Once the project area is remediated, the Xiangjiang River's water quality and ecosystem will benefit in the long run.

40. It is noted that uponproject remediation, there is still a long road ahead for redevelopment, and there is obvious uncertainty associated with industrial restructuring in the QIZ. To address the strategic and cumulative impacts in a more scientific and thorough approach, the project will support a second phase detailed strategic and cumulative environment and social impacts assessment as part of the Technical Assistance program (component 3 of the project). The study will, based on a preliminary assessment, carry out further data collection, research and consultation for a strategic cumulative impacts assessment. In particular, social and livelihood impacts associated with land redevelopment will be reviewed. A Terms of Reference for this study has been developed, and included in the EMP.

41. **OP4.04 Natural Habitats**. An ecological survey carried out during EA preparation indicates there are no critical natural habitats or endangered/valuable species and plants identified in the project area. The project remediation activities, particularly the land clearance, earth excavation and sediment dredging will have negative impacts on natural habitats. The excavated areas will be restored by backfilling clean soils and revegetation. Temporary treatment works will be removed and site restored upon service completion. The dredged ponds will be rehabilitated through backfilling appropriate materials to support aquatic ecosystem recovery. Overall, the project impacts on natural habitats will be limited and short-term. In the long run, the project area after remediation will have positive impacts on the adjacent Xiangjiang River.

42. **OP4.11 Physical Cultural Resources**. A site survey and consultation with responsible agencies and local communities were carried out during EA preparation to identify PCR in the project area. There is no Cultural Relics Protection Unit found. A Dawang Temple and tombs are located on hills where no physical activities will be implemented. A Wuniang Temple is located in non-remediation area. The project activities designed during project preparation are not anticipated to have direct impact on any of these PCRs. The policy is triggered for precautionary purpose, because during project implementation, within the project area additional remediation activities may be deemed necessary as a result of legal requirements or site monitoring, and they may potentially impact the identified PCRs. An ESMF has been prepared for the potential remediation activities to guide policy screening for such specific activities. Chance-find procedures are included in the EMP.

43. **Environmental Management Plan.** A standalone EMP was prepared based on the findings of the EIA. The EMP outlines measures to avoid, minimize, and mitigate potential environmental and social impacts as well as a budget for the implementation of EMP activities. The EMP specifies institutional arrangement, specific site remediation plans, monitoring plans, site maintenance requirements (i.e., mitigation measures during operation), acceptance and post-remediation management, capacity building, public engagement, and EMP implementation budget. The project will have a dual supervision arrangement; one on construction supervision, the other on environmental supervision which will monitor the remediation process and ensure

required quality standards will be met. The EMP will be incorporated into bidding documents and contracts.

44. The EMP also includes a TOR for long-term groundwater monitoring plan, and a TOR for detailed strategic and cumulative impacts assessment. An ESMF was prepared to deal with potential other remediation activities in the project area. The ESMF sets principles, screening, environmental documentation, public consultation and information disclosure, and review requirements for new activities.

45. **Institutional Capacity**. The project owner has no prior experience in managing Bank-financed projects. The EMP has included a clear institutional arrangement that defines the environmental management responsibilities, supervision and reporting duties at municipal-level PMO and ZREIDC. An independent environmental monitoring consultant will be hired to assist the PMO/PIU in managing environmental safeguards compliance during project implementation.

46. **Public Consultation and Information Disclosure**. Public consultation and information disclosure were conducted following national laws and regulations, as well as World Bank safeguards policies. Two rounds of consultation and information disclosure were carried out during July 2014 – May 2015 through a combination of public meetings, field interviews and questionnaire surveys in the project affected communities.

47. Prior to consultations, brief project information, environmental impacts and mitigation measures as well as linkage of full environmental impact assessment reports were disclosed through the website of Zhuzhou Municipal Government (www.zhuzhou.gov.cn). Meanwhile, posters were placed in main communities of the project areas. Following the information disclosure, public consultations were conducted among project affected communities, including field interviews, public meetings and questionnaire surveys among the public.

48. The project received broad support from the public, most of whom expressed strong wishes to implement the remediation project to improve the local environment. The public's key environmental concerns mainly focus on: (a) lack of relevant knowledge; (b) impacts of dust, odor and noise; (c) concerns of potential soil pollution outside the remediation area, and (d) wish to have relocation of industries out of the area, or relocation of community out of contaminated area.

49. These public concerns have been given due considerations and were responded to during the consultation and in the EIA/EMP, including explanation and disclosure of relevant information on-site; development of mitigation measures for dust, odor and dust control; additional clean soil replacement at residential areas outside the remediation area; information on local development plan of industrial relocation etc. All necessary mitigation measures have been incorporated into the project design and the Environmental Management Plans (EMPs). The full draft EIA report was locally disclosed on April 27, 2015 on the website of Zhuzhou Municipal Government and on August 19, 2015 in the Bank's Infoshop. The project appraisal stage Integrated Safeguard Datasheet (ISDS) was approved and disclosed in the Bank's Infoshop on October 14, 2015.

Social:

50. The project will improve the natural environment and benefit the local population, however it may cause some adverse social impacts due to potential house/structure demolition and land use. The project will therefore, trigger the OP4.12 Involuntary Resettlement.

51. The ethnic minority screening, including desk review and direct consultation with the Minority Bureau of Zhuzhou Shifeng District, found that the project is located in a peri-urban area, where, besides urban citizens, only four Han Nationality villages are present. The screening concluded and the social preparation work also verified that no ethnic groups are present in the project or collectively attached to the project areas, and hence OP4.10 Indigenous Peoples is not triggered.

52. Project activities will include cleanup of land occupied by six closed industrial enterprises. Hence, due diligence review related to the enterprises was carried out and summarized in a review report.

53. **Socioeconomic Survey and Analysis**. In order to identify the impacts and design a socially sustainable project, a socioeconomic survey and analysis was conducted and is documented in the Resettlement Plan (RP). A broad stakeholder consultation in the Qingshuitang district, where the project is located, revealed strong support for the project. Furthermore, a socioeconomic survey and meaningful consultation was conducted in the project area in Tongtangwan, including a random sampled study involving 232 persons and meetings with the affected enterprises. Research showed that all involved are aware of the pollution problem and strongly desire to get the pollution treated as soon as possible. The survey also shows that 98 percent of the participants hope to relocate outside the area, if the pollution issue is not addressed; 89 percent think that pollution decrease would have no adverse impacts but positive impacts on income generation; and 93 percent fully support the project.

54. The analysis also recognized concerns of various stakeholders, especially in relation to resettlement as well as temporary impacts on enterprise/business operations. Forty-six households among the directly affected by the resettlement activities also participated in the study and their concerns have been reflected in the RP/RPF with adequate mitigation measures proposed.

55. **Involuntary Resettlement.** The project will likely entail relocation of households and enterprises, as well as land acquisition, therefore a RP was prepared. Meanwhile, some potential impacts could not be clearly identified at this stage of preparation, therefore a RPF is being prepared to address the following: (a) any project actions located outside the currently determined remediation area of 2.73 km^2, if any; (b) identification of linkage activities, for instance, treatment facilitates solid waste generation by the project, not clearly determined by project appraisal; (c) any resettlement related to affected enterprises, not included in RP, within

the boundaries of the project; (d) activities, which cannot be clearly determined during preparation stage; and (e) activities, which might be changed during implementation stage.

56. The main resettlement activities include relocation of 94 households, structures demolition of three enterprises, about 273 mu permanent land acquisition and 4190 mu temporary land acquisition. The land compensation rates will follow the national land law, while house/structure compensation will be based on replacement cost. Land compensation is calculated as cash plus training and social security program, given that income from land is very limited. Affected households have two house compensation options to choose from - cash or house replacement. The Government is currently building thousands of apartments at several alternative locations for resettled households to choose from – among which one is almost completed. The compensation fee for house exceeds the price of replacement house. With resettlement allowance and movement subsidies, the affected households will be well compensated. These measures are explored based on consultations with the affected people by local government authorities and acceptable to the affected population. The RP also elaborates on the measures pertinent to institution, participation and financing arrangements, monitoring system, and grievance redress, etc. The total resettlement cost is estimated to be about RMB 212 million.

57. In addition, two activities in the project area were identified to link to the project, Tongxia Road II and former implemented soil pollution treatment. The implemented resettlement under the two activities included carrying out of a due diligence review, as annex II of the RP, which found that 416 mu collective land was permanently acquired in five villages/communities, with relocation of 122 households and 498 persons. All the land was compensated upon written contracts with village committees in line with national land regulations, and all the household relocation was conducted after full and timely compensation disbursement to the affected upon written agreements with each household based on commercial assets evaluation in line with national regulations. The random interview of the review found high satisfaction from the affected households. The replacement housing is under construction and will be completed and transferred to the households prior to early 2016. The replacement house construction and allocation among the affected people will be monitored during project implementation.

58. **Due Diligence Review on Worker Settlement in Closed Enterprises.** The project will aim to cleanup land of six enterprises, which were already closed by the Government due to environmental non-compliance. The works will include demolishing the structures in three enterprises, and leasing the contaminated land during project implementation from the communities that own it to allow for remediation. A due diligence review on worker settlement in the closed enterprises was conducted and concluded that the enterprise closure and the worker settlement followed relevant national and provincial regulations.

59. **Gender.** The gender-differentiated socioeconomic analysis revealed that more men are directly impacted from the pollution compared to women because more men are employed in the affected enterprises. Women are mostly impacted because of illness or even death of their husbands due to pollution. Furthermore, the pollution affects the vulnerable, including women to a higher degree, because they have limited financial capacity to move out of the area and women are known to work within the neighborhood in the project area. While project activities will

reduce impacts on both women and men caused by pollution, it will also affect both men and women due to resettlement and land acquisition. The RP proposes actions to ensure women's property investment and compensation rights are duly protected. While mostly men are working in the closed enterprises and women are less directly affected, they will nevertheless have the same opportunities as men to receive the training and alternative job opportunities. The external monitoring will be conducted to track women's inclusion in the resettlement implementation. Indicators on reduced impact on women from the pollution and provision of training opportunities will also be monitored as part of project Results Framework.

60. **Citizen Engagement and Participation** has been and will continue to be ensured during project preparation and implementation. As part of the socioeconomic analysis, the information on proposed project activities was disseminated and interviews conducted with a number of affected households (48, including women-headed) and the six enterprise owners. The consultations with stakeholders and the affected people will continue as project preparation progresses. The knowledge and public information/environmental demonstration center for urban redevelopment and site remediation established under the project will serve as a point of information on district's redevelopment plans, and will allow residents to continuously express their opinions, as well as serve as a center of grievance redress, allowing the affected people to submit the complaints. The RP further details a participation plan and a resettlement booklet for the project implementation stage. It also details procedures of addressing the complaints, tracking and reporting of the complaints.

61. The reports, including RP and RPF and Workers Worker Settlement of closed Enterprises review report, were disclosed locally on June 4, 2015 and were disclosed internationally in the Bank's InfoShop on August 13, 2015. The project appraisal stage Integrated Safeguard Datasheet (ISDS) was approved and disclosed in the Bank's Infoshop on October 14, 2015.

62. **Monitoring and Grievance Redress**. Internal and external monitoring systems were established as per RP, including procedure, key contents and indicators, staffing and reporting. Implementation will be monitored by a qualified external monitoring agent. The monitoring will cover the implementation of the RP and the RPF, as well as the house relocation under the due diligence review report.

63. **Institutional Capacity.** This is the first Bank-financed project implemented by the PMO and ZREIDC and institutional capacity for safeguard policies needs strengthening. There is an Environment and Resettlement Group established as part of the PIU with dedicated staff to be responsible for ensuring compliance with social safeguards. A qualified safeguards consultant was hired to assist the PIU during preparation of social safeguards documents and train PIU staff. Additional training is provided by the Bank team during preparation missions.

Monitoring & Evaluation

64. Detailed arrangements for monitoring and evaluation will be made and specified in the project implementation plan. In addition to arrangements in monitoring progress towards achievement of the PDO (see Annex 1), a specialized technical and safeguards related monitoring activities will be carried out by an external consultant teams. The costs of monitoring

and evaluation for different purposes have been included in the project cost estimates.

65. The PMO will be responsible for project progress and results monitoring, and submission of semi-annual progress and financial reports to the World Bank. The PIU will support PMO in collecting necessary data from project beneficiaries, stakeholders and contractors. Additional studies will be made if necessary in order to obtain effective data for justifying achievements of the PDO. The Monitoring and Evaluation (M&E) system of the project includes: (a) annual work plans and budgets; (b) periodic on-site inspection and verification by PMO and PIU staff; (c) consolidated semi-annual project progress reports compiled by PMO to the World Bank; (d) consolidated semi-annual unaudited Interim Financial Reports (IFRs) on use of funds provided by the PMO to the World Bank; (e) annual financial audits of the sole project account set in MOF. An external consultant will be engaged to undertake independent monitoring of the implementation of the resettlement action plan.

Annex 4: Implementation Support Plan

CHINA
Zhuzhou Brownfield Remediation Project

Strategy and Plan for Implementation Support

1. The objective of the implementation support plan is to ensure: (a) the objectives of the project are satisfactorily achieved; (b) implementation of all project activities follows agreed procedures and complies with all fiduciary and safeguards requirements; and (c) identified risks are timely and adequately mitigated. While most of the project risks are either low or moderate, the overall project risk is rated as substantial due to the implementation agency capacity and unintended environmental and social impacts. Hence, the focus of the Bank's implementation support will be on implementation capacity building and managing of unintended environmental and social impacts.

2. *Implementing agencies capacity building*: Neither PMO nor PIU have experience in implementing Bank-financed projects, including in fiduciary (procurement, FM) and safeguards policies. Risks posed by this lack of experience have been and will further be mitigated through staffing the PMO and PIU with sufficient number of competent staff, providing them with targeted training on Bank policies, procedures, project management and related technical skills during project preparation and early stages of implementation. During project implementation, staff capacity will be enhanced by competent implementation support consultants and specialized firms for detailed design, project management, construction supervision, and monitoring and evaluation.

3. Specifically, risks arising from lack of experience in Bank *procurement* and *financial management* procedures will be mitigated through hiring of a procurement agent with procurement experience in projects financed by the Bank or other multilateral financing institutions to assist with the procurement process; hiring of a consulting firm with project management experience in projects financed by the Bank or other multilateral financing institutions to provide project management and technical support, including contract supervision, financial management and procurement related issues; attendance of workshops on procurement, FM and contract management under Bank financed projects by the PMO and PIU staff; provision of procurement training by the Bank procurement specialist throughout project implementation; preparation and use of the procurement management manual and FM manual to provide guidance on procurement and FM.

4. In terms of addressing lack of prior experience in managing *safeguard* aspects in Bank-financed projects, the EMP defines clear institutional arrangements setting out the environmental management responsibilities, supervision and reporting duties at PMO and PIU level. In addition, an independent environmental monitoring consultant will be hired to assist the PMO/PIU in managing environmental safeguards compliance during project implementation. Similarly, for project related social safeguards aspects, a qualified safeguards consultant has been hired to assist the PIU during preparation of social safeguards documents and train PIU staff. Additional training has been and will be provided by the Bank team.

5. *Environmental and social impacts:* This second risk will be mitigated through targeted training of PMO and PIU environmental and resettlement management staff on related Bank policies and procedures, involvement of affected communities in the RAP development and implementation oversight, and engagement of an independent monitoring consultant.

6. The tables below summarize the implementation support needed during the different stages of the project, and the respective resources.

Time	Focus	Skills Needed	Resource Estimate
First 12 months	Procurement supervision and training	Procurement specialist	5 SWs
	FM supervision and training	FM specialist	3 SWs
	Social safeguards/Resettlement supervision	Social development specialist	4 SWs
	Environmental management and supervision	Environmental specialist	3 SWs
	Technical supervision and support	Site clean-up and remediation, waste management specialists	8 SWs
	Project management	TTL and Co-TTL	12 SWs
12-80 months	Procurement review, supervision and training	Procurement specialist	4 SWs
	FM supervision and training	FM specialist	2 SWs
	Social safeguards/Resettlement supervision	Social development specialist	4 SWs
	Environmental management and supervision	Environmental specialist	3 SWs
	Technical supervision and support	Site clean-up and remediation, waste management specialists	7 SWs
	M&E	M&E Specialist	1 SWs
	Economic and Financial analysis	Economist / Financial Analyst	1 SWs
	Project management	TTL and Co-TTL	8 SWs

Skills Mix Required

Skills Needed	Number of Staff Weeks each Year	Number of Trips	Comments
TTL/Environmental engineer	6 SWs	2	Washington based
Co-TTL/ Environmental specialist	6 SWs	2	Country office based
Remediation and waste management specialist	4 SWs	2	Int. Consultant
Procurement specialist	4 SWs	2	Country office based
FM specialist	2 SWs	2	Country office based

Social development specialist	4 SWs	2	Country office based
M&E specialist	1 SWs	1	Local Consultant
Economist	0.5 SWs	1	Local Consultant
Financial analyst	0.5 SWs	1	Local Consultant

Annex 5: Economic and Financial Analysis

CHINA
Zhuzhou Brownfield Remediation Project

Economic Analysis

1. For the purpose of the economic analysis of the project, the cost-benefit analysis was adopted with a project life span of 25 years and a social discount rate of 10%, on the basis of with- and without-project scenarios.

2. **Project Benefits.** The project benefits include unquantifiable benefits and quantifiable benefits.

3. Unquantifiable Benefits. The project will help the Government implement *the Regulatory Planning for Qingshuitang Core Area*. This plan foresees a mix of logistics activities, manufacturing of railway equipment, production of sports equipment, commercial activities and recreation, including the development of an eco-park around a constructed lake-wetland area. Remediation of contaminated soil in QIZ is one of the fundamental works to start implementation of this plan.

4. The other unquantifiable benefits of the project are:

- Improved living environment of 25,864 people who live in the core Qingshuitang Industrial Zone. These people rely extensively on the contaminated land and polluted water for growing vegetables for household consumption and washing.
- Improved water quality for Xiangtan Municipality (30 km from Zhuzhou Municipality) and Changsha Municipality (100 km from Zhuzhou Municipality), which use Xiangjiang River as drinking water sources. The Xiangjiang River flows through QIZ. Due to the contaminated soil in QIZ, the water in Changsha-Zhuzhou-Xiangtan section of the Xiangjiang River is also polluted with heavy metals.

5. Quantifiable Benefits. The quantifiable benefit of the project is the expected increase in land value, which is used as a proxy for the market value of the benefits of the cleanup. Land prices in Shifeng District have been repressed due to the poor environmental conditions in the QIZ. While the market for land sales currently is weak, there is little doubt of development potential in Shifeng District, which is located at the heart of Zhuzhou. Hence, it is estimated that the land value in the district would increase at the time remediation of QIZ is completed, although the project would not directly cause land transactions. Due to the remediation activities of the project, the land remediated would be clean, healthy, and more suitable for working and living and would increase the land and property prices in the adjacent areas.

6. Following with- and without-project scenarios, the local market price of land in Shifeng District was used as the value of land under without-project scenario. The local

market prices in Tianyuan District were used as the value of land under with-project scenario. Tianyuan District is the capital district of Zhuzhou Municipality. It is located south of QIZ. Due to the Xiangjiang River between QIZ and Tianyuan District, the land in Tianyuan District is not polluted by heavy metals, and is of a similar quality as QIZ soil expected after the remediation. However, Tianyuan District is less developed than Shifeng District. The land value in Tianyuan District is therefore scaled up by the difference of local GDPs between Shifeng and Tianyuan Districts. The following tables present GDPs of two districts, the land value under without- and with-project scenarios:

Local GDPs, RMB billion

	Shifeng District	**Tianyuan District**	**Ratio**
2012	26.50	20.00	1.3
2013	28.83	22.10	1.3
2014	31.62	24.80	1.3

Land Prices for Economic Analysis, RMB/m^2

	Without Project	**With Project**
Industrial Land	354	428
Residential Land	2,604	3,443
Commercial Land	5,411	11,474

7. The economic analysis assumes that each year after the completion of the project, the value of the land remediated under the project will increase by three percent. This assumption is made on the basis that three percent is the ceiling of CPI, which central government can accept. If the land value can increase by three percent, the land owner will not lose the value of holding a piece of land.

8. Only industrial land, residential land, and commercial land can be traded in the market. The increase in land value therefore refers to the increase in industrial, residential, and commercial land only. The following table lists different types of land in Shifeng District.

Land in Shifeng District, m^2

	Industrial Land	**Residential Land**	**Commercial Land**
Shifeng District	4,808,113	4,820,001	26,947

Project Costs

9. The project cost is RMB 1,566.36 million, including 3.93 percent of taxes, and RMB 65.17 million of financial charges during construction. For the purpose of economic analysis, these transfer payments are deducted from the total project costs. The total project cost for economic analysis is about RMB 1,439.65 million. The project costs for economic analysis are as follows:

Project Cost for Economic Analysis, RMB million

	Financial Cost	**Economic Cost**
Baseline Cost before Tax	1,309.2	1,309.2

Contingencies	130.4	130.4
Tax - Baseline Cost	56.8	
Tax – Contingencies	4.7	
Financial Charges During Construction	65.2	
Total Cost	**1,566.4**	**1,439.65**

Least Costs

10. Three available technical options were compared and the option with least cost was selected as the technical option for the project. These technical options include off-site stabilization, off-site washout, and combination with nine different technical options. The following table summarizes the engineering costs of these technical options.

Cost Analysis of Various Alternative Technical Options, RMB million

Technical Option	Off-site Stabilization	Off-site Washout	Combination with 9 Technical Options
Engineering Cost	11,251.46	3,748,11	1,030.15
Recommended	No	No	Yes

EIRR

11. The cost benefit analysis calculated the economic internal rate of return (EIRR) on the recommended technical option to assess the justification of the project investment.

12. The following assumptions were used to calculate the EIRR:

- The life span of the project is 25 years, including construction period.
- The investment schedule is 8%, 17%, 33%, 17%, 14%, and 11%.
- The project benefits will be realized when the project investment is finished.
- No O&M costs are considered. After the remediation, no industrial land would exist. The current industrial land would be changed to other land such as residential land or commercial land. Therefore, it is not necessary to make further O&M to prevent the land from being polluted by heavy metals.

13. Based on the above assumption, the EIRR for the whole investment is 38.0 percent, higher than the social discount rate. The investment is economically justified.

Sensitivity Analysis

14. Sensitivity analysis was also carried out. Three scenarios were considered: (1) the investment will increase by 20%; (2) the land value will decrease by 20%, and (3) both occur simultaneously. EIRRs for those scenarios were calculated and the results are listed in the following table:

EIRRs under Sensitivity Analysis

Scenario	EIRR
Basic	38.0%
Increase in Investment Cost by 20%	32.5%
Decrease in Land Value by 20%	31.3%
Both Incurred Simultaneously	26.1%

Financial Analysis

15. The financial analysis was carried out to assess financial viability of the project, including financial plan, fiscal impact of the project, and cash flows for the project stakeholders.

Financing Plan of Project

16. The total project cost is estimated at RMB 1,566.36 million. The financing plan of the project includes World Bank loan and counterpart funds. The following table presents the financing plan of the project:

Project Investment and Financing Plan (RMB, million)	Total	2016	2017	2018	2019	2020	2021
Project Investment Plan	**1,566.36**	**124.08**	**273.62**	**510.31**	**261.01**	**221.41**	**175.93**
Financing Plan	**1,566.36**	**203.38**	**462.18**	**349.16**	**172.79**	**203.53**	**175.31**
World Bank	960.00	71.88	165.89	314.25	161.75	137.53	108.70
Central and Provincial Governments	458.75	121.00	291.79	34.92	11.04	-	-
Local Government	147.61	10.50	4.50	-	-	66.00	66.61

17. For CY2016, the counterpart financing in the amount of RMB 121 million from the central and provincial government grants designated to co-finance special programs of heavy metal pollution control in Xiangjiang River basin, have already been secured. Since the grants are only committed by the central and provincial governments on a yearly basis, ZREIDC will apply for the grants annually to secure counterpart funding in the years 2017-2022. As of now, the total grant amount typically reaches 30 percent of the total investment cost of the applications. The Zhuzhou Municipal and Shifeng District Governments will also service the World Bank loan debt, and secure counterpart financing in case the grants from the central and provincial governments cannot be adequately and timely secured.

18. The remaining project cost would be financed by the local governments, including Zhuzhou Municipal and Shifeng District Governments from their fiscal revenue. The counterpart funds will be transferred to the implementing agency – the ZREIDC to carry out project activities. Currently, ZMG already provides at least RMB100 million to ZREIDC and SDG at least RMB20 million annually. Although this funding is not specifically assigned for

the co-financing of the project, this demonstrated both commitment and fiscal capacity of the local governments.

Fiscal Analysis

19. According to the financing plan, local governments, including ZMG and SDG will be ultimately responsible for provision of counterpart funds for the project. These funds will finance the expenditures, which are not eligible for Bank loan and co-financing grants from the central and provincial governments. Based on current practice of funding provision, it is assumed that the ratio of funding between ZMG and SDG would be 5 to 1. As such, the responsibility of counterpart funding by local governments is projected as follows:

Local Government Counterpart Funds, RMB million

	Total	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Local Government	**147.61**	**10.50**	**4.50**	**-**	**-**	**66.00**	**66.61**
ZMG	123.01	8.75	3.75	-	-	55.00	55.51
SDG	24.60	1.75	0.75	-	-	11.00	11.10

20. By comparing the amount proposed above of annual funding stream, it is concluded that counterpart funds allocated by the local governments will not have negligible impact on their budgets. The following is the detailed analysis.

- ZMG's Fiscal Revenue. The average fiscal revenue of ZMG over the past three years (2012 to 2014) was about RMB 3.68 billion and the average increase rate was 11.4 percent. Assuming that during the period of project implementation the annual increase of fiscal revenue is ZMG is 5.7 percent (conservatively assumed as half of the average of the past 3 years), the annual fiscal revenue for the period of project implementation are calculated and compared with the counterpart funds provided by ZMG as follows:

Fiscal Revenues and Counterpart Funds – ZMG, RMB million

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Fiscal Revenues	4,690	4,960	5,240	5,540	5,860	6,190
Counterpart Funds for the project	8.75	3.75			55.00	55.51
% of Fiscal Revenue	0.2	0.1			0.9	0.9

- SDG's Fiscal Revenue. The average fiscal revenue of SDG over the past three years (2012 to 2014) was about RMB 619 million with the average increase rate of about 14.4 percent. Assuming that during the period of project implementation the annual increase of fiscal revenue in SDG will be 7.2 percent (conservatively assumed as half of the average of the past three years), the annual fiscal revenues for the period of project implementation are calculated and compared with the SDG counterpart funds for the project as follows:

Fiscal Revenues and Counterpart Funds – SDG, RMB million

	2016	2017	2018	2019	2020	2021
Fiscal Revenues	754	808	866	928	995	1,066
Counterpart Funds	1.75	0.75	-	-	11.00	11.10
% of Fiscal Revenue	0.2	0.1			1.1	1.0

- Sensitivity Analysis. As mentioned above, the counterpart funds from central and provincial government grants are not committed beyond 2016, and ZREIDC has to apply for these funds annually. If, for some reasons, the grant funding cannot be secured, ZMD and SDG will cover the entire counterpart funding from their fiscal revenue. Following the assumptions mentioned above, the fiscal impact of the entire counterpart funds by ZMD and SDG was analyzed and the results are presented in the following tables.

Sensitivity Analysis – ZMG, RMB million

	2016	2017	2018	2019	2020	2021
Fiscal Revenues	4,690	4,960	5,240	5,540	5,860	6,190
Counterpart Funds	8.75	32.44	163.38	82.72	69.90	56.02
% of Fiscal Revenue	0.2	1.0	3.0	1.0	1.0	1.0

Sensitivity Analysis – SDG, RMB million

	2016	2017	2018	2019	2020	2021
Fiscal Revenues	754	808	866	928	995	1,066
Counterpart Funds	1.75	6.49	32.68	16.54	13.98	11.20
% of Fiscal Revenue	0.2	0.8	3.8	1.8	1.4	1.1

It is obvious that provision of entire counterpart funds would not have significant impact on the fiscal budgets of ZMD and SDG, although the provision of counterpart funds by SDG in 2018 would amount to 3.8 percent of its fiscal revenue.

21. Following the diagram of the project fund flow, the Bank loan will be borne by ZMG. Assuming the Bank loan will be repaid in equal installments over 20 years from 2022 with an average interest rate of 1.2 percent and the annual fiscal revenue increase by 2.9 percent, the following table shows the impact of the debt service on the fiscal revenues of ZMG:

Fiscal Revenues and Debt Service, RMB million

	2022	2023	2024	2025	2026	2027	2028	2029~2041
Fiscal Revenues	6,368	6,550	6,737	6,930	7,128	7,332	7,542	120,121
Principal Repayment	48.00	48.00	48.00	48.00	48.00	48.00	48.00	624.00
Interest Payment	11.23	10.66	10.08	9.50	8.93	8.35	7.78	48.67
% of Fiscal	0.93	0.90	0.86	0.83	0.80	0.77	0.74	0.56

Revenue								

22. As of December 31, 2015, the local government debt borne by ZMG was about RMB 3,746.05 million. Around 80 percent of the debt will be repaid within the period of project implementation. Comparing with the principal repayments of local government debt, the ZMG's responsibility of co-financing for the project and debt service of the project are insignificant. The following table shows the principal repayment of local government debt, counterpart funding for the project, and the project debt service by ZMG:

Local Government Debt and Project Debt Service, RMB million

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Principal Repayment	300.00	350.00	390.00	430.00	470.00	500.00	550.00	600.00	156.00
Counterpart Funds		8.75	3.75		31.67	60.00	18.84		
Debt Service								59.23	58.66

Stakeholder Analysis

23. The stakeholders of the project include: (a) the World Bank, which provides 61 percent of the financing to the project; (b) governments, which provide counterpart funds to the project; (c) the ZREIDC, which is the implementing agency of the project; (d) industrial enterprises, which benefit from the project; (e) real estate developers, who will potentially benefit from the project; and (f) villagers, who provide land for project implementation.

Land Market in China

24. In general, the ownership of the land in urban area belongs to the State and the land in rural area belongs to the farmers' collectives. The land in China cannot be traded, but for public interests, the State can expropriate and requisition the land. The State places a strict control on the usage of land. All land in China is classified into the land for agriculture, land for construction, and unused land. The usage of land is defined by the master plan of land utilization compiled by the State. Changing the usage of land must be approved by the State. The land owned by the State or farmers' collectives can be used by entities or individuals. The rights to use State-owned land are verified by the governments above county level. The governments at or above county level have responsibility to reserve land by recovering the right to use State-owned land, requisitioning with compensation, purchasing, and other legal means. This State-owned reserved land can be put into the market by the governments according to the supply and demand of land. The governments have the right to prepare the reserved land and then grant the right to use State-owned land in the markets. The rights to use State-owned land can be transferred in the market.

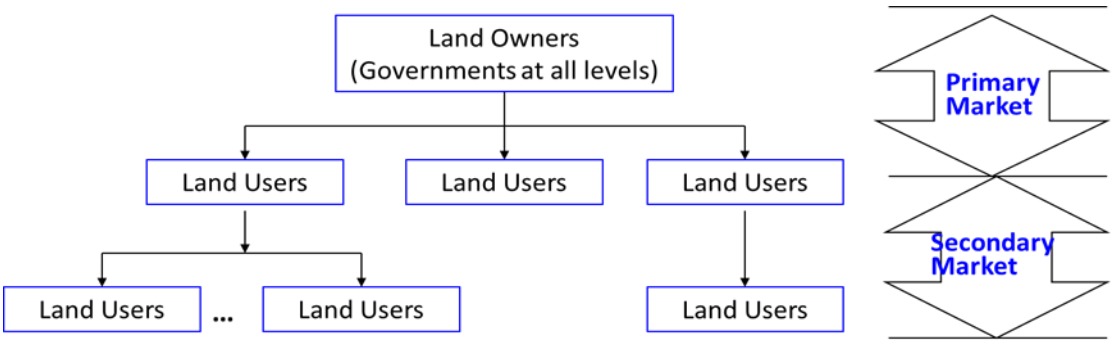
25. The land market in China refers to the market of the right to use State-owned land since the land in China cannot be traded. The land market in China also refers to the market for urban land transactions since the use of rural land is defined by the agreements negotiated

between land users and the farmers' collectives. Therefore, the land market refers to the market where the rights to use State-owned urban land are traded.

26. There are two land markets in China: the primary market and the secondary market. The primary market is a monopoly market. The governments are the only suppliers of the right to use State-owned land. In this market, the governments grant the rights to use State-owned land to the users and the users can use the land within certain period of time. The buyers of the rights to use State-owned land can be any entity and individual. This market reflects the relationship between land owners and land users.

27. The secondary market is a competition market. The holders of the rights to use State-owned land obtained from the primary market transfer their rights to others. This market reflects the relationship of land users. The following diagram illustrates the structure of the land market in China:

Structure of Land Market in China



Cash-flow of Government

28. In addition to the providing counterpart funds to the project, local government will acquire 215 mu of former farm land from its land use owners for the implementation of the project. The Government will sell the right to use this land in the future. According to the master plan, there will be no industrial land in QIZ. Assuming this land will be sold as residential land in 7 years, the following table demonstrates the cash-flow of local government acquiring 1 ha of farm land and selling the right to use this land as residential land. The gross income of selling the right to use State-owned land will be 604 percent of the costs of land acquisition and preparation.

Financial Balance of Selling Right to Use Land - Local Government

	RMB million/ha	RMB million/mu
Cost of Land Acquisition	1.08	0.07
Cost of Land Preparation	3.00	0.20
Cost of Land Remediation	5.52	0.37
Sales of right to use residential land	34.44	2.30
Gross Income	24.84	1.66

29. This gross revenue is part of government fiscal revenue.

Cash-flow of ZREIDC

30. ZREIDC is the implementing agency of the project. It will also be one of the beneficiaries of the project.

31. ZREIDC holds the right to use more than 2,000m^2 of residential land. Since ZREIDC is not a developer or a real estate company, this right to use State-owned land will be sold in the future when the land market prices increase to compensate company's expenses. The average booking cost of the rights to use residential land is about RMB 2,661/m^2. With an assumption that the land value in Shifeng District will increase to RMB 3,443/m^2 when the remediation is completed in 7 years, the following table demonstrates the cash-flow of ZREIDC selling its right to use 1 ha residential land. The gross income of selling the right to use State-owned land will be 52 percent of the booking costs of the land.

Financial Balance of Selling Right to Use Land – Industrial Enterprises

	RMB million/ha	**RMB/m2**
Cost of Residential Land	22.62	2,260.80
Sales Price of Residential Land	34.44	3,442.50
Gross Income	11.82	1,181.70

32. The increase in land value will help ZREIDC make profits.

Cash-flow of Industrial Enterprises

33. The industrial enterprises refer to the enterprises, which hold the rights to use industrial land. There are 1.74 km^2 of industrial land in the project area. The cash-flow analysis assumes that 1 ha of industrial land would be sold in the market when the remediation is completed in 7 years and the right to use this 1 ha of industrial land was made in 2012. The historic cost of obtaining the right to use the land was RMB 362/m^2 and the sales price in 7 years was RMB 428/m^2. The following table demonstrates the cash-flow of industrial enterprises selling their right to use 1 ha of industrial land. The gross income of selling the right to use State-owned land will be 18 percent of the costs for obtaining the right.

Financial Balance of Selling Right to Use Land – Industrial Enterprises

	RMB million/ha	**RMB/m^2**
Cost for obtaining right to use land	3,63	362.42
Sales of right to use land	4.29	428.40
Gross Income	0.66	65.98

34. The increase in land value provides opportunity for industrial enterprises to make different commercial decision.

Cash-flow of Real Estate Developers

35. The real estate developers refer to commercial entities, which purchase the right to use State-owned land to construct housing and then sell it in market. The developer can also sell its right to use State-owned land without constructing any housing development. There are 1.96 km2 of residential lands in the project area. The cash-flow analysis assumes that 1 ha of residential land would be sold in the market without any property on it when the remediation is completed in 7 years and the right to use this 1 ha of residential land was made in 2012. The historic cost of obtaining the right to use State-owned land was RMB 2,408/m^2 and the sales price in 7 years was RMB 3,443/m^2. The following table demonstrates the cash-flow of real estate developer selling its right to use 1 ha residential land. The gross income of selling the right to use State-owned land will be 43 percent of the costs for obtaining the right.

Financial Balance of Selling Right to Use Land – Real Estate Developers

	RMB million/ha	**RMB/m2**	
Cost for obtaining right to use land	24.09	2,407.52	
Sales of right to use land	34.44	3,442.50	
Gross Income	10.35	1,034.98	43% of cost

36. The increase in land value provides opportunity for real estate developers to make different commercial decision.

Cash-flow of Villagers

37. Local government will acquire about 215 mu of a former farm land from the villagers who no longer can use the land for farming but still owe the use rights for the implementation of the project. For each mu of farm land, local government will compensate RMB 72,000 to villagers, according to the RAP of the project. The villagers will lose 215 mu of land and get RMB 15.5 million in compensation from the local government. The following table shows the compensation to villagers.

Financial Balance of Selling Right to Use Land – Villagers

	Area (mu)	**Area (ha)**
Total Land Acquired from Villagers	215.14	14.34
	RMB/mu	RMB million/ha
Compensation Rate	72,000	1.08
	RMB million	RMB million
Total Compensation	15.49	15.49

Annex 6: Map of Zhuzhou City, Qingshuitang Industrial Area, Core Area and Project Area (CHN42146)

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