Project Administration Manual

Project Number: 48443-002
Loan Number: LXXXX
September 2018

People's Republic of China: Hunan Xiangjiang River Watershed Existing Solid Waste Comprehensive Treatment Project

ABBREVIATIONS

3R	–	reduce, reuse, and recycle
ADB	–	Asian Development Bank
CSC	–	construction supervision company
CQS	–	consultants' qualifications selection
DMF	–	design and monitoring framework
EIA	–	environmental impact assessment
EMDP	–	ethnic minority development plan
EMP	–	environmental management plan
EMS	–	environmental monitoring station
FMA	–	financial management assessment
GRM	–	grievance redress mechanism
HFD	–	Hunan Provincial Finance Department
HPG	–	Hunan Provincial Government
HURD	–	Hunan Provincial Housing and Urban–Rural Development Department
ICB	–	international competitive bidding
ICS	–	individual consultant selection
LAR	–	land acquisition and resettlement
LIEC	–	loan implementation environmental consultant
MOF	–	Ministry of Finance
MSW	–	municipal solid waste
NCB	–	national competitive bidding
NDRC	–	National Development and Reform Commission
O&M	–	operation and maintenance
PAM	–	project administration manual
PMO	–	project management office
PPMS	–	project performance management system
PRC	–	People's Republic of China
PSA	–	poverty and social assessment
QCBS	–	quality- and cost-based selectin
SGAP	–	social and gender action plan
SPS	–	Safeguard Policy Statement
WWTP	–	waste water treatment plant
YREB	–	Yangtze River Economic Belt

CONTENTS

APPENDIX:

Environmental Management Plan

Project Administration Manual Purpose and Process

The project administration manual (PAM) describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with the policies and procedures of the government and Asian Development Bank (ADB). The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

The executing agency, Hunan Provincial Housing and Urban–Rural Development Department, and implementing agencies (Changning City Government, Dong'an County Government, Guiyang County Government, Hengshan County Government, Hengyang County Government, Lanshan County Government, Leiyang City Government, Lengshuijiang City Government, Yongzhou City Government, Zixing City Government) are wholly responsible for the implementation of the ADB-financed project, as agreed jointly between the borrower and ADB, and in accordance with the policies and procedures of the government and ADB. ADB staff is responsible for supporting implementation including compliance by executing and implementing agencies of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At loan negotiations, the borrower and ADB shall agree to the PAM and ensure consistency with the loan agreement. Such agreement shall be reflected in the minutes of the loan negotiations. In the event of any discrepancy or contradiction between the PAM and the loan agreement, the provisions of the loan agreement shall prevail.

After ADB Board approval of the project's report and recommendation of the President (RRP), changes in implementation arrangements are subject to agreement and approval pursuant to relevant government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval, they will be subsequently incorporated in the PAM.

I. PROJECT DESCRIPTION

A. Rationale

1. The Xiangjiang River and its watershed are part of the larger Dongting Lake watershed. Both watersheds are integral elements of the downstream Yangtze River watershed. The Yangtze River Economic Belt (YREB) covers nine provinces and two specially administered cities in the Yangtze River Basin. It accounts for over 40% of the PRC's population and has 40% of the freshwater resources. It also serves as the drinking water resource for 400 million people, provides 60% of the total fisheries production, has 20% of the total wetland area, and contributes about 45% of the PRC's economic output. The PRC's YREB Development Plan, 2016–2030,[1] stipulates the prioritization of ecological protection and promotion of green development as the guiding principle for the YREB development. As upstream watersheds, the Xiangjiang River and Dongting Lake play a pivotal role in the water quality of the Yangtze River watershed and in the general maintenance of healthy rivers and waterways. Therefore, the Xiangjiang River watershed is a key water resource in the overall strategic planning for water security in the Yangtze River, and its ecological improvement in turn promotes ecosystem restoration, environmental protection, and water resources management of the YREB and its watersheds.

2. The Xiangjiang River watershed has a total area of about 94,660 square kilometers, with approximately 90% of it located in Hunan and the remaining 10% located in the Guangxi Province. The economic activity and expansion of the human-made surroundings have extensively developed the Xiangjiang River watershed. By 2017, approximately 61% of Hunan's total population, or about 25.1 million people, lived within the watershed. The total gross domestic product for the Xiangjiang River watershed in 2017 was estimated to be 75% of the overall total gross domestic product of Hunan Province. The rapid economic growth experienced countrywide from the mid-1980s until the present, coupled with inadequate environmental protection, contributes to the deterioration of the environment and the increased pollution in Hunan and the Xiangjiang River watershed. By 2000, the surface water of the Xiangjiang River, which met class III quality or better, was less than 70% along the entire river system.[2] Based on the PRC drinking water code, water along most reaches of the Xiangjiang River did not meet the standards to be used as a source for raw water. The pollution in the Xiangjiang River had negative impacts on living standards and the health of residents living around the river. The pollution was recognized by the government as a threat to the long-term sustainable growth of industry along the river, an impediment to the maintenance of overall river health, a material risk to the strategic supplies for downstream drinking water, and an unacceptable visual intrusion on the watershed's well-recognized cultural attraction.

3. The main sectors responsible for the Xiangjiang River watershed's environmental degradation are industry, agriculture, and domestic (with domestic sources being primarily municipal wastewater and MSW). In the period 2000–2017, the government adopted an integrated approach to pollution control to protect water quality in the Xiangjiang River watershed. In 2011, the Hunan Provincial Government (HPG) initiated a major program of environmental pollution control to target the major pollution sources.[3] Subsequent environmental regulations and incremental enforcement in Hunan have reduced the impacts from industrial and agricultural

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[1] Government of the PRC. 2016. *Outline of the Yangtze River Economic Belt Development Plan, 2016–2030.* Beijing.

[2] Government of the PRC, Ministry of Environmental Protection. 2002. *Environmental Quality Standards for Surface Water.* Beijing. There are five categories, with Class I being the highest quality of water and class V being the lowest quality. Class III is the minimum that can be used as a bulk source of raw water for production of drinking water.

[3] HPG. 2011. *Heavy Metal Pollution Management Project Implementation Plan in the Xiangjiang River Basin: 2011–2015.* Changsha.

sources, and new wastewater treatment plants have reduced pollution from untreated sewage. However, significant challenges remain regarding MSW. Urbanization has left a legacy of substandard landfill sites that were once in outlying rural areas and are now located close to newly created urban areas. Much of the countryside has been urbanized and has become part of the built environment of the counties and county-level cities. With the expansion of MSW services being limited in these areas, the challenge of managing MSW in a sustainable manner has grown.

4. **Addressing the poor management of substandard landfill sites.**[4] Aging landfill sites, which are generally no longer receiving any MSW, are one of the last remaining long-term sources of pollution that have not yet been fully addressed in Hunan. Most of these landfill sites are referred to as substandard MSW landfills, or dumpsites, meaning they were not planned, engineered, constructed, or operated to appropriate standards. They have been left untreated or partially sealed at various locations. They are typically closed in an operational sense. However, they have not been closed and restored in accordance with the best practice for decommissioning.[5] Because they were not closed competently, liquid leachate continues to pollute surface water and groundwater and the waste is also releasing landfill gas.[6] The liquid leachate and waste contribute to long-term pollution of the river system and downstream water quality by raising the biological and chemical oxygen demands, while gross pollution of the soil below the landfills remains unchecked. Without any form of managed closure, they will continue to generate leachate. The landfills pose risks to the health and well-being of people living near them and are a safety risk to anyone accessing them. HPG has identified 59 landfills in the watershed to be treated and improved by county and county-level city governments.[7] While some landfills have been treated under domestically funded projects, there are still untreated sites that continue to generate leachate when rainfall and runoff infiltrates the solid waste body, further generating leachate from the natural process of waste decomposition.

5. **Improvement of inadequate municipal solid waste management services in rural areas.** Efficient MSW management, which promotes reduction (by waste minimization), reuse (of waste materials), recycling, and recovery, is gaining ground in the PRC. However, the management and disposal of MSW generated in rural areas is underdeveloped and inadequate. Most waste is randomly dumped onto open areas without treatment. In some cases, it is burned openly, generating polluting emissions. Randomly dumped MSW allows waste to break down and decompose without the means to prevent leachate from percolating into the groundwater or flowing into surface water bodies; indiscriminately dumped MSW can clog streams and drains. In the PRC, MSW management focuses on urban areas. For vast rural areas, the management of domestic waste is delegated to villagers. In 2016, HPG commenced the implementation of a five-year plan for rural MSW treatment, which targeted the achievement of at least 70% of rural waste being treated by 2020.[8] This builds on rigorous national guidance on controlled treatment and disposal of MSW.[9] It supports the 3-year Action Plan for Rural Settlement Environment Regulation

[4] Before the mid-1980s, disposal of MSW in Hunan was rarely managed in accordance with best practice, and formal services were rare. MSW was typically disposed of in so-called substandard landfill sites. The sites have become contaminated resulting from gradual decomposition of buried waste, with consequent degradation of soil and water.

[5] Closure and restoration is an MSW industry recognized term, which describes the process of closing a site from an engineering and environmental perspective, including a process of restoration using agreed design standards for future land use. It is not operational closure of a landfill site whereupon materials are no longer delivered to the site.

[6] As waste within a landfill decomposes, it generates leachate which is a highly polluting liquid contaminant.

[7] Hunan Provincial Housing and Urban–Rural Development Department (HURD). 2014. *Existing Solid Waste Landfill Rectification Planning for Xiangjiang River Watershed.* Changsha.

[8] HURD. 2016. *Hunan Rural Solid Waste Management Implementation Planning, 2016–2020.* Changsha.

[9] Government of the PRC, Ministry of Housing and Urban–Rural Development. 2011. *Notice on Further Strengthening Urban Domestic Refuse Disposal.* Beijing; and Government of the PRC, Ministry of Housing and Urban–Rural

in Hunan Province issued by HPG in 2018 which requires comprehensive implementation of enhanced services for rural sewage and waste treatment. In the rural areas of Hunan, there has been some progress despite remaining limited and inconsistent.

6. **Expansion of municipal solid waste to include collection and treatment of kitchen waste.** HPG is also promoting the treatment of kitchen waste from commercial sources, which is typically disposed of in landfills or in small dumpsites without treatment. However, because of its high water and protein content, kitchen waste tends to generate more leachate and greenhouse gas emissions than other MSW. There is concern about unregulated kitchen waste handling regarding food safety and its impacts on human health.[10] According to a proposal raised in the Hunan People's Congress,[11] eight kitchen waste management projects have been proposed to recover by-products for beneficial reuse, with due regard to public health and overall food safety.

7. **Strategic context.** In the PRC's Thirteenth Five-Year Plan, the government's strategy is to intensify the control of water pollution and the protection of key watersheds.[12] This includes the ecological restoration of resource-depleted areas and the promotion of treating pollutants in contaminated river basins. HPG is committed to meeting these obligations and to eliminating or minimizing pollutants. It has prioritized reducing long-term pollution and promoting the comprehensive treatment and effective management of MSW.[13] HPG focuses on landfill management and MSW collection, transfer, and treatment in urban and rural areas.

8. **ADB support.** The project demonstrates alignment with the operational priorities of ADB Strategy 2030 particularly in terms of environmental sustainability and integrated solutions for livable cities. It closely supports the strategic priorities set out in ADB's country partnership strategy for the PRC, 2016–2020; ADB's Water Operational Plan, 2011–2020, particularly in integrating the management of water resources including pollution control; and ADB's Urban Operational Plan, 2012–2020, particularly in improving environmental sustainability, promoting green and inclusive growth, and enhancing urban–rural links.[14] The project is ADB's first MSW investment in Hunan and the only one in the PRC that focuses entirely on MSW management. The project will adopt lessons learned from over 20 years of ADB experience in national dialogue with the government on MSW policies and practices. This dialogue has contributed to an enabling environment that has facilitated policy, regulatory, and operational improvements. Starting in 2000, ADB supported the government in strengthening urban MSW through technical assistance projects, which helped develop a national policy framework and plans for MSW and wastewater management, focusing on small cities and towns. ADB has also provided specific support for the treatment of substandard landfills in the PRC and for the environmental management of watersheds in Hunan. The project supports HPG's approach to urban–rural integrated MSW

Development and National Development and Reform Commission. 2016. *National Plan for Treatment of Municipal Solid Waste.* Beijing.

[10] There is an unregulated business that collects kitchen waste to recover oils for cooking (known as "gutter" oil) and proteins for animal feed. Both uses are strictly prohibited and have serious impacts on human and animal health, yet this traditional form of recycling and reuse continues unabated.

[11] HPG. 2014. *Proposal on Hunan Municipal Solid Waste Separation and Collection for the Hunan People's Congress.* Changsha.

[12] Government of the PRC, State Council. 2016. *The Thirteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China, 2016–2020*. Beijing.

[13] HPG. 2013. *Implementation Plan for the First Three-Year Action Plan for Hunan Xiangjiang River Pollution Control.* Changsha.

[14] ADB. 2016. *Country Partnership Strategy: People's Republic of China, 2016–2020—Transforming Partnership: People's Republic of China and Asian Development Bank.* Manila; ADB. 2011. *Water Operational Plan, 2011*–2020. Manila; and ADB. 2013. *Urban Operational Plan, 2012–2020*. Manila.

management, which seeks to address the entire cycle of MSW starting in households with collecting, separating, and recycling; and continuing in counties and cities with transferring and treating the remaining wastes. It covers a large population and various levels of government agencies. The engagement with multiple agencies is designed to drive ownership and build wide-ranging capacity at the lowest administrative level and act as a model project.

9. **Value addition of ADB assistance.** The PRC has adequate policies and regulations for MSW management to which ADB knowledge studies and technical assistance have contributed.[15] The implementation of these policies in rural areas, counties, and county-level cities has been a constant challenge. HPG recognizes this and has requested ADB's support to develop an investment project in rural and urban–rural areas, which is intended to show how policy and regulations can be translated into projects that follow best practices. This is intended to keep from duplicating past practices of low-cost interventions that deliver substandard outcomes. This builds on lessons from ADB's past engagements, showing the demand for clear statements on best practice and for robust technical guidance and support. ADB's presence offers a unique opportunity to deliver numerous projects under one overarching project, wholly focused on MSW, to allow collaboration and comparative assessment. ADB's focused support on a chronically underserved sector allows it to be comprehensively addressed. ADB's engagement assists the government in the last stage of providing MSW services and in addressing overlooked aging landfills. The government and ADB have designed the project collaboratively to have a sharper focus on consistent, effective, and innovative approaches with a high potential for replication, based on the best international and national practices. This enhanced design development broadened the project's scope while adopting more holistic and strategic approaches, leading to improved MSW service outcomes and the adoption of appropriate high-level technologies with large-scale demonstration potential, including (i) practical and environmentally sound approaches to landfill closure and restoration, building on recent codes of practice;[16] (ii) robust operational practices to improve the treatment of leachate from landfills; (iii) the selective adoption and promotion of the reduce, reuse, and recycle (3Rs) principle;[17] (iv) improved operational management with approaches incorporating information and communication technology; and (v) a kitchen waste management system as a large-scale demonstration to appropriately manage this valuable resource.[18] The project has been designed to fit with Hunan's future development goals and service-level needs and, noting past lessons, it has been designed to build ownership and deliver practical outcomes. It is expected to act as a catalyst for further investment projects in Hunan, and the government is keen to promote cross-country learning.

B. Impact and Outcome

10. The project is aligned with the following impact: environment in the Xiangjiang River watershed in Hunan Province improved (footnote 12). The project will have the following outcome:

[15] ADB. 2000. *Technical Assistance to the People's Republic of China for Strengthening Urban Solid Waste Management.* Manila; ADB. 2007. *Technical Assistance to the People's Republic of China for Urban Wastewater and Solid Waste Management for Small Cities and Towns*. Manila; ADB. 2012. *Technical Assistance to the People's Republic of China for Management of Uncontrolled Landfills*. Manila; ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for Hunan Dongjiang Lake Integrated Environmental Protection and Management Project.* Manila; and ADB. 2016. *Technical Assistance to the People's Republic of China for Remediation of Heavy Metal Contamination in Farmlands of Hunan Province.* Manila.

[16] Government of the PRC, Ministry of Environmental Protection. 2017. *GB52210-2017: Technical Code for Municipal Solid Waste Sanitary Landfill Closure.* Beijing.

[17] Introduced as a concept in the PRC many years ago, the uptake of the 3Rs principle has been slow in rural areas.

[18] Piloting an intelligent management system to monitor operational logistics at all stages to improve efficiency.

long-term pollutants discharged to the Xiangjiang River watershed reduced.[19] The project will directly benefit an estimated population of 6.9 million and more indirectly in the wider watershed.

C. Outputs

11. **Output 1: Substandard municipal solid waste landfills closed.** The project will close and restore nine substandard landfills, demonstrating at each site the installation of a capping layer and drainage, a leachate collection system, a landfill gas collection and treatment system, and the restoration of vegetation and landscaping.[20]

12. **Output 2: Substandard municipal solid waste landfills mined and remediated.** The project will demonstrate the remediation of two substandard landfill sites through mining, which will include the excavation and transport of waste materials to adjacent sanitary landfill sites. The project will include the closure and restoration of the Xiaowujia site (in Lanshan) and the Zixing site.

13. **Output 3: New urban–rural integrated municipal solid waste management systems established.**[21] The project will establish best practice and well-defined urban–rural MSW management systems in seven project areas. It will support Hunan's strategy for integrated MSW management by piloting the construction of collection and transfer stations in selected locations to demonstrate differing scale and approaches. It will include the procurement of the associated collection and transport equipment and fleet vehicles.[22]

14. **Output 4: Sanitary landfill facilities upgraded.** The project will upgrade the facilities in four sanitary landfill sites. The project will include upgrading and expanding leachate treatment facilities, installing leachate residual treatment facilities, improving site drainage, upgrading landfill cover and associated improvements, and refurbishing and upgrading site infrastructure.[23]

15. **Output 5: A new kitchen waste treatment and management system established.** The project will assist the Yongzhou City Government to establish a kitchen waste treatment and management system for commercial facilities. It will include the collection, transport and treatment, and associated operation and maintenance (O&M) and management systems. The project will support these initiatives by developing a well-prepared regulatory framework, appropriate institutional arrangements, a selection of appropriate technology, and a financially sustainable operational model.

16. **Output 6: Capacity for environmentally sustainable municipal solid waste management enhanced.** The project will support capacity development and institutional strengthening to ensure the successful implementation of the project. This will include technical support for project management and implementation, and training. The project will prepare operationally focused studies on MSW policies and best practice, accompanied by research on

[19] The design and monitoring framework is in Appendix 1.
[20] The sites included are Dong'an; Doupi (in Hengyang); Guiyang; Hengshan; Jiufengshan (in Lanshan); Lengshuijiang; Shanglingqiao; Zhugemiao (in Yongzhou); and Tietong (in Changning).
[21] The project will support the (i) construction of large-scale MSW treatment facilities, including collection and transfer stations; and (ii) procurement of MSW equipment.
[22] It will serve urban and rural populations (highlighted by approximation in brackets) in Changning (0.99 million), Hengyang (1.12 million), Lanshan (0.26 million), Leiyang (1.20 million), Lengshuijiang (0.34 million), Yongzhou (1.32 million), and Zixing (0.36 million). The rural populations served by this project do not receive formal MSW services.
[23] The sites included are Hengyang, Lanshan, Leiyang, and Lengshuijiang.

innovation and technology and pilot projects as inputs to developing knowledge products and guidelines and/or procedures to guide future investments in Hunan.[24]

17. The summary of the project outputs is shown in Table 1.

Table 1: Summary of Project Outputs

Output	Implementing Agency	Description				Proposed Treatment	Remark
1. Substandard MSW Landfills Closed			**Area** (10,000 m^2) **/ Volume** (10,000 m^3)	**Year Built / No Longer Used**	**Condition**		
	Changning	Changning City Tietong MSW Landfill	4.03 / 50.0	2001 / 2012	Simple close	On-site closure	
	Dong'an	Dong'an County MSW Landfill	2.39 / 25.44	1993 / 2012	Simple close	On-site closure	
	Guiyang	Guiyang County MSW Landfill	4.60 / 68.0	1982 / 2012	Simple close	On-site closure	Adjacent to tailing site
	Hengshan	Hengshan County MSW Landfill	2.60 / 39.0	1997 / Present	In operation		
	Hengyang	Hengyang County Doupi MSW Landfill	2.2 / 25.2	1991 / 2014	Simple close	On-site closure	
	Lanshan	Lanshan County Jiufengshan MSW Landfill	2.24 / 22.4	1999 / 2013	Simple close	On-site closure	
	Lengshuijiang	Lengshuijiang City MSW Landfill	3.70 / 58.5	1996 / 2011	Simple close	On-site closure	Fly ash sites
	Yongzhou	Yongzhou City Lengshuijiang Shanglingqiao MSW Landfill	2.00 / 14.3	1995 / 2008	Simple close	On-site closure	
	Yongzhou	Yongzhou City Lingling Zhugemiao MSW Landfill	8.00 / 210.0	1999 / 2010	Simple close	On-site closure	
2. Substandard MSW Landfills Mined and Remediated							
	Lanshan	Lanshan County Xiaowujia MSW Landfill	0.55 / 5.0	1986 / 1998	Equipment yard	Mining	Not in use
	Zixing	Zixing City MSW Landfill	1.2 / 5.0	2000 / 2010	Simple close	Mining	Next to sanitary landfill
3. New Urban–Rural Integrated MSW Management Systems Established			**Urban / Rural Township**	**Total Population** (10,000)	**Condition**		
	Hengyang	Hengyang County Urban–Rural Integrated MSW	1 / 25	109.4	No rural collection	Integrated	
	Changning	Changning City Urban–Rural Integrated MSW	2 / 18	91.8	No rural collection	Integrated	
	Leiyang	Leiyang City Urban–Rural Integrated MSW	1 / 24	120.1	No rural collection	Integrated	
	Yongzhou	Yongzhou City Urban–Rural Integrated MSW	3 / 19	131.6	No rural collection	Integrated	
	Lanshan	Lanshan County Urban–Rural Integrated MSW	1 / 13	43.01	No rural collection	Integrated	
	Zixing	Zixing City Urban–Rural Integrated MSW	2 / 11	35.8	No rural collection	Integrated	
	Lengshuijiang	Lengshuijiang City MSW Transfer Station	4 / 6	37.03	No transfer station	400 t/d station	
4. Sanitary Landfill Facilities Upgraded			**Area** (10,000 m^2) **/**	**Start / Service Life**	**Daily Capacity** (t/d)		

[24] The range of system for MSW management and the variations in landfill conditions and engineering solutions will allow wide-ranging engineering and operational lessons to be collated and disseminated in Hunan and in the PRC.

Output	Implementing Agency	Description				Proposed Treatment	Remark
			Capacity (10,000 m^3)				
	Hengyang	Hengyang County Lida Sanitary Landfill Upgrade	15.77 / 215	2013 / 25	300	Upgrade	
	Leiyang	Leiyang City Nanjing Sanitary Landfill Upgrade	13.33 / 400	2008 / 20	380	Upgrade	
	Lanshan	Lanshan County Qijiacun Sanitary Landfill Upgrade	6.61 / 122	2014 / 19	150	Upgrade	
	Lengshuijiang	Lengshuijiang City Zengjiachong Sanitary Landfill Upgrade	20.0 / 473	2011 / 35	250	Upgrade	
5.	**New Kitchen Waste Treatment and Management System Established**		**Service Area / Population** (10,000)	**Design Capacity** (t/d)	**Current Condition**		
	Yongzhou	Yongzhou City Kitchen Waste Treatment	Yongzhou / 52.26 (Lengshuijiang) / 68.0 (Lingling)	100 (short) / 200 (long)	No treatment	New center	
6.	**Capacity for Environmentally Sustainable MSW Management Enhanced**						
	Project implementation support						
	Institutional strengthening and training						
	Capacity development and studies on MSW						

m^2 = square meter, m^3 = cubic meter, MSW = municipal solid waste, t/d = ton per day.

II. IMPLEMENTATION PLANS

A. Project Readiness Activities

Activities	2018												Responsible Individual/Unit/Agency/ Government
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Establish project implementation arrangement													EA, PMO, IAs
Feasibility study report approval													HDRC
Resettlement plans submission to ADB													ADB
Resettlement plans endorsed and disclosed by EA/IAs													EA, IAs
Preliminary design approval													IA construction bureaus
Advance contracting and retroactive financing													EA, PMO, IAs, TC
CUAR approval													HDRC, NDRC
FROR approval													HFD, MOF
State Council approval for loan negotiation													State Council
Loan negotiation													ADB, HFD, EA
ADB Board approval													ADB
Loan signing													ADB, MOF, HFD, EA
Government legal opinion provided													MOF, NDRC, EA
Loan effectiveness													ADB, MOF, HFD

ADB = Asian Development Bank, CUAR = capital utilization application report, EA = executing agency, FROR = financial review opinion report, HFD = Hunan Provincial Finance Department, HRDC = Hunan Development Reform Commission, IA = implementing agency, MOF = Ministry of Finance, NDRC = National Development and Reform Commission, PMO = project management office, TC = tendering company.

B. Overall Project Implementation Plan

Activities	2018				2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1: Substandard MSW landfills closed																								
1. Prepare preliminary design																								
2. Prepare construction drawings																								
3. Implement land acquisition and resettlement																								
4. Implement SGAP and EMDP																								
5. Prepare bidding documents																								
6. Procure and award contract																								
7. Construction																								
Output 2: Substandard MSW landfills mined and remediated																								
1. Prepare preliminary design																								
2. Prepare construction drawings																								
3. Implement land acquisition and resettlement																								
4. Implement SGAP and EMDP																								
5. Prepare bidding documents																								
6. Procure and award contract																								
7. Construction																								
Output 3: New urban–rural integrated MSW management systems established																								
1. Prepare preliminary design																								
2. Prepare construction drawings																								
3. Implement land acquisition and resettlement																								
4. Implement SGAP and EMDP																								
5. Prepare bidding documents																								
6. Procure and award contract																								
7. Construction																								
8. Purchase equipment																								
Output 4: Sanitary landfill facilities upgraded																								
1. Prepare preliminary design																								
2. Prepare construction drawings																								

Activities	2018				2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3. Prepare bidding documents																								
4 Procure and award contract																								
5. Construction																								
6. Purchase equipment																								
7. Implement SGAP and EMDP																								
Output 5: New kitchen waste treatment and management system established																								
1. Develop legal and institutional proposals																								
2. Prepare preliminary design																								
3. Prepare construction drawings																								
4. Prepare bidding documents																								
5. Procure and award contract																								
6. Purchase and install equipment																								
7. Construction																								
8. Commissioning																								
9. Implement SGAP and EMDP																								
Output 6: Capacity for environmentally sustainable MSW management enhanced																								
1. Recruit and mobilize consultants																								
2. Establish PPMS																								
3. Establish EIA, RP, and PPMS monitoring																								
4. Support project implementation																								
5. Conduct studies and research, workshops, and trainings																								
6. Implement SGAP and EMDP																								

EIA = environmental impact assessment, EMDP = ethnic minority development plan, MSW = municipal solid waste, PPMS = project performance management system, RP = resettlement plan, SGAP = social and gender action plan.

III. PROJECT MANAGEMENT ARRANGEMENTS

A. Project Implementation Organizations: Roles and Responsibilities

18. The Hunan Provincial Housing and Urban–Rural Development Department (HURD) is the executing agency, and the county and county-level city governments are the implementing agencies, i.e., the (i) five counties of Dong'an, Guiyang, Hengshan, Hengyang, and Lanshan; and (ii) five county-level cities of Changning, Leiyang, Lengshuijiang, Yongzhou, and Zixing.

19. A project management office (PMO) has been established under HURD to provide overall guidance, supervision, coordination, and management of project preparation and implementation.

Project Implementation Organizations	Management Roles and Responsibilities
Executing Agency HURD	(i) Provide overall guidance, supervision, coordination, and management of project preparation and implementation (ii) Provide policy guidance during implementation (iii) Provide project coordination with relevant government agencies, central governments, local governments, and other agencies (iv) Liaise with ADB for management and administration
Project Management Office under HURD	(i) Provide overall guidance to the implementing agencies, including supervision, coordination, and management of project preparation and implementation, approving withdrawal applications and managing the audit of project financial statements (ii) Responsible for project coordination and implementation of all project components (iii) In-charge of all day-to-day management work during project preparation and implementation period (iv) Communicate and coordinate with implementing agencies and all involved parties and government agencies for project implementation (v) Engage a tendering company to assist and support implementing agencies to carry out contract package procurement (vi) Oversee the engagement of design institute by each implementing agency to complete preliminary design and construction drawing development (vii) Responsible for financial management, budgeting and planning, consolidation and submission of withdrawal applications, consolidation of project financial statements and facilitation of audit (viii) Provide guidance on project procurement activities, including review and submission of bidding documents, coordination with ADB for reviews and approvals, procurement assistance, bid evaluation reports, and other procurement-related activities (ix) Responsible for implementing capacity development component, including engagement of the project management and implementation support consultant, and other consultants to carry out researches and studies (x) Prepare training plan and carry out training, workshops, and study tours

Project Implementation Organizations	Management Roles and Responsibilities	
	(xi)	Establish project performance monitoring system and carry out project performance monitoring throughout project implementation
	(xii)	Establish environmental management plan implementation and monitoring system and carry out environmental monitoring during project implementation
	(xiii)	Establish LAR implementation and monitoring system and carry out LAR monitoring during project implementation
	(xiv)	Establish social safeguard action plan implementation and monitoring system and carry out social safeguard action plan implementation and monitoring
	(xv)	Carry out project progress management, prepare and submit project progress reports, project midterm adjustment report, and project completion report
Implementing Agencies 10 counties and county-level cities	(i)	Responsible for daily operation and management of the implementation of subprojects in their municipalities
	(ii)	Responsible for the procurement of contract packages in their subprojects
	(iii)	Responsible for their subproject implementation and management including progress, quality and safety, contract management, payment application
	(iv)	Responsible for implementation of environmental management plan, resettlement plan, and social safeguard action plans
1. Changning City Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Tietong existing MSW landfill closure, and urban–rural integrated MSW management system
2. Dong'an County Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Dong'an existing MSW landfill closure
3. Guiyang County Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Guiyang existing MSW landfill closure
4. Hengshan County Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Hengshan existing MSW landfill closure
5. Hengyang County Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Doupi existing MSW landfill closure; Lida sanitary landfill upgrade, and urban–rural integrated MSW management system
6. Lanshan County Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Jiufenshan existing MSW landfill closure, Xiaowujia existing MSW landfill mining, Qijiacun sanitary landfill upgrade, and urban–rural integrated MSW management system
7. Leiyang City Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Nanjing sanitary landfill upgrade, and urban–rural integrated MSW management system

Project Implementation Organizations	Management Roles and Responsibilities	
8. Lengshuijiang City Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Lengshuijiang existing MSW landfill closure, Zengjiachong sanitary landfill upgrade, and urban–rural integrated MSW management system
9. Yongzhou City Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Shanglingqiao existing MSW landfill closure, Zhugemiao existing MSW landfill closure, urban–rural integrated MSW management system, and kitchen waste collection and treatment system
10. Zixing City Government	(i)	Engage a design institute to complete preliminary design and construction drawing development
	(ii)	Implement Zixing existing MSW landfill mining, and urban–rural integrated MSW management system
Hunan Provincial Finance Department	(i)	Sign the onlending and/or relending agreements for the project
	(ii)	Open project imprest account, manage imprest account, approve and submit withdrawal applications, guide financial management and audit of the project
	(iii)	Submit to ADB the persons authorized to sign the withdrawal applications, including specimen signatures of the authorized persons for disbursement of loan proceeds
	(iv)	Process and submit to ADB, through the Ministry of Finance, any request, when required, for matters pertaining to loan or project agreements
	(v)	Monitor project implementation and provide coordination and facilitation as needed
	(vi)	Monitor the onlending agreements and coordinate for repayment of ADB loan
Ministry of Finance	(i)	Supervise the executing agency in the implementation of the project, and act as representative of the PRC Government
	(ii)	Guide the executing agency on ADB documentation requirements, such as legal opinion, and fulfill loan effectiveness conditions when needed

Project Implementation Organizations	Management Roles and Responsibilities
ADB	(i) Provide guidance to the executing and implementing agencies to ensure smooth project implementation and achieve the desired development impacts and their sustainability (ii) Conduct regular loan review missions, a midterm review mission, and project completion review mission (iii) Review and approve procurement actions (iv) Process the withdrawal applications (v) Monitor the status of compliance with all loan covenants including safeguards (vi) Review the annual audit report and follow up on audit recommendations (vii) Regularly update project performance review reports with the assistance of the executing and implementing agencies (viii) Regularly update project information documents for public disclosure on the ADB website, including safeguard documents (ix) Monitor implementation of ADB's anticorruption policies

ADB = Asian Development Bank, HURD = Hunan Provincial Housing and Urban–Rural Development Department, LAR = land acquisition and resettlement, MSW = municipal solid waste, PRC = People's Republic of China.

B. Key Persons Involved in Implementation

Executing Agency Hunan Provincial Housing and Urban–Rural Development Department (HURD)	Name: Yao, Yingjie Position: Deputy Director General, HURD Phone: +86 0731 8895 0016 Email: jstmail@163.com Address: 266 Gaosheng Road, Yuhua District, Changsha
Project Management Office under HURD	Name: Wu, Yong Position: Director, Project Management Office and Director, Housing and Construction Division, HURD Phone: +86 0731 8895 026 Email: jstmail@163.com Address: 266 Gaosheng Road, Yuhua District, Changsha
Hunan Provincial Finance Department	Name: Zhao, Chuancheng Position: Director, Foreign Fund Utilization Office Phone: +86 0731 8516 5067 Email: 335152389@qq.com Address: No. 1 Chengnan Xi Road, Changsha
Hunan Development and Reform Commission	Name: Deng, Rongxing Position: Director, Foreign Fund Utilization and Investment Division Phone: +86 0731 8999 1508 Email: 768420671@qq.com Address: No. 8 Xiangfu Xi Road, Changsha
Implementing Agencies	
1. Changning City Government	Name: Yuan Guijing Position: Deputy Director, Changning City Urban Management Bureau

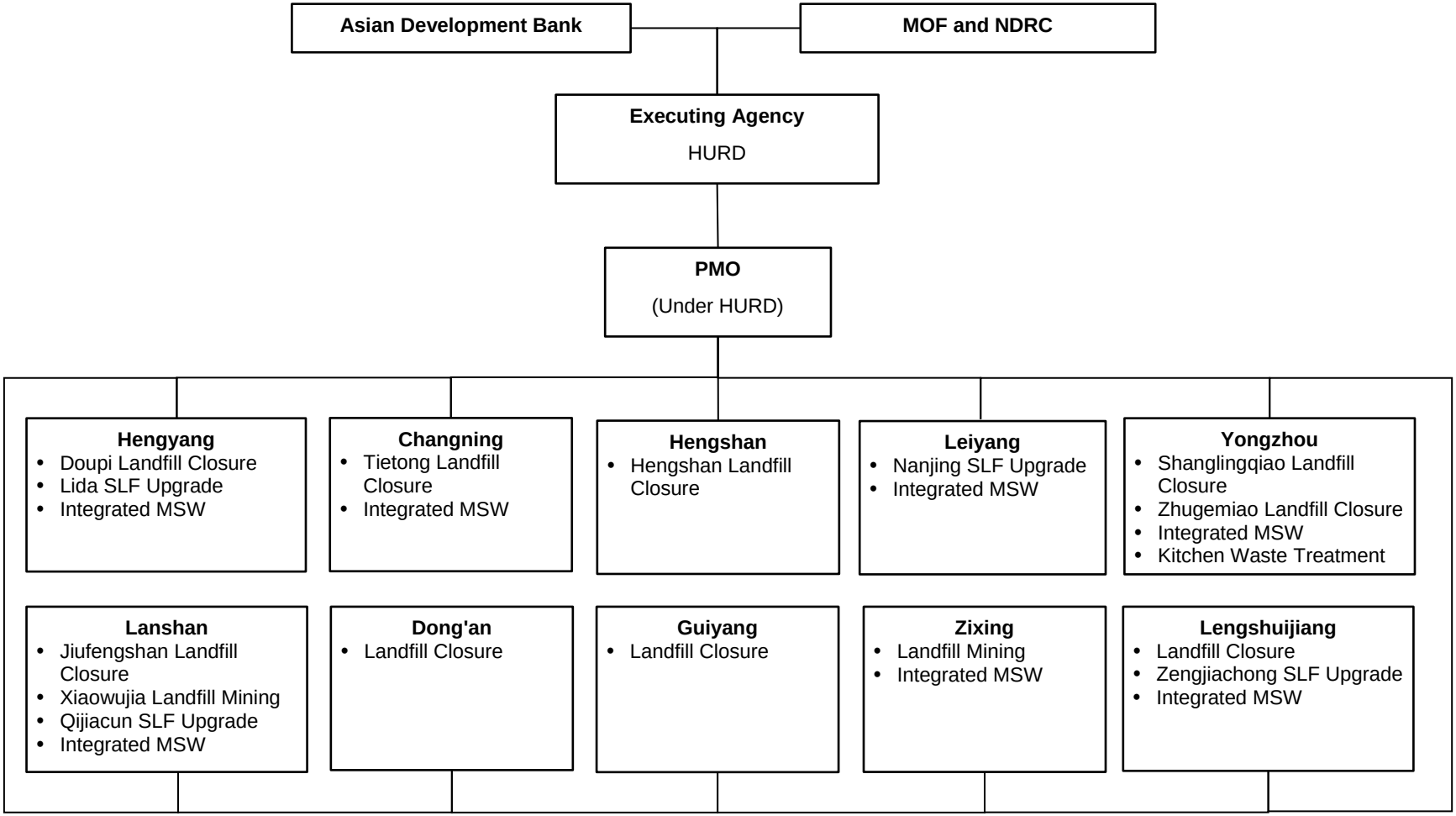
	Phone: +86 186 747 34333 Email: 813415231@qq.com Address: Qingyang North Road, Changning City
2. Dong'an County Government	Name: Tang Xiaoping Position: Deputy Director, Dong'an County Urban Management Bureau Phone: +86 139 7468 2717 Email: dadzzw@163.com Address: No. 513 Jianshe Road, Dong'an County
3. Guiyang County Government	Name: Li Zhiming Position: Director, Guiyang County Urban Management Bureau Phone: +86 138 7552 6566 Email: 4470543@163.com Address: No. 55 County Road, Guiyang County
4. Hengshan County Government	Name: Lei Zhengzong Position: Director, Hengshan County Urban Management Bureau Phone: +86 073 4581 2581 Email: 359712208@qq.com Address: No. 101 Jianshe Street, Hengshan County
5. Hengyang County Government	Name: Luo Shiyou Position: Director, Hengyang County Urban Management Bureau Phone: +86 137 6246 1898 Email: hyxgovcn@126.com Address: Qingfeng Road, Hengyang County
6. Lanshan County Government	Name: Tan Zhongyan Position: Director, Lanshan County Environmental Protection Bureau Phone: +86 137 8746 2276 Email: lsjjxxzx@126.com Address: No. 1 Shunfeng Road, Lanshan County
7. Leiyang City Government	Name: Zhang Xiaoyonng Position: Director, Leiyang City Urban Management Bureau Phone: +86 135 7526 4222 Email: 1076028720@qq.com Address: No. 59 Caichi Road, Leiyang City
8. Lengshuijiang City Government	Name: Hu Tianshan Position: Deputy Director, Lengshuijiang City Urban Management Bureau Phone: +86 133 6738 4333 Email: 26059168@qq.com Address: No. 1 Jiangbei Road, Lengshuijiang City
9. Yongzhou City Government	Name: Tang Huiyun Position: Director, Yongzhou City Urban Management & Planning Bureau Phone: +86 138 0746 7590 Email: yzcity@163.com

	Address: No. 412 Baiye Road, LengshuijiangLengshuijiang District, Yongzhou City
10. Zixing City Government	Name: Zeng Zhixiong Position: Director, Foreign Fund Utilization Office Phone: +86 139 7553 4883 Email: 352203889@qq.com Address: No. 3 Sushi Road, Zixing City

Asian Development Bank

Urban and Social Sectors Division, East Asia Department	Name: Sangay Penjor Position: Director Phone: +63 2 632 5340 Fax: +63 2 636 2407 Email: spenjor@adb.org
Mission Leader	Name: Alan Baird Position: Senior Urban Development Specialist Phone: +63 2 632 4410 Fax: +63 2 636 2407 Email: abaird@adb.org

C. Project Organization Structure



HURD = Hunan Provincial Housing Urban–Rural Development Department, MOF = Ministry of Finance, NDRC = National Development and Reform Commission, PMO = project management office, MSW = municipal solid waste, SLF = sanitary landfill.

IV. COST AND FINANCING

A. Cost Estimates Preparation and Revisions

20. The cost estimates were prepared jointly by the project management office (PMO) and ADB with assistance from the transaction technical assistance consultant. The source and basis for the cost estimates were reviewed during the project preparation and have been confirmed by related parties. The process was facilitated by a financial model in Microsoft Excel software which enabled easy updating or revision as necessary. The model is maintained by both the PMO and ADB. Revision of the cost estimates will be conducted when deemed necessary during implementation. The PMO will be responsible for proposing and drafting any revision which would be subject to ADB approval.

B. Key Assumptions

21. The following key assumptions underpin the cost estimates and financing plan:

(i) Exchange rate: $1.00 = CNY6.28 (as of 31 January 2018);

(ii) Price contingencies based on expected cumulative inflation over the implementation period are as follows:

Table 2: Escalation Rates for Price Contingency Calculation

Item	2018	2019	2020	2021	2022	2023	Average
Foreign rate of price inflation	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%
Domestic rate of price inflation	2.4%	2.3%	2.4%	2.5%	2.5%	2.5%	2.4%

Source: Asian Development Bank.

(iii) In-kind contribution is not applicable for this project financing plan.

C. Summary Cost Estimates and Financing Plan

22. The project is estimated to cost $258 million (Table 3).

Table 3: Summary Cost Estimates
($ million)

Item		Amount[a]
A.	**Base Cost**[b]	
	Output 1: Substandard MSW landfills closed	75.59
	Output 2: Substandard MSW landfills mined and remediated	12.67
	Output 3: New urban–rural integrated MSW management systems established	90.74
	Output 4: Sanitary landfill facilities upgraded	23.57
	Output 5: New kitchen waste treatment and management system established	14.94
	Output 6: Capacity for environmentally sustainable MSW management enhanced	4.00
	Subtotal (A)	**221.51**
B.	**Contingencies**[c]	**27.34**
C.	**Financial Charges During Implementation**[d]	**9.15**
	Total (A+B+C)	**258.00**

MSW = municipal solid waste.

[a] Includes taxes and duties of $21.96 million to be financed from ADB and government resources. ADB loan will finance taxes and duties of $15.53 million; such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of $6.43 million through cash contribution.

[b] In early-2018 prices as of 11 January 2018.

[c] Physical contingencies computed at 8% for civil works; and 6% for field research and development, training, surveys, and studies. Price contingencies computed at average of 1.6% on foreign exchange costs and 2.4% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount.
Source: Asian Development Bank estimates.

23. The government has requested a regular loan of $150 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including a grace period of 5 years; an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; a commitment charge of 0.15% per year; and such other terms and conditions set forth in the draft loan and project agreements. Based on the straight-line repayment method, the average maturity is 15.25 years, and the maturity premium payable to ADB is 0.10% per year. The PRC is the borrower of the loan and will make the loan available, through HPG, to the project-level governments, which will assume the foreign exchange and financial interest risks.

24. The summary financing plan is in Table 2 with details for each local government in the PAM. ADB will finance the expenditures in relation to civil works, goods, consulting services, and capacity development activities. The government has assured ADB that counterpart funds for the project will be provided in a timely manner, including for any shortfall of funds or cost overruns.

Table 4: Summary Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (regular loan)	150.0	58.1
Government[a]	108.0	41.9
Total	**258.0**	**100.0**

[a] Comprising (i) five county governments of Dong'an, Guiyang, Hengshan, Hengyang, and Lanshan; and (ii) five county-level city governments of Changning, Leiyang, Lengshuijiang, Yongzhou, and Zixing.
Source: Asian Development Bank estimates.

Table 5: Detailed Financing Plan

Item	Amount		Share of Total (%)
	(CNY million)	($ million)	
A. Base Cost			
1. Hengyang County	173.12	27.57	10.7
2. Changning City	132.53	21.10	8.2
3. Hengshan County	37.26	5.93	2.3
4. Leiyang City	174.54	27.79	10.8
5. Yongzhou City	271.71	43.27	16.8
6. Lanshan County	224.75	35.79	13.9
7. Dong'an County	53.05	8.45	3.3
8. Guiyang County	68.31	10.88	4.2
9. Zixing City	102.42	16.31	6.3
10. Lengshuijiang City	153.36	24.42	9.5
Subtotal (A)	**1,391.05**	**221.51**	**85.9**
B. Contingencies	**171.72**	**27.34**	**10.6**
C. Financial Charges During Implementation	**57.46**	**9.15**	**3.5**
Total (A+B+C)	**1,620.23**	**258.00**	**100.0**

Source: Asian Development Bank estimates.

Table 6: Detailed Financing Plan (by financier)

Item	Amount		Share of Total (%)
	(CNY million)	($ million)	
Asian Development Bank	942.00	150.00	58.14
Hengyang County	84.14	13.40	5.19
Changning City	62.57	9.96	3.86
Hengshan County	18.45	2.94	1.14
Leiyang City	85.92	13.68	5.30
Yongzhou City	133.06	21.19	8.21
Lanshan County	110.71	17.63	6.83
Dong'an County	26.24	4.18	1.62
Guiyang County	32.27	5.14	1.99
Zixing City	49.86	7.94	3.08
Lengshuijiang City	75.01	11.94	4.63
Total	**1,620.23**	**258.00**	**100.00**

Source: Asian Development Bank estimates.

D. Detailed Cost Estimates by Expenditure Category

Item	(CNY million) Foreign Exchange	Local Currency	Total Cost	($ million) Foreign Exchange	Local Currency	Total	% of Total Base Cost	% of Total Cost
A. Investment Costs[a]								
1. Civil works	55.05	495.45	550.50	8.77	78.89	87.66	39.6	34.0
2. Mechanical and equipment	65.37	588.30	653.67	10.41	93.68	104.09	47.0	40.3
3. Environment and social mitigation	3.99	35.90	39.89	0.63	5.72	6.35	2.9	2.5
4. Land acquisition and resettlement	0.00	21.33	21.33	0.00	3.40	3.40	1.5	1.3
5. Capacity development[b]	25.12	0.00	25.12	4.00	0.00	4.00	1.8	1.6
6. Survey, design, and management	9.10	81.92	91.02	1.45	13.04	14.49	6.5	5.6
7. Operation capital	0.95	8.57	9.52	0.15	1.36	1.52	0.7	0.6
Subtotal (A)	**159.58**	**1,231.47**	**1,391.05**	**25.41**	**196.09**	**221.51**	**100.0**	**85.9**
B. Contingencies[c]								
1. Physical	8.27	74.40	82.66	1.32	11.85	13.16	5.9	5.1
2. Price	8.90	80.15	89.06	1.42	12.76	14.18	6.4	5.5
Subtotal (B)	**17.17**	**154.55**	**171.72**	**2.73**	**24.61**	**27.34**	**12.3**	**10.6**
C. Financial Charges During Implementation	**57.46**	**0.00**	**57.46**	**9.15**	**0.00**	**9.15**	**4.1**	**3.5**
Total Project Cost (A+B+C)	**234.21**	**1,386.02**	**1,620.23**	**37.29**	**220.70**	**258.00**	**116.5**	**100.0**

Note: Numbers may not sum precisely because of rounding.

ADB = Asian Development Bank.

[a] Includes taxes and duties of $21.96 million to be financed from ADB and government resources. ADB loan will finance taxes and duties of $15.53 million. The government will finance taxes and duties of $6.43 million through cash contribution.

[b] Includes consulting services, workshops, trainings, and study tours.

[c] Physical contingencies computed at 8% for civil works; and 6% for field research and development, training, surveys, and studies. Price contingencies computed at average of 1.6% on foreign exchange costs and 2.4% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: ADB estimates.

E. Allocation and Withdrawal of Loan Proceeds

Table E1: Summary Categories and Financing Percentages

No.	Item	Amount Allocated for ADB Financing ($)	Basis for Withdrawal from the Loan Account
1	Works, Goods, Consulting Services, and Capacity Development	150,000,000	Up to 100% of total expenditure claimed
	Total	**150,000,000**	

ADB = Asian Development Bank.

Table E2: Detailed Categories and Financing Percentages to be used during Disbursement

No.	Item	Amount Allocated for ADB Financing ($)	Basis for Withdrawal from the Loan Account
1	Works and Goods	146,000,000	74% of total expenditure claimed
2	Capacity Development[a]	4,000,000	100% of total expenditure claimed
	Total	**150,000,000**	

ADB = Asian Development Bank.

[a] Includes consulting services, workshops, trainings, and study tours.

F. Detailed Cost Estimates by Financier ($ million)

Item	Asian Development Bank		Hengyang County		Changning City		Hengshan County		Leiyang City		Yongzhou City	
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category
A. Investment Costs[a]												
1. Civil works	64.58	74.00	2.49	2.8	1.97	2.2	0.67	0.8	1.94	2.2	3.39	3.9
2. Mechanical and equipment	76.74	74.00	3.65	3.5	2.99	2.9	0.72	0.7	4.34	4.2	6.47	6.2
3. Environment and social mitigation	4.68	74.00	0.23	3.6	0.23	3.7	0.06	1.0	0.20	3.1	0.31	4.9
4. Land acquisition and resettlement	0.00	0.00	0.43	12.8	0.38	11.1	0.00	0.0	0.19	5.6	0.20	5.9
5. Capacity development[b]	4.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Survey, design, and management	0.00	0.00	1.90	13.1	1.48	10.2	0.45	3.1	1.95	13.5	2.84	19.6
7. Operation capital	0.00	0.00	0.07	4.7	0.06	4.2	0.03	2.1	0.37	24.6	0.65	43.1
Subtotal (A)	**150.0**	**67.70**	**8.77**	**4.0**	**7.10**	**3.2**	**1.93**	**0.9**	**8.99**	**4.1**	**13.87**	**6.3**
B. Contingencies[c]												
1. Physical	0.00	0.00	1.64	12.4	1.25	9.5	0.36	2.7	1.67	12.7	2.60	19.7
2. Price	0.00	0.00	1.76	12.4	1.35	9.5	0.39	2.7	1.79	12.7	2.80	19.7
Subtotal (B)	**0.00**	**0.00**	**3.40**	**12.4**	**2.60**	**9.5**	**0.74**	**2.7**	**3.46**	**12.7**	**5.40**	**19.7**
C. Financial Charges During Implementation[d]												
1. Interest during construction	0.00	0.00	1.16	13.4	0.25	2.9	0.25	2.9	1.16	13.4	1.81	21.0
2. Commitment charges	0.00	0.00	0.07	13.4	0.02	2.9	0.02	2.9	0.07	13.4	0.11	21.0
Subtotal (C)	**0.00**	**0.00**	**1.23**	**13.4**	**0.26**	**2.9**	**0.26**	**2.9**	**1.23**	**13.4**	**1.92**	**21.0**
Total Project Cost (A+B+C)	**150.00**		**13.40**		**9.96**		**2.94**		**13.68**		**21.19**	
% Total Project Cost	**58.1**		**5.2**		**3.9**		**1.1**		**5.3**		**8.2**	

Note: Numbers may not sum precisely because of rounding.

ADB = Asian Development Bank.

[a] Includes taxes and duties of $21.96 million to be financed from ADB and government resources. ADB loan will finance taxes and duties of $15.53 million. The government will finance taxes and duties of $6.43 million through cash contribution.

[b] Includes consulting services, workshops, trainings, and study tours.

[c] Physical contingencies computed at 8% for civil works; and 6% for field research and development, training, surveys, and studies. Price contingencies computed at average of 1.6% on foreign exchange costs and 2.4% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: ADB estimates.

Detailed Cost Estimates by Financier ($ million)
(continued)

Item	Lanshan County		Dong'an County		Guiyang County		Zixing City		Lengshuijiang City		Total Cost
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	
A. Investment Costs[a]											
1. Civil works	5.41	6.2	1.63	1.9	1.44	1.6	1.94	2.2	2.21	2.5	87.66
2. Mechanical and equipment	3.30	3.2	0.46	0.4	1.07	1.0	1.49	1.4	2.86	2.7	104.09
3. Environment and social mitigation	0.36	5.7	0.06	1.0	0.06	0.9	0.06	0.9	0.10	1.6	5.40
4. Land acquisition and resettlement	0.22	6.5	0.00	0.0	0.00	0.0	1.05	30.9	0.92	27.2	1.00
5. Capacity development[b]											4.00
6. Survey, design, and management	2.18	15.1	0.57	3.9	0.69	4.8	0.71	4.9	1.73	11.9	14.49
7. Operation capital	0.10	6.8	0.03	2.1	0.03	2.1	0.06	4.2	0.09	6.1	1.52
Subtotal (A)	**11.59**	**5.2**	**2.75**	**1.2**	**3.28**	**1.5**	**5.31**	**2.4**	**7.92**	**3.6**	**221.51**
B. Contingencies[c]											
1. Physical	2.15	16.3	0.51	3.9	0.66	5.0	0.92	7.0	1.42	10.8	13.16
2. Price	2.31	16.3	0.55	3.9	0.71	5.0	0.99	7.0	1.53	10.8	14.18
Subtotal (B)	**4.46**	**16.3**	**1.06**	**3.9**	**1.36**	**5.0**	**1.91**	**7.0**	**2.95**	**10.8**	**27.34**
C. Financial Charges During Implementation[d]											
1. Interest during construction	1.49	17.3	0.35	4.1	0.47	5.4	0.68	7.9	1.02	11.8	8.62
2. Commitment charges	0.09	17.3	0.02	4.1	0.03	5.4	0.04	7.9	0.06	11.8	0.53
Subtotal (C)	**1.58**	**17.3**	**0.37**	**4.1**	**0.50**	**5.4**	**0.72**	**7.9**	**1.08**	**11.8**	**9.15**
Total Project Cost (A+B+C)	**17.63**		**4.18**		**5.14**		**7.94**		**11.94**		**258.00**
% Total Project Cost	**6.8**		**1.6**		**2.0**		**3.1**		**4.6**		**73.6**

Note: Numbers may not sum precisely because of rounding.
ADB = Asian Development Bank.
[a] Includes taxes and duties of $21.96 million to be financed from ADB and government resources. ADB loan will finance taxes and duties of $15.53 million. The government will finance taxes and duties of $6.43 million through cash contribution.
[b] Includes consulting services, workshops, trainings, and study tours.
[c] Physical contingencies computed at 8% for civil works; and 6% for field research and development, training, surveys, and studies. Price contingencies computed at average of 1.6% on foreign exchange costs and 2.4% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount.
Source: ADB estimates.

G. Detailed Cost Estimates by Outputs ($ million)

Item	Total Cost	Substandard MSW landfills closed		Substandard MSW landfills mined and remediated		New urban–rural integrated MSW management systems established		Sanitary landfill facilities upgraded		New kitchen waste treatment and management system established		Capacity for environmentally sustainable MSW management enhanced	
		Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category
A. Investment Costs[a]													
1. Civil works	87.66	42.61	48.6	9.03	10.3	25.02	28.5	7.93	9.0	3.07	3.5	0.00	0.0
2. Mechanical and equipment	104.09	25.09	24.1	2.20	2.1	53.75	51.6	12.78	12.3	10.26	9.9	0.00	0.0
3. Environment and social mitigation	6.35	1.96	30.8	0.44	6.9	3.20	50.3	0.58	9.1	0.18	2.8	0.00	0.0
4. Land acquisition and resettlement	3.40	0.45	13.2	0.00	0.0	2.95	86.8	0.00	0.0	0.00	0.0	0.00	0.0
5. Capacity development[b]	4.00	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	4.00	100.0
6. Survey, design, and management	14.49	5.14	35.5	0.94	6.5	5.56	38.4	1.91	13.2	0.94	6.5	0.00	0.0
7. Operation capital	1.52	0.34	22.4	0.06	3.9	0.26	17.1	0.37	24.3	0.49	32.2	0.00	0.0
Subtotal (A)	**221.51**	**75.59**	**34.1**	**12.67**	**5.7**	**90.74**	**41.0**	**23.57**	**10.6**	**14.94**	**6.7**	**4.0**	**1.8**
B. Contingencies[c]													
1. Physical contingency	13.16	4.49	34.1	0.75	5.7	5.39	41.0	1.40	10.6	0.89	6.7	0.24	1.8
2. Price contingency	14.18	4.93	34.8	0.83	5.8	5.92	41.7	1.54	10.8	0.97	6.9	0.00	0.0
Subtotal (B)	**27.34**	**9.42**	**34.5**	**1.58**	**5.8**	**11.31**	**41.4**	**2.94**	**10.7**	**1.86**	**6.8**	**0.24**	**0.9**
C. Financial Charges During Implementation[d]													
1. Interest during implementation	8.62	2.94	34.1	0.49	5.7	3.53	41.0	0.92	10.6	0.58	6.7	0.16	1.8
2. Commitment charges	0.53	0.18	34.1	0.03	5.7	0.22	41.0	0.06	10.6	0.04	6.7	0.01	1.8
Subtotal (C)	**9.15**	**3.12**	**34.1**	**0.52**	**5.7**	**3.75**	**41.0**	**0.97**	**10.6**	**0.62**	**6.7**	**0.17**	**1.8**
Total Project Cost (A+B+C)	**258.00**	**88.13**	**34.2**	**14.77**	**5.7**	**105.79**	**41.0**	**27.48**	**10.7**	**17.42**	**6.8**	**4.40**	**1.7**

Note: Numbers may not sum precisely because of rounding.
ADB = Asian Development Bank, MSW = municipal solid waste.

[a] Includes taxes and duties of $21.96 million to be financed from ADB and government resources. ADB loan will finance taxes and duties of $15.53 million. The government will finance taxes and duties of $6.43 million through cash contribution.

[b] Includes consulting services, workshops, trainings, and study tours.

[c] Physical contingencies computed at 8% for civil works; and 6% for field research and development, training, surveys, and studies. Price contingencies computed at average of 1.6% on foreign exchange costs and 2.4% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: ADB estimates.

H. Detailed Cost Estimates by Year ($ million)

Item	Total Cost	2019	2020	2021	2022	2023
A. Investment Costs[a]						
1. Civil works	87.66	4.38	13.15	21.91	30.68	17.53
2. Mechanical and equipment	104.09	5.20	15.61	26.02	36.43	20.82
3. Environment and social mitigation	6.35	0.32	0.95	1.59	2.22	1.27
4. Land acquisition and resettlement	3.40	0.17	0.51	0.85	1.19	0.68
5. Capacity development[b]	4.00	0.20	0.60	1.00	1.40	0.80
6. Survey, design, and management	14.49	0.72	2.17	3.62	5.07	2.90
7. Operation capital	1.52	0.08	0.23	0.38	0.53	0.30
Subtotal (A)	**221.51**	**11.08**	**33.23**	**55.38**	**77.53**	**44.30**
B. Contingencies[c]						
1. Physical	13.16	0.66	1.97	3.29	4.61	2.63
2. Price	14.18	0.71	2.13	3.55	4.96	2.84
Subtotal (B)	**27.34**	**1.37**	**4.10**	**6.84**	**9.57**	**5.47**
C. Financial Charges During Implementation	**9.15**	**0.58**	**1.44**	**2.28**	**3.10**	**1.75**
Total Project Cost (A+B+C)	**258.00**	**13.02**	**38.76**	**64.49**	**90.20**	**51.52**
% Total Project Cost	**100.00**	**5.00**	**15.00**	**25.00**	**35.00**	**20.00**

Note: Numbers may not sum precisely because of rounding.

ADB = Asian Development Bank.

[a] Includes taxes and duties of $21.96 million to be financed from ADB and government resources. ADB loan will finance taxes and duties of $15.53 million. The government will finance taxes and duties of $6.43 million through cash contribution.

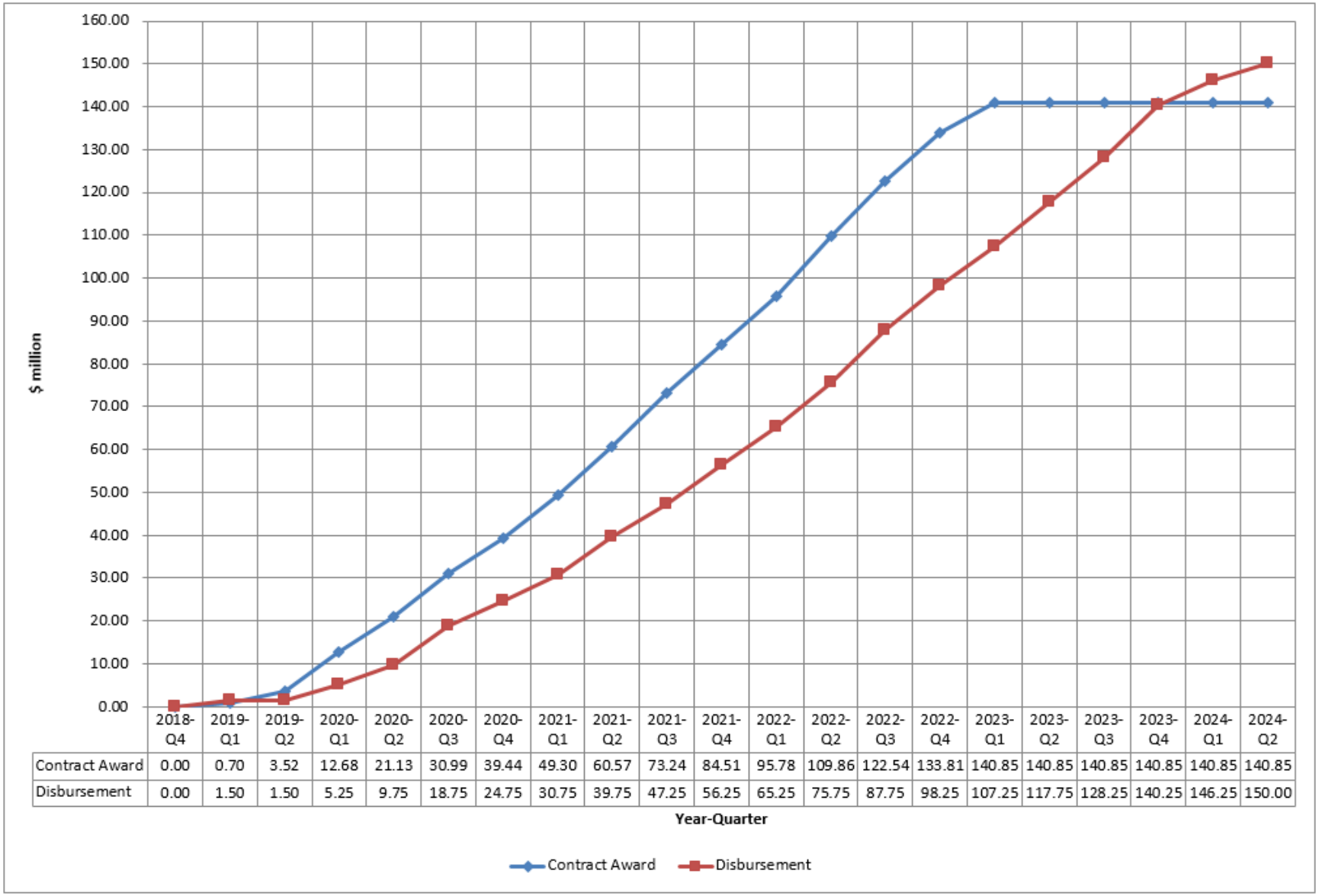
[b] Includes consulting services, workshops, trainings, and study tours.

[c] Physical contingencies computed at 8% for civil works; and 6% for field research and development, training, surveys, and studies. Price contingencies computed at average of 1.6% on foreign exchange costs and 2.4% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount.

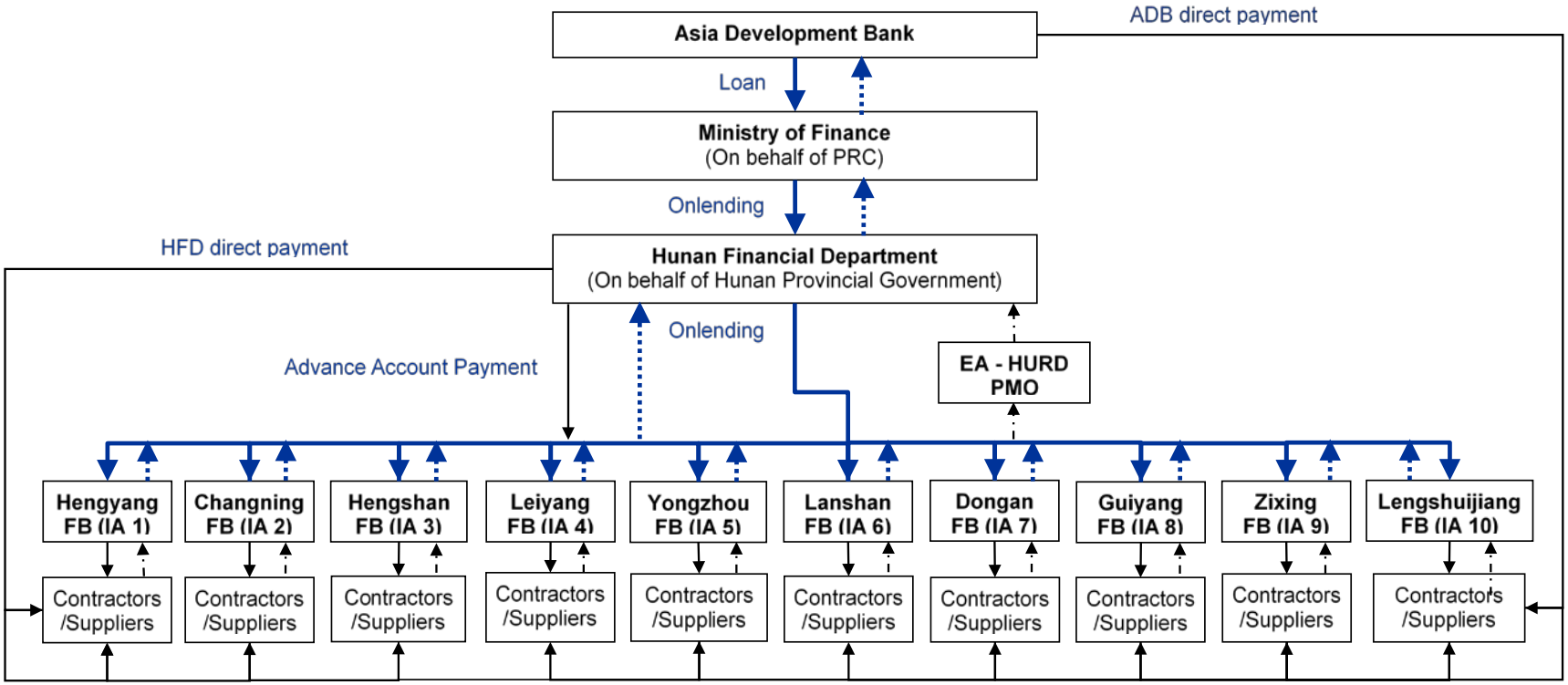
Source: ADB estimates.

I. Contract and Disbursement S-Curve



	2018-Q4	2019-Q1	2019-Q2	2020-Q1	2020-Q2	2020-Q3	2020-Q4	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4	2023-Q1	2023-Q2	2023-Q3	2023-Q4	2024-Q1	2024-Q2
Contract Award	0.00	0.70	3.52	12.68	21.13	30.99	39.44	49.30	60.57	73.24	84.51	95.78	109.86	122.54	133.81	140.85	140.85	140.85	140.85	140.85	140.85
Disbursement	0.00	1.50	1.50	5.25	9.75	18.75	24.75	30.75	39.75	47.25	56.25	65.25	75.75	87.75	98.25	107.25	117.75	128.25	140.25	146.25	150.00

J. Fund Flow Diagram



ADB = Asian Development Bank, EA = executing agency, FB = finance bureau, HFD = Hunan Provincial Finance Department, HURD = Hunan Provincial Housing and Urban–Rural Development Department, PMO = project management office, PRC = People's Republic of China.

V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

25. The financial management assessment (FMA) was carried out for the project in accordance with ADB's Guidelines for the Financial Management and Analysis of Projects and Financial Due Diligence: a Methodology Note.[25] HURD (the executing agency) has set up a PMO to manage and monitor the overall project implementation process; communicate and coordinate with ADB, the Ministry of Finance, and the National Development and Reform Commission; approve and submit tendering documents and fund withdrawal applications to ADB; submit consolidated project audited financial statements; and supervise the monitoring and evaluation of environment, resettlement, and social issues during project implementation. The director of the urban construction division in HURD is assigned as the PMO manager and has three full-time staff managing project implementation, including finance, procurement, resettlement, and environment. The FMA was conducted for the financial management capacity of HURD and the 10 project counties/county-level cities (the implementing agencies). The assessment covered funds flow arrangements, staffing, accounting and financial reporting systems, financial information systems, and internal and external auditing arrangements.

26. The Hunan Provincial Finance Department (HFD), particularly its Foreign Fund Utilization Division, as the project advance account holder, has sufficient financial management experience for donor-funded projects, including ADB, World Bank, and Japan bank loans. HFD has managed several foreign loan projects involving urban development, agriculture, environment, and transportation sectors.

27. The financial management capacity of HURD was assessed as adequate. The assessment concluded that the skills in the general financial management practices such as bookkeeping, statutory reporting, project budgeting and costing, corporate treasury and budgeting were sufficiently developed. This is due to the good conventional accounting environment and standardized practices within PRC Government's financial departments. HURD's experience in the computerized accounting systems and payment processing, project budgeting and costing, and internal auditing is satisfactory. The financial management capacity of the implementing agencies was assessed as adequate since they are similarly operating under PRC Government standard financial management and accounting systems. While the executing and implementing agencies have adequate financial management capacity, they are new to ADB project implementation procedures and requirements. The overall financial management risk is rated as *moderate*. The assessment concluded that (i) there are established accounting and financial management policies and procedures in the PRC, which are strictly followed by the implementing agencies; and (ii) they have sound accounting and financial management capability and are experienced in managing urban development and construction projects. However, they lack experience in implementing foreign-funded projects, and the managers and financial personnel have little knowledge of ADB policies and procedures, especially the annual project reporting requiring a different accounting method. The lack of ADB project implementation experience may delay project implementation due to ineffective management in terms of reporting, disbursement, safeguards monitoring, and other required project management tasks. The identified risks in financial management will be closely monitored during project implementation. It was agreed that the executing and implementing agencies will further strengthen their capabilities by (i) setting up clear institutional arrangements and coordination mechanisms; (ii) completing staff deployment in

[25] ADB. 2005. *Financial Management and Analysis of Projects*. Manila; ADB. 2009. *Financial Due Diligence: A Methodology Note.* Manila.

appropriate financial management positions with English language support; (iii) developing methodologies for managing foreign exchange and interest rate risks; and (iv) undertaking more training, particularly on ADB policy and procedures. Table 7 demonstrates the financial risk mitigation plan to be adopted by the executing and implementing agencies during project implementation.

Table 7: Financial Management Action Plan

Action	Responsibility	Timing
Recruitment of experienced project management consultants to assist in project implementation	PMO	After loan negotiation
Training on ADB financial management requirements, including accounting and auditing, disbursement, and foreign exchange and interest risk management	PMO, implementing agencies, HFD, ADB, Hunan Audit Office	2 months before loan effectiveness
Close monitoring to timely identify potential issues in counterpart funding	PMO, implementing agencies, HFD, ADB	At least once a year during project implementation
Recruitment of accounting staff with required financial skills, and separation of the accounting and auditing functions by restructuring the current finance departments at the implementing agency level	PMO, implementing agencies	1 month before loan effectiveness

ADB = Asian Development Bank; HFD = Hunan Provincial Finance Department, PMO = project management office.
Source: ADB.

Table 8: Financial Management, Internal Control, Risk Assessment and Risk Management Plan

Risk Description	Risk Assessment	Mitigation Measures and Risk Management Plan
1. **Implementing capacity.** IAs lack experience in implementing ADB-financed projects, which is very likely to result in delays to procurement, disbursement, and construction.	High	IAs will be responsible for the implementation, O&M of the Project and will build on their experience in successfully managing and implementing domestically funded construction projects. The project will monitor compliance with financial management policies and procedures.
2. Deficiencies and misinterpretation of ADB guidelines in disbursement and withdrawal of project funds.	Moderate	IAs lack experience for foreign funded projects. Provide additional training to project implementation units in handling ADB disbursements and utilization of project funds.
3. **Cost escalation.** Cost escalation and delay due to contract variations and/or labor shortages owing to seasonal construction demand.	Moderate	HFD provided assurance on adequate and timely provision of counterpart funds. Price contingency and physical contingency are included in the cost estimates to accommodate cost escalation.
4. **Operation and maintenance.** Unsustainable O&M, due to lack of capacity and budget.	Moderate	Capacity building and institutional strengthening for components with substantial O&M costs shall be provided and HFD will provide assurance on O&M budget provision.
5. **Counterpart funding.** The provision for counterpart funding is delayed.	Moderate	The corresponding counties and cities have issued commitment letters for counterpart funding provision
6. **Staffing.** Accounting staff do not have adequate understanding of ADB requirements.	Low in EA High in IA	The EA has implemented several foreign-funded projects. However, both the EA and IAs will need to recruit additional financial staff for the project as the current financial departments are understaffed. The IAs have limited capacity in project accounting and financial reporting. The finance staff have basic knowledge and training for domestic accounting systems but training in

Risk Description	Risk Assessment	Mitigation Measures and Risk Management Plan
		ADB financial management and disbursement procedures will be provided.
7. Foreign currency and interest rate risk management	Moderate	Although, in general terms, foreign exchange hedging is not widely practiced in the PRC, the foreign currency risk is moderate to ADB since local governments have issued commitment letters for repayment. Corresponding risk for the IAs would be moderate too since the CNY exchange rate is expected to be stable over the midterm. Interest rate risk is expected to be moderate since international capital market has had no volatility since 2008. In addition, ADB offers interest conversions at low transaction costs.
8. Accounting policies and procedures	High	9 IAs will use accrual basis for the Project with separately maintained books instead of cash basis as currently used. Training will be provided by the FM Specialist to comply with this requirement
9. Internal audit	High	Lack of accounting staff for review procedure because given the size of the IAs and EA, having own internal independent audit divisions is difficult to justify from an efficiency point of view.
10. External audit	Moderate	The IAs are audited by local government audit bureaus on an irregular basis in accordance with the Chinese accounting and auditing system. The project, as an integrated part of the IAs, will be within the scope of future audits. Although external audit is not annual, the IAs' fund flows are subject to strict procedures governed by HPG since their income is fiscal appropriation.
11. Reporting and monitoring	Moderate	No previous problems were identified for the participating IAs, but bookkeeping and reporting may be a challenge to the IAs as they lack experience with international financing institutions.
12. Information systems	High	The IAs are using computerized accounting systems, but at rudimentary levels on a cash basis.

ADB = Asian Development Bank, CNY = yuan, EA = executing agency, HFD = Hunan Provincial Finance Department, IA = implementing agency, O&M = operation and maintenance, PRC = People's Republic of China.
Source: ADB.

B. Disbursement

28. The loan proceeds will be disbursed in accordance with ADB's Loan Disbursement Handbook (2017, as amended from time to time),[26] and detailed arrangements agreed upon between the government and ADB. Online training for project staff on disbursement policies and procedures is available.[27] Project staff are encouraged to avail of this training to help ensure efficient disbursement and fiduciary control.

29. The project will use the combination of direct payment, reimbursement, and advance fund procedures for disbursements of the loan. Responsibilities by the PMO on disbursement activities are summarized as follows: (i) preparation of disbursement projections based on the

[26] The handbook is available electronically from the ADB website: http://www.adb.org/documents/ loan-disbursement-handbook
[27] Disbursement eLearning. http://wpqr4.adb.org/disbursement_elearning

implementing agencies' respective projections; (ii) request budgetary allocations for counterpart funds; (iii) remind implementing agencies to submit supporting documents for review and endorsement; and (iv) consolidate, prepare, and send withdrawal applications through HFD to ADB.

30. HFD is responsible for making direct payments to contractors and suppliers, and transfer funds to the implementing agencies from the advance account. HFD is also responsible for sending loan withdrawal applications to ADB to initiate either advance account replenishment or where appropriate, to request direct payments by ADB to consultants or suppliers.

31. **Advance fund procedure.** To facilitate project implementation and funds flow to ADB upon loan effectiveness, an advance account will be established and maintained by HFD. The currency of the advance account is the US dollar.[28] The advance account is to be used exclusively for ADB's share of eligible expenditures. HFD, who administers the advance account is accountable and responsible for proper use of advances from the advance account.

32. The total outstanding advance to the advance account should not exceed the estimate of ADB's share of expenditures to be paid through the advance account for the forthcoming 6 months. HFD may request for initial and additional advances to the advance account based on an Estimate of Expenditure Sheet[29] setting out the estimated expenditures to be financed through the account for the forthcoming 6 months. Supporting documents should be submitted to ADB or retained by HFD, executing agency, and implementing agencies in accordance with ADB's Loan Disbursement Handbook when liquidating or replenishing the advance account.

33. **Statement of expenditure procedure.**[30] The statement of expenditure (SOE) procedure may be used for reimbursement of eligible expenditures or liquidation of advances to the advance account. The ceiling of the SOE procedure is the equivalent of $200,000 per individual payment. Supporting documents and records for the expenditures claimed under the SOE should be maintained and made readily available for review by ADB's disbursement and review missions, upon ADB's request for submission of supporting documents on a sampling basis, and for independent audit. Reimbursement and liquidation of individual payments in excess of the SOE ceiling should be supported by full documentation when submitting the withdrawal application to ADB.

34. **Reimbursement.** The reimbursement procedure is a disbursement procedure where ADB pays from the loan account to the borrower's account for the eligible expenditure which have been incurred and paid for by the borrower out of its budget allocation or its own resources. Use of the procedure is encouraged for all eligible expenditures when the borrower has sufficient resources. Under this procedure, ADB's payment are made only to the borrower.

35. Before the submission of the first withdrawal application, the borrower should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the government, together with the authenticated specimen signatures of each authorized person. The minimum value per withdrawal application is stipulated in the Loan Disbursement Handbook. Individual payments below such amount should be paid (i) by HFD and

[28] The bank charges on the imprest account will be financed from the proceeds of the loan.
[29] The Estimate of Expenditure sheet is available in Appendix 8A of ADB's *Loan Disbursement Handbook* (2017, as amended from time to time).
[30] SOE forms are available in Appendix 7B and 7D of ADB's *Loan Disbursement Handbook* (2017, as amended from time to time).

subsequently claimed to ADB through reimbursement, or (ii) through the advance fund procedure, unless otherwise accepted by ADB. The borrower should ensure sufficient category and contract balances before requesting disbursements. Use of ADB's Client Portal for Disbursements (CPD)[31] system is encouraged for submission of withdrawal applications to ADB.

36. For the counterpart funds, the PMO shall cause the implementing agencies to allocate the designated funding for the project as indicated in the loan and project agreements. Counterpart funds from the government will be disbursed and liquidated by the implementing agencies to contractors, suppliers, and service providers. The disbursement procedures will follow the project implementing agreement mutually signed between each implementing agencies and HFD as well as the local financial management practices by each counties and cities.

C. Accounting

37. The executing agency and each implementing agency will maintain, or cause to be maintained, separate books and records by funding source for all expenditures incurred on the project following Accounting Methods for Projects Financed by the World Bank (reference No. 2000 [13]).[32] Each implementing agency will prepare its own project accounts covering their respective components of the project and submit them to the PMO after verification by their respective local finance bureau. The PMO will check the project accounts and consolidate the accounts of all the implementing agencies, and incorporate the PMO expenses related to the project operations. The executing agency, through PMO, will prepare the consolidated project financial statements in accordance with the government's accounting laws and regulations which are consistent with international accounting principles and practices.

D. Auditing and Public Disclosure

38. The executing agency will cause the detailed consolidated project financial statements to be audited in accordance with the PRC national auditing standards by an independent auditor acceptable to ADB. The audited consolidated project financial statements together with the auditor's opinion will be presented in the English language to ADB within 6 months from the end of the fiscal year by the executing agency.

39. The audit report for the project financial statements will include a management letter and auditor's opinions, which cover (i) whether the project financial statements present an accurate and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting standards; (ii) whether the proceeds of the loan were used only for the purpose(s) of the project; and (iii) whether the borrower or executing agency was in compliance with the financial covenants contained in the legal agreements (where applicable).

40. Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal program supervision, and followed up regularly with all concerned, including the external auditor.

41. The HFD, executing agency, and implementing agencies have been made aware of ADB's

[31] The CPD facilitates online submission of withdrawal application to ADB, resulting in faster disbursement. The forms to be completed by the Borrower are available online at https://www.adb.org/documents/client-portal-disbursements-guide.

[32] Accounting regulations issued by the Ministry of Finance for all foreign aid-funded projects.

approach to delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements.[33] ADB reserves the right to require a change in the auditor (in a manner consistent with the constitution of the borrower), or for additional support to be provided to the auditor, if the audits required are not conducted in a manner satisfactory to ADB, or if the audits are substantially delayed. ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.

42. Public disclosure of the audited consolidated project financial statements, including the auditor's opinion, will be guided by ADB's Public Communications Policy 2011.[34] After the review, ADB will disclose the audited consolidated project financial statements and the opinion of the auditors no later than 14 days of ADB's confirmation of their acceptability by posting them on ADB's website. The management letter, additional auditor's opinions, and audited entity financial statements will not be disclosed.[35]

VI. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting and Retroactive Financing

43. To expedite project implementation, the government requested ADB to approve (i) advance contracting, which includes the recruitment of consultants, procurement of civil works, and equipment purchase; and (ii) retroactive financing of eligible expenditures.

44. All advance contracting and retroactive financing will be undertaken in conformity with ADB's Procurement Guidelines (2015, as amended from time to time) and Guidelines on the Use of Consultants (2013, as amended from time to time). The issuance of invitations to bid under advance contracting and retroactive financing will be subject to ADB's prior approval. The borrower, executing agency, and implementing agencies have been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the project.

45. **Advance contracting.** Advance contracting will include (i) tendering and bid evaluation for civil works packages; (ii) recommendation for contract award; and (iii) recruitment of consultants. The advance contracting includes civil works packages and consulting service contracts. The issuance of invitations to bid and bidding documents under advance procurement action will be subject to ADB's prior approval.

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[33] ADB's approach and procedures regarding delayed submission of audited project financial statements are as follows:
(i) When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (a) the audit documents are overdue; and (b) if they are not received within the next 6 months, requests for new contract awards and disbursement such as new replenishment of advance accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed.
(ii) When audited project financial statements are not received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursement such as new replenishment of advance accounts, processing of new reimbursement, and issuance of new commitment letters. ADB will (a) inform the executing agency of ADB's actions; and (b) advise that the loan may be suspended if the audit documents are not received within the next 6 months.
(iii) When audited project financial statements are not received within 12 months after the due date, ADB may suspend the loan.

[34] Public Communications Policy. http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications

[35] This type of information would generally fall under public communications policy exceptions to disclosure. ADB. 2011. *Public Communications Policy*. Paragraph 97(iv) and/or 97(v).

46. **Retroactive financing.** The government was informed that as a general rule, retroactive financing is permitted only if (i) it is specifically agreed by ADB and the borrower; (ii) the goods, works, services, and consultants for which it is requested are procured in accordance with ADB's Procurement Guidelines (2015, as amended from time to time) and Guidelines on the Use of Consultants (2013, as amended from time to time); (iii) the amount to be retroactively financed does not exceed 20% of the loan amount; and (iv) the expenditures must have been incurred before effectiveness of the relevant loan but, generally, no earlier than 12 months before signing of the loan agreement. In either instance, detailed assessments (due diligence) on each retroactive financing proposal must demonstrate that (i) the expenditures incurred are genuine, reasonable, and material to getting the project off the ground; and (ii) they were incurred for proper reasons, in a transparent manner over a reasonable period of time.

B. Procurement of Goods, Works, and Consulting Services[36]

47. All procurement of goods and works, including consulting services, will be undertaken in accordance with ADB's Procurement Guidelines (2015, as amended from time to time) and Guidelines on the Use of Consultants (2013, as amended from time to time). All civil works contracts will be procured using national competitive bidding (NCB). For goods contracts, 9 will be procured using international competitive bidding (ICB), 10 will use NCB, and 1 will procured using Shopping method. The first draft bidding documents for civil works and goods for each implementing agency (translated in English) should be submitted to ADB for approval regardless of the amount. Subsequent bidding documents will be for post review.

48. To facilitate project management and implementation, provide capacity building and institutional strengthening, and undertake external monitoring; an estimated 256 person-months (49 international and 207 national) of consulting services are required for project management and implementation support consultants, startup support consultants, external monitors, and municipal solid waste consultants.

C. Procurement Plan

49. An 18-month procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages and national competitive bidding guidelines is shown in the following:

Basic Data

Project Name: Hunan Xiangjiang River Watershed Existing Solid Waste Comprehensive Treatment Project	
Project Number: 48443-002	**Approval Number:** TBA
Country: People's Republic of China	**Executing Agency**: Hunan Provincial Housing and Urban–Rural Development Department
Project Procurement Classification: Category B **Procurement Risk:** Medium	**Implementing Agencies:** Five county governments of Dong'an, Guiyang, Hengshan, Hengyang, and Lanshan; and five county-level city governments of Changning, Leiyang, Lengshuijiang, Yongzhou, and Zixing
Project Financing Amount: $258 million **ADB Financing:** $150 million **Cofinancing (ADB Administered):** N/A **Non-ADB Financing:** $108 million	**Project Closing Date:** 31 December 2023

[36] During implementation, the executing agency will have the option to change to ADB's new Procurement Framework.

Date of First Procurement Plan:	**Date of this Procurement Plan**:
8 February 2018	4 September 2018

1. Methods, Thresholds, Review and 18-Month Procurement Plan

a. Procurement and Consulting Methods and Thresholds

Except as the Asian Development Bank (ADB) may otherwise agree, the following process thresholds shall apply to procurement of goods and works.

Procurement of Goods and Works		
Method	**Threshold**	**Comments**[a]
International Competitive Bidding (ICB) for Works	$40,000,000 and above	Prior review
International Competitive Bidding for Goods	$3,000,000 and above	Prior review
National Competitive Bidding (NCB) for Works	$100,001 up to $39,999,999	Prior review for first bidding documents for each implementing agency; post review thereafter
National Competitive Bidding for Goods	$100,001 up to $2,999,999	Prior review for first bidding documents for each implementing agency; post review thereafter
Shopping for Works	Up to $100,000	Post review
Shopping for Goods	Up to $100,000	Post review

Consulting Services	
Method	**Comments**
Quality- and Cost-Based Selection (QCBS)	Prior review; quality-cost ratio 90:10; may use full technical proposal and simplified technical proposal
Consultants' Qualifications Selection (CQS)	Prior review; simplified technical proposal
Individual Consultant Selection (ICS)	Prior review

b. Goods and Works Contracts Estimated to Cost $1 Million or More

The following table lists goods and works contracts for which the procurement activity is either ongoing or expected to commence within the next 18 months.

Goods and Works							
Package Number	General Description	Estimated Value ($)	Procurement Method	Review	Bidding Procedure	Advertisement Date (quarter/year)	Comments
Changning City							
C-CN01	Tietong Existing MSW Landfill Closure	8,497,651	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
C-CN02	Changning Integrated MSW System Transfer Stations	3,280,255	NCB	Post	1S1E	Q4 2018	Small works; AC/RF
E-CN01	Changning Integrated MSW System Equipment	6,401,274	ICB	Prior	1S1E	Q2 2019	Goods
Dong'an County							
C-DA01	Dong'an Existing MSW Landfill Closure	7,602,847	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF

Goods and Works							
Package Number	General Description	Estimated Value ($)	Procurement Method	Review	Bidding Procedure	Advertisement Date (quarter/year)	Comments
Guiyang County							
C-GY01	Guiyang Existing MSW Landfill Closure	9,954,594	NCB	Prior	1S1E	Q1 2019	Small works
Hengshan County							
C-HS01	Hengshan Existing MSW Landfill Closure	5,340,494	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
Hengyang County							
C-HY01	Doupi Existing MSW Landfill Closure	7,679,459	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
C-HY02	Lida Sanitary Landfill Upgrade Civil Works	1,305,732	NCB	Post	1S1E	Q3 2018	Small works; AC/RF
C-HY03	Hengyang MSW Collection and Transfer Stations	4,789,809	NCB	Post	1S1E	Q2 2019	Small works
E-HY01	Lida Sanitary Landfill Leachate Treatment Upgrade	1,114,650	NCB	Prior	1S1E	Q1 2019	Goods
E-HY02	Hengyang Integrated MSW System Equipment	9,135,350	ICB	Prior	1S1E	Q3 2019	Goods
Lanshan County							
C-LS01	Lanshan Sanitary Landfill Upgrade	2,143,471	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
C-LS02	Jiufengshan Existing MSW Landfill Closure	6,419,190	NCB	Post	1S1E	Q3 2019	Small Works
C-LS03	Xiaowujia Existing MSW Landfill Mining	2,872,611	NCB	Post	1S1E	Q4 2018	Small works; AC/RF
C-LS04	Lanshan Integrated MSW System Transfer Stations	3,184,713	NCB	Post	1S1E	Q4 2018	Small works; AC/RF
E-LS01	Lanshan Sanitary Landfill Upgrade Equipment	2,566,879	NCB	Prior	1S1E	Q1 2019	Goods
E-LS02	Lanshan Integrated MSW System Equipment	6,568,471	ICB	Prior	1S1E	Q2 2019	Goods
Leiyang City							
C-LY01	Leiyang Integrated MSW System Transfer Stations	4,936,306	NCB	Prior	1S1E	Q4 2018	Small works; AC/RF
C-LY02	Leiyang Sanitary Landfill Upgrade and Partial Closure for Fly Ash Storage	5,079,618	NCB	Post	1S1E	Q1 2019	Small works
E-LY01	Leiyang Sanitary Landfill Equipment	4,203,822	ICB	Prior	1S1E	Q2 2019	Goods
E-LY02	Leiyang Integrated MSW System Equipment	9,920,382	ICB	Prior	1S1E	Q1 2019	Goods
Lengshuijiang City							

Goods and Works							
Package Number	General Description	Estimated Value ($)	Procurement Method	Review	Bidding Procedure	Advertisement Date (quarter/year)	Comments
C-LSJ01	Lengshuijiang Existing MSW Landfill Closure	9,570,701	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
C-LSJ02	Lengshuijiang Sanitary Landfill Upgrade	1,471,897	NCB	Post	1S1E	Q1 2019	Small works
C-LSJ03	Lengshuijiang City Transfer Station	3,354,522	NCB	Post	1S1E	Q1 2020	Small works
E-LSJ01	Lengshuijiang Sanitary Landfill Upgrade Equipment	3,405,892	ICB	Prior	1S1E	Q2 2019	Goods
Yongzhou City							
C-YZ01	Zhugemiao Existing MSW Landfill Closure	8,186,322	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
C-YZ02	Shanglingqiao Existing MSW Landfill Closure	6,318,949	NCB	Post	1S1E	Q1 2019	Small works
C-YZ03	Yongzhou Integrated MSW System Transfer Stations	3,082,803	NCB	Post	1S1E	Q4 2018	Small works; AC/RF
E-YZ01	Yongzhou Integrated MSW System Equipment	6,734,076	ICB	Prior	1S1E	Q4 2018	Goods; AC/RF
Zixing City							
C-ZX01	Zixing Existing MSW Landfill Mining and Sanitary Landfill Upgrade	7,113,057	NCB	Prior	1S1E	Q3 2018	Small works; AC/RF
C-ZX02	Zixing Integrated MSW System Transfer Stations	2,055,389	NCB	Post	1S1E	Q1 2019	Small works
E-ZX01	Zixing Integrated MSW System Equipment	2,711,783	NCB	Post	1S1E	Q2 2019	Goods
E-ZX02	Zixing Sanitary Landfill Upgrade Equipment	1,676,752	NCB	Prior	1S1E	Q1 2019	Goods

AC = advance contracting, ICB = international competitive bidding, MSW = municipal solid waste, NCB = national competitive bidding, RF = retroactive financing.

[a] The Ministry of Finance-issued Chinese model bidding documents for procurement of civil works and goods under national competitive bidding should be used without modification.

c. Consulting Services Contracts Estimated to Cost $100,000 or More

The following table lists consulting services contracts for which the recruitment activity is either ongoing or expected to commence within the next 18 months.

Consulting Services							
Package Number	General Description	Estimated Value	Recruitment Method	Review	Advertisement Date (quarter/year)	Type of Proposal	Comments
CS1	Project Management and Implementation Support	2,054,000	QCBS	Prior	Q3 2018	FTP	Assignment: International 90:10; AC/RF
CS2	MSW Separation and Integrated Urban–Rural MSW Management Study and Demonstration	500,000	QCBS	Prior	Q3 2019	FTP	Assignment: International; 90:10
CS6	Startup Support (3 contracts)	103,300	ICS	Prior	Q3 2018	–	Assignment: National; Procurement, environment, and resettlement experts; AC/RF
CS7	External Environmental Monitoring	150,000	CQS	Prior	Q2 2019	STP	Assignment: National

AC = advance contracting, CQS = consultants' qualifications selection, FTP = full technical proposal, ICS = individual consultant selection, QCBS = quality- and cost-based selection, RF = retroactive financing, STP = simplified technical proposal.

d. Goods and Works Contracts Estimated to Cost Less than $1 Million and Consulting Services Contracts Less than $100,000 (Smaller Value Contracts)

The following table groups smaller-value goods, works and consulting services contracts for which the activity is either ongoing or expected to commence within the next 18 months.

Goods and Works								
Package Number	General Description	Estimated Value	Number of Contracts	Procurement Method	Review	Bidding Procedure	Advertisement Date (quarter/year)	Comments
Dong'an County								
E-DA01	Dong'an MSW Equipment	95,541		Shopping	Post	–	Q2 2019	Goods

MSW = municipal solid waste.

Consulting Services								
Package Number	General Description	Estimated Value	Number of Contracts	Recruitment Method	Review	Advertisement Date (quarter/year)	Type of Proposal	Comments
None								

2. Indicative List of Packages Required Under the Project

The following table provides an indicative list of goods, works and consulting services contracts over the life of the project, other than those mentioned in previous sections (i.e., those expected beyond the current period).

Goods and Works							
Package Number	General Description	Estimated Value ($)	Estimated Number of Contracts	Procure-ment Method	Review	Bidding Procedure	Comments
Changning City							
E-CN02	Changning Intelligent MSW Management System	636,943	1	NCB	Prior	1S1E	Goods
Hengyang County							
E-HY03	Hengyang Intelligent MSW Management System	636,943	1	NCB	Post	1S1E	Goods
Lanshan County							
C-LS05	Lanshan Rural Existing MSW Dump Site Clean Up	8,240,446	1	NCB	Post	1S1E	Small works
E-LS03	Lanshan Intelligent MSW Management System	636,943	1	NCB	Post	1S1E	Goods
Leiyang City							
E-LY03	Leiyang Intelligent MSW Management System	636,943	1	NCB	Prior	1S1E	Goods
Lengshuijiang City							
E-LSJ02	Lengshuijiang City Transfer Station Equipment	2,794,745	1	NCB	Prior	1S1E	Goods
E-LSJ03	Lengshuijiang Intelligent MSW Management System	636,943	1	NCB	Post	1S1E	Goods
Yongzhou City							
C-YZ04	Yongzhou Kitchen Waste Treatment Facility	4,140,207	1	NCB	Post	1S1E	Small works
E-YZ02	Yongzhou Kitchen Waste Treatment System Equipment	9,371,019	1	ICB	Prior	1S1E	Goods
E-YZ03	Yongzhou Intelligent MSW Management System	955,414	1	NCB	Prior	1S1E	Goods
Zixing City							
E-ZX03	Zixing Intelligent	636,943	1	NCB	Post	1S1E	Goods

Goods and Works							
Package Number	General Description	Estimated Value ($)	Estimated Number of Contracts	Procure-ment Method	Review	Bidding Procedure	Comments
	MSW Management System						

ICB = international competitive bidding, MSW = municipal solid waste, NCB = national competitive bidding.

Consulting Services							
Package Number	General Description	Estimated Value	Estimated Number of Contracts	Recruitment Method	Review	Type of Proposal	Comments
CS3	Existing MSW Landfill Treatment and Redevelopment	200,000	1	CQS	Prior	STP	Assignment: International
CS4	Kitchen Waste and Other Waste Management and Resource Recovery	300,000	1	QCBS	Prior	FTP	Assignment: International; 90:10
CS5	Incineration and Waste Resource Recovery	200,000	1	CQS	Prior	STP	Assignment: International

CQS = consultants' qualifications selection, FTP = full technical proposal, QCBS = quality- and cost-based selection, STP = simplified technical proposal.

3. List of Awarded and Ongoing, and Completed Contracts

The following tables list the awarded and ongoing contracts and completed contracts.

a. Awarded and Ongoing Contracts

Goods and Works							
Package Number	**General Description**	**Estimated Value**	**Awarded Contract Value**	**Procurement Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Comments**

Consulting Services							
Package Number	**General Description**	**Estimated Value**	**Awarded Contract Value**	**Recruitment Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Comments**

b. Completed Contracts

Goods and Works								
Package Number	**General Description**	**Estimated Value**	**Contract Value**	**Procurement Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Date of Completion**	**Comments**

Consulting Services								
Package Number	**General Description**	**Estimated Value**	**Contract Value**	**Recruitment Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Date of Completion**	**Comments**

4. Non-ADB Financing

The following table lists goods, works and consulting services contracts over the life of the project, financed by non-ADB sources.

Goods and Works				
General Description	**Estimated Value (cumulative)**	**Estimated Number of Contracts**	**Procurement Method**	**Comments**
Consulting Services				
General Description	**Estimated Value (cumulative)**	**Estimated Number of Contracts**	**Recruitment Method**	**Comments**

National Competitive Bidding

Regulation and Reference Documents

The procedures to be followed for national competitive bidding shall be those set forth in *The Government Procurement Law of the People's Republic of China* approved on 29 June 2002 and *Law of the People's Republic of China on Bid Invitation and Bidding of the People's Republic of China* promulgated on August 30, 1999 with the clarifications and modifications described in the following paragraphs required for compliance with the provisions of the ADB *Procurement Guidelines*.

Procurement Procedures

Competitive Bidding Procedure (Procurement Law Article 26 and Law on Bidding Article 10)

Public tendering is the acceptable method of government procurement, and public invitation is the accepted bid invitation mode.

Eligibility

The eligibility of bidders shall be as defined under section I of the Procurement Guidelines; accordingly, no bidder or potential bidder should be declared ineligible for reasons other than those provided in section I of the Guidelines, as amended from time to time.

Advertising

All invitations to prequalify or to bid shall be advertised in the national press (China Daily Newspaper) or a free and open access website (www.chinabidding.com). Such advertisement shall be made in sufficient time for prospective bidders to obtain prequalification or bidding documents and prepare and submit their responses. In any event, a minimum preparation period of twenty-eight (28) days shall be given. The preparation period shall count (a) from the date of advertisement, or (b) when the documents are available for issue, whichever date is later. The advertisement and the prequalification and bidding documents shall specify the deadline for such submission.

Bidding Period

The minimum bidding period is 28 days prior to the deadline for the submission of bids.

Participation by Government-Owned Enterprises

Government owned enterprises in the Borrower's country may be permitted to bid if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law and (c) are not a dependent agency of the Borrower/Project Executing Agency.

Rebidding

Re-bidding shall not be allowed solely because the number of bids is less than three (3).

Bidding Documents

Qualification Requirements

Qualification requirements of bidders and the method of evaluating the qualification of each bidder shall be specified in detail in the bidding documents, and in the prequalification documents if the bidding is preceded by a prequalification process.

Bid Submission and Opening

Bidders shall be allowed to submit bids by mail or by hand.

All bids shall be opened in public; all bidders shall be afforded an opportunity to be present (either in person or through their representatives) at the time of bid opening, but bidders shall not be required to be present at the bid opening.

Bid Evaluation and Award

No bid may be rejected solely on the basis that the bid price falls outside any standard contract estimate, or margin or bracket of average bids established by the Borrower/Project Executing Agency.

Each contract shall be awarded to the lowest evaluated responsive bidder, that is, the bidder who meets the appropriate standards of capability and resources and whose bid has been determined (a) to be substantially responsive to the bidding documents and (b) to offer the lowest evaluated cost. The winning bidder shall not be required, as a condition of award, to undertake responsibilities for work not stipulated in the bidding documents or otherwise to modify the bid as originally submitted.

ADB Policy Clauses

Each contract financed with the proceeds of the Loan shall provide that the suppliers and contractors shall permit ADB, at its request, to inspect their accounts and records relating to the performance of the contract and to have said accounts and records audited by auditors appointed by ADB.

A provision shall be included in all bidding documents for NCB works and goods contracts financed by ADB stating that the Borrower shall reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question.

A provision shall be included in all bidding documents for NCB works and goods contracts financed by ADB stating that ADB will declare a firm or individual ineligible, either indefinitely or for a stated period, to be awarded a contract financed by ADB, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices or any integrity violation in competing for, or in executing, ADB-financed contract.

D. Consultant's Terms of Reference

50. The outline terms of reference for the consulting service packages are detailed below.

1. CS1: Project Management and Implementation Support

51. Project implementation and institutional strengthening consulting service of an estimated 31 person-months of international and 108 person-months of national consultants will be engaged by QCBS method with a quality:cost ratio of 90:10 with full technical proposal procedure. The consultants will assist the PMO in:

(i) setting up institutional framework, operational procedure, document control, design supervision, and contract management systems for the project and work plan to guide and facilitate the project implementation. This should utilize and adapt as necessary the arrangements set up for the earlier ADB projects in Hunan Province;

(ii) establishing a project performance management system (PPMS) in accordance with ADB requirements, including establishing baseline and operation mechanism for data collection, analysis and reporting;

(iii) developing comprehensive project implementation plans and procedures for monitoring and controlling overall project activities;

(iv) conducting technical review and providing expert comments on detailed engineering design in accordance with the design codes and standards;

(v) reviewing designs, drawings, and the bidding documents, including the identification of potential technical problems and suggesting means of resolving these, and incorporation of environmental mitigation measures where appropriate;

(vi) ensuring that bidding documents include for contractors to provide equipment operation and maintenance manuals in Chinese and that training in equipment and maintenance is adequately provided for;

(vii) performing technical, financial and procedural review of bid evaluation, and supporting contract negotiations;

(viii) conducting routine site visits and providing technical inputs to construction planning, supervision and monitoring for quality control of the project construction;

(ix) conducting contract management, including monitoring construction progress, preparing semiannual progress reports, reviewing the contractors' claims for payments, coordinating project implementation among contractors and various stakeholders, and coordinating daily operational tasks;

(x) conducting technical review for construction supervision and management, including (a) approval of construction methods; (b) ensuring work is undertaken according to the intent of contract specifications; (c) control over construction quality; (d) adherence to contract work programs and recovery of slippage; (e) site health and safety procedures as per environment management plan, ethnic minority development plan (EMDP), and social and gender action plan (SGAP); (f) record keeping systems to protect client interests in event of claims; and (g) claims assessment and determination;

(xi) providing expert inputs, review and justification for contract variation and preparing necessary documentations in accordance with the government and ADB requirements, if necessary;

(xii) providing expert inputs on asset commissioning and handover, including a review of documentation provided by the contractors and that they have fully discharged their training obligations;

(xiii) establishing an efficient and effective financial management system for the project implementation in accordance with ADB policy and procedural requirements and implementing such financial management system;

(xiv) assessing financial management and (a) reviewing current accounting and administrative capacities of the project operation units for the built facilities, (b) verifying if internal control system is employed and providing guidance on setting up the appropriate financial controls, (c) checking current internal audit, external or government audit, and (d) recommending any changes as appropriate;

(xv) assessing the financial performance of the project operation units for the past 5 years and evaluating its financial capacity regarding cost recovery, borrowing capacity, debt servicing, tariff collection, accounts receivable, and subsidies, as appropriate;

(xvi) identifying areas for improvement, e.g., the accounting method transition by majority of the implementing agencies from cash basis method to accrual method, and training needed with respect to the quality of financial statements disclosure,

and notes to the financial statements, and developing templates for the annual financial statements;

(xvii) assisting the executing agency and implementing agencies in establishing a project accounting and disbursement system to comply with ADB disbursement requirements, and domestic financial management and financial annual auditing requirements; and providing assistance in accounting management and disbursement processing, annual auditing, and other financial related tasks;

(xviii) collecting all necessary information, editing, drafting, and submitting the reports required under loan and project covenants on a timely manner, especially in providing assistance to the implementing agencies' annual project reporting, auditing, and review of the English version of the auditing report submitted to ADB and help address ADB's comments;

(xix) assisting the executing agency and implementing agencies in reviewing and updating the environmental management plan (EMP), resettlement plan, and SGAP; and conducting internal monitoring of the implementation of the EMP, resettlement plan, EMDP, and SGAP on a semiannual basis;

(xx) providing expert opinions to ensure effectiveness of the project components' environmental mitigation measures and enhancement package implementation;

(xxi) collecting periodic information for PPMS updating;

(xxii) preparing necessary information for ADB's loan administration missions including loan review, loan midterm review, and loan completion missions;

(xxiii) updating project financial status, project cost tables, financing plan and financial and economic analysis, and safeguard implementation;

(xxiv) organizing and providing semiannual training on effective project financial management, procurement, disbursement, safeguards, and anticorruption measures;

(xxv) organizing and providing semiannual training on the skills necessary for construction supervision, project management, and implementation of social and environmental safeguards for ADB requirements;

(xxvi) undertaking annual tariff reviews for wastewater tariff, and assessing the impact and affordability of the tariff increase on the poor;

(xxvii) providing (a) training on prevention and control of communicable diseases, including HIV and community disturbance to contractors, and (b) drug and human trafficking awareness campaigns to the local communities;

(xxviii) advising and training contractors and supervising companies on ADB policy and procedural requirements to ensure their full compliance;

(xxix) sampling and monitoring of environmental data related to the project, and contracting out the official environmental monitoring service to an accredited environmental monitoring station;

(xxx) making recommendations to resolve any issues or problems on implementing the EMP, resettlement plan, and the SGAP;

(xxxi) developing and submitting the semiannual progress reports, including internal social and poverty, resettlement reports (semiannually), and environmental monitoring reports (annually), to ADB with quality acceptable to ADB;

(xxxii) preparing a project completion report within 3 months of project completion; and

(xxxiii) assist the PMO to arrange a series of study tours and workshops/seminars to strengthen the institutional capacity of PMO and executing agency and/or implementing agencies. The following are the indicative objectives, however, the details for study tours can be adjusted during implementation based on actual needs and implementation progress: (a) two overseas study tours to similar regions in Europe or North America; (b) two overseas study tours to similar regions

in Asia; and (iii) three domestic study tours to similar cities, all focusing on integrated MSW management systems.

52. The indicative inputs are summarized in Table 8 below.

Table 8: Consulting Service Inputs (CS1)

Position	International (person-month)	National (person-month)
Team Leader/Project Management/Urban Development Specialist	10	
Deputy Team Leader/Construction Management/Civil Engineering Specialist		30
Procurement Specialist	2	12
MSW Engineering and Management Specialist	6	12
Economist	3	6
Financial Management Specialist		6
Environmental Specialist	3	12
Social Development and Gender Specialist	3	12
Resettlement Specialist	2	10
PPMS Specialist	2	8
Total	**31**	**108**

MSW = municipal solid waste, PPMS = project performance monitoring system.

2. CS2: Municipal Solid Waste Separation and Integrated Urban–Rural Municipal Solid Waste Management Study and Demonstration

53. Research study and demonstration consulting service of an estimated 8 person-months of international and 32 person-months of national consultants will be engaged by QCBS method with a quality:cost ratio of 90:10 with full technical proposal procedure.

54. The main objectives of the consulting service are to conduct detailed research on MSW separation as well as the establishment of an effective urban–rural integrated MSW management; to evaluate and assess the current practices and arrangements in the PRC; identify the problems and restrictions for the effective implementation of these systems; and develop detailed planning and implementation guidelines for the establishment and implementation of efficient and sustainable arrangements for MSW separation and urban–rural integrated MSW management systems. The consulting service will prepare the design and implementation of a pilot project in a selected township-village to demonstrate MSW separation and urban–rural integrated MSW management systems. The specific tasks may include, but not be limited to:

(i) conducting research and surveys on MSW separation and urban–rural integrated MSW management systems; the research will (a) provide an overview on the developments and practices in the PRC and other countries, (b) identify problems in planning and implementation, and (c) provide suggestions and recommendations in planning, design, and implementation of MSW separation and urban–rural integrated MSW management systems;

(ii) conducting detailed assessment and analysis on rural solid waste management systems including waste minimization, separation, reuse and recycling, and collection and treatment; based on the assessment and results, develop detailed guidelines on planning, design, and implementation of rural solid waste management systems;

(iii) conducting detailed studies and analyses on urban MSW management systems, including waste minimization, separation, reuse and recycling, and collection and treatment; based on the assessment and results of both rural and urban solid

waste management systems, develop the detailed guidelines in planning, design, and implementation of urban–rural integrated MSW management systems;

(iv) conducting detailed studies and surveys on the technologies and innovations in rural and urban solid waste management including waste sorting and recycling, composting, waste-to-energy, waste for use as construction materials, etc;

(v) developing guidelines for the development of integrated municipal solid waste management system based on the MSW management hierarchy and the 3Rs principle, i.e., reduce, reuse and recycle, and with the emphasis on the waste minimization;

(vi) developing detailed guidelines, standards and procedures for the establishment of MSW separation and urban–rural integrated MSW management systems including planning, design, implementation, operation and monitoring systems;

(vii) using the established guidelines and standards, design a pilot project for solid waste separation and urban–rural integrated MSW management in a selected township-village(s), and working with the township-village authorities to implement the pilot project;

(viii) conducting detailed assessment and understanding of socio-cultural and gender barriers and opportunities to the actual implementation of the 3Rs principle, service delivery, and specific innovations in both rural and urban areas; and develop MSW systems, guidelines and potential future interventions;

(ix) developing a project performance monitoring system and conduct performance monitoring for the three consecutive years, updating and refining the study guidelines and standards based on the implementation results of the pilot project; and

(x) providing training as necessary.

55. The indicative inputs are summarized in Table 9 below.

Table 9: Consulting Service Inputs (CS2)

Position	**International** (person-month)	**National** (person-month)
Team Leader/MSW Planning Specialist	8	
Deputy Team Leader/MSW Separation/Recycling Specialist		12
MSW Planning Specialist		6
MSW Treatment Specialist		6
MSW Procurement Specialist		6
MSW Social and Gender Specialist		2
Total	**8**	**32**

MSW = municipal solid waste.

3. CS3: Existing Municipal Solid Waste Landfill Treatment and Redevelopment

56. Research study and demonstration consulting service of an estimated 3 person-months of international and 12 person-months of national consultants will be engaged by CQS method.

57. The main objectives of the consulting service are to conduct a detailed study on planning, design, implementation and monitoring of existing landfill closure and the potential redevelopment of the sites after closure; to include a review and evaluate the current best practices both in the PRC and developed countries, identify and assess of the technologies and innovations used in landfill closure; to consider other approaches to redevelopment and reuse of closed landfill sites;

and develop detailed guidelines and standards for onsite landfill closure. The specific tasks may include, but not be limited to:

(i) conducting research and survey MSW landfill closures for both substandard and sanitary landfills; providing an overview of related developments and practices in the PRC and other countries; identifying problems in planning and implementation, and providing suggestions and recommendations in the planning, design, and implementation of landfill site closure and potential redevelopment for urban development;

(ii) conducting detailed studies on technologies and innovations on leachate collection and treatment as well as leachate residual treatment, to identify best practices in leachate and residual treatment, and provide suggestions and recommendations for planning, design, and implementation of closure;

(iii) conducting detailed studies on redevelopment and restoration of landfill sites; identifying environmental issues and potential remedy measures to mitigate impact; identifying constraints and limitations for potential landfill site redevelopment and use for urban development; and developing approaches and methods for redevelopment and reuse of landfill sites; and

(iv) developing detailed guidelines, standards, and procedures for the planning, design, construction, management, and monitoring of the MSW landfill closures, including the capping of the landfill, leachate and residual treatment, landfill gas collection and treatment as well as guidelines for landfill site redevelopment and reuse; the guideline shall also cover the standards and procedures for maintenance and monitoring of landfill sites after closure, especially for the key indicators related to the environmental protection and human health; the guidelines for annual monitoring of subsidence rate for MSW landfills after closure will also be developed.

58. The indicative inputs are summarized in Table 10 below.

Table 10: Consulting Service Inputs (CS3)

Position	**International** (person-month)	**National** (person-month)
Team Leader/MSW Treatment Specialist	3	
Deputy Team Leader/Landfill Engineering Specialist		8
Urban Development Specialist		4
Total	**3**	**12**

MSW = municipal solid waste.

4. CS4: Kitchen Waste and Other Waste Management and Resource Recovery

59. Research study and demonstration consulting service of an estimated 4 person-months of international and 20 person-months of national consultants will be engaged by QCBS method.

60. The main objectives of the consulting service are to conduct detailed research and survey for current and emerging developments on kitchen waste collection and treatment, construction waste management, waste water treatment plant (WWTP) sludge handling and treatment, review and evaluate best practices in the PRC and other countries; identify the problems and issues in developing and implementing on these special municipal waste treatment requirements, evaluate environmental and health impacts following the implementation of these treatment applications, and develop detailed guidelines, standards and procedures on reatment and resource recovery for kitchen waste, construction waste, WWTP sludge, and other specialized waste to be used for future projects. The specific tasks may include, but not be limited to:

(i) conducting research and survey of developments on handling, treating ans disposal/reuse of kitchen waste, construction waste, WWTP sludge and other specialized municipal wastes; providing an overview and evaluation of current practices in the PRC and other countries;, identifying problems and issues in development and application; and providing suggestions and recommendations in the planning, design, implementation, operation and monitoring of treatment facilities;

(ii) conducting detailed studies on technologies and innovations in kitchen waste collection and treatment, construction waste reuse and resource recovery, WWTP sludge treatment and other specialized municipal waste treatment; identifying and comparing different alternatives and technologies; and providing recommendations of the use and application of these technologies;

(iii) conducting detailed studies and analyses on the development and implementation of kitchen waste collection and treatment, construction waste management, WWTP sludge treatment; developing the framework and roadmap in policy and regulation development, institutional setup and other enabling arrangements; developing a monitoring and enforcement system; and establishing environmental and health monitoring systems; and

(iv) developing detailed guidelines, procedures and standards in the planning, design, construction and implementation, operation and maintenance, monitoring and enforcement for the applications of kitchen waste collection and treatment, construction waste management, WWTP sludge treatment and disposal, and other specialized municipal wastes.

61. The indicative inputs are summarized in Table 11 below.

Table 11: Consulting Service Inputs (CS4)

Position	**International** (person-month)	**National** (person-month)
Team Leader/MSW Planning Specialist	4	
Deputy Team Leader/Kitchen Waste Management Specialist		10
Construction Waste Specialist		6
Sludge Treatment Specialist		4
Total	**4**	**20**

MSW = municipal solid waste.

5. CS5: Incineration and Waste Resource Recovery

62. Research study and demonstration consulting service of an estimated 3 person-months of international and 12 person-months of national consultants will be engaged by CQS method.

63. The main objectives of the consulting sevice are to conduct detailed studies on the development and implementation of waste treatment by incineration and other types of resource recovery, review and assess technologies in waste incineration, and the development trends in the sector; review and evaluate current best practices in the PRC and other countries, review the environmental and health issues related to incineration and other waste resource recovery applications; and develop detailed guidelines and procedures in the planning, design, and implementation of waste treatment facilities using incineration and/or other types of waste resource recovery processes. The specific tasks may include, but not be limited to:

(i) conducting research and survey on waste incineration developments and implementation in the PRC and other countries; providing an overview and

evaluation on developments and best practice in incineration and other waste resource recovery processes; identifying problems and issues on environmental and health impacts as well as during the planning and implementation of incineration facilities; and providing suggestions and recommendations for the planning, design and implementation of waste incineration and other waste resource recovery facilities;

(ii) conducting detailed research and evaluation on waste incineration including implementation, use of technology and innovation, development trends, current best practice in the PRC and other countries including lessons learned, identify and assess environmental and health issues, and providing suggestions and recommendations on the application of MSW incineration;

(iii) in addition to incineration, conducting detailed assessment and analysis on other types of MSW resource recovery applications such as MSW sorting for resource recovery, identifying technologies and innovations, assessing each type of resource recovery, and developing detailed guidelines for the planning, design, and implementation of these waste resource recovery including incineration, MSW sorting and recycling, etc; and

(iv) conducting detailed studies and analyses on MSW incineration and other MSW resource recovery applications, identifying environmental and health issues and mitigation measures, developing detailed guidelines for the planning, design and implementation and monitoring of MSW incineration and other types of waste resource recovery.

64. The indicative inputs are summarized in Table 12 below.

Table 12: Consulting Service Inputs (CS5)

Position	**International** (person-month)	**National** (person-month)
Team Leader/MSW Planning Specialist	3	
Deputy Team Leader/MSW Incineration Specialist		8
Waste Resource Recovery Specialist		4
Total	**3**	**12**

MSW = municipal solid waste.

6. CS6: Startup Support

65. One individual consultant for an estimated 7 person-months for national project procurement, one individual consultant for an estimated 2 person-months of national safeguards (social and resettlement), and one individual national consultant for an estimated 2 person-months for environment support will be engaged through ICS for initial project implementation support. The consultants will assist the PMO in:

(i) establishing initial project management system including internal procedures of routine data filling and information exchange for procurement, and required reporting on project progress and safeguards;

(ii) recruiting consulting services for the project implementation and institutional strengthening support (CS1), through QCBS method in accordance with ADB guidelines and procedural requirements;

(iii) recruiting consulting services for the external environment monitoring (CS7), through CQS method in accordance with ADB guidelines and procedural requirements;

(iv) procuring goods and works for the project's infrastructural components under advance contracting in accordance with ADB guidelines and procedural requirements;
(v) assisting the executing and implementing agencies in updating and finalizing the resettlement plan for ADB approval prior to award of civil works contracts;
(vi) assisting the implementing agencies to implement the EMDP and SGAP, or updates if necessary;
(vii) ensuring the communications strategy, grievance redress system, and information disclosure systems are established and functioning and that external monitoring agencies for safeguards are engaged before the start of physical works;
(viii) collecting necessary information for reporting requirement of ADB including, semiannual implementation progress report, and project administration manual update for inception mission; and
(ix) providing training on project management, procurement, disbursement, financial management, and social safeguards policy and procedures.

7. CS7: External Environmental Monitoring

66. An external environmental monitoring agency will be engaged intermittently for 12 person-months for the entire duration of project implementation. The PMO will engage the national consultants by firm/institute during implementation, using CQS method. The external environment monitor will assist the PMO in:

(i) coordinating and planning of external monitoring;
(ii) updating the EMP and monitoring the internal EMP compliance;
(iii) conducting routine inspection on EMP implementation;
(iv) providing advice to the implementing agencies to optimize technical design of the project works from an environmental aspect and assuring that environmental mitigation measures are well undertaken in construction and operation;
(v) provide training to project stakeholders on ADB's environment safeguard requirement;
(vi) reviewing project progress and compliance with the EMP based on field visits, and reviewing the environmental impact monitoring conducted, with the findings reported in a format acceptable to ADB; this will also include annual monitoring, reporting, and evaluation on the subsidence rate of the MSW landfills after closure;
(vii) organizing public awareness campaigns on environmental protection;
(viii) making recommendations to resolve any issues or problems, and providing advice to the PMO and relevant implementing agency; and
(ix) submitting external monitoring reports in English and Chinese language to HURD and ADB with quality acceptable to ADB every 6 months during implementation of plans.

VII. SAFEGUARDS

A. Environment

67. **Environment assessment.** The project is classified as category A for environment following ADB's Safeguard Policy Statement (SPS 2009). The project environmental impact assessment (EIA) and environmental management plan (EMP) identify the environmental mitigation and monitoring measures needed during project implementation to address identified environmental risks and impacts. For existing facilities proposed for upgrade under the project, an environmental compliance audit including on-site assessment report identify whether actions

were in accordance with ADB's safeguards principles and requirements, and appropriate mitigation measures to address any outstanding compliance issues are incorporated in the EMP. These documents comply with the PRC's regulatory requirements and SPS 2009 and will be disclosed on the ADB website at least for 120 days prior to ADB's Board consideration.

68. Two rounds of stakeholder consultation meetings have been conducted at each project county/county-level city and no significant issue has been identified. Public consultations informed the project design and environmental impact assessment (EIA) process, and will continue throughout project implementation. Any environmental grievances will be handled in accordance with the grievance redress mechanism (GRM) established for the project. The EMP outlines potential impacts, mitigation and monitoring measures, institutional arrangements, training requirements, and implementation budget.

69. The EIA identified potential direct, indirect, cumulative, and induced environmental impacts and risks and proposed mitigation measures for pre-construction, construction, and operation phases of the project. These include air, soil, and groundwater and surface water pollution caused by excavation, collection and treatment of leachate, collection and transportation of solid wastes, and closure of landfill sites. The EIA includes information on issues associated with specific contaminants such as polychlorobiphenyls, asbestos, persistent organic pollutants, and other hazardous substances expected from the substandard sites. Large-scale collection and transportation of solid waste is required with temporary impacts on air and dust, noise, odor, disruption to traffic, and community safety. Avoidance of impact through design, site management, and mitigation measures through construction management is identified for each impact in the project EMP which will be implemented by the contractors and monitored and reported by the PMO. The proposed closure works will include site regrading, stormwater interception ditches, surface water drainage system, earth cover incorporating a linear low-density polyethylene geomembrane, site restoration, landscaping, and installation of groundwater monitoring wells downstream of the site. The landfill gas will be collected using landfill gas wells sunk into the waste body, with the gas being treated with biocovers before discharging into the atmosphere. In all cases, where the EMP requirements are strictly followed, it is expected that construction impacts will be kept at acceptable levels. None of the project sites is located or adjacent to environmentally sensitive areas. Biodiversity impacts are expected to be minimal and suitable mitigation measures will be adopted during detailed design and implementation.

70. The project is classified as medium climate risk and the climate risk and vulnerability assessment conducted found that intense precipitation and flood as the most important risk affecting project design, construction, maintenance, and performance. Intense precipitation may cause considerable damage to construction sites with landfill liner structure fractures and waste/leachate overflow. Intense precipitation and flood can damage operational or closed landfills and other facilities within the project boundary. It can also disturb regular operation and maintenance in case the project sites have access difficulties. The project will implement adaptation measures in response to climate vulnerability of the watershed to reduce the risk of pollutant diffusion in extreme climate events, mainly floods.

71. The EIA will be updated during detailed design stage to include (i) additional baseline data collected by investigation of leachate movement and groundwater table, (ii) additional data gathered by sampling in different seasons and locations at suitable distance with the project site, (iii) any potential chemical/hazard which may pose public health concern including sludge management and disposal at leachate treatment facilities; (iv) occupational health and safety risks identified during construction, and (v) assessment of land use plan for each of the MSW landfill sites to be closed. The updated EIA will also include detailed guidance on the land use planning

and development in accordance with the local city/county rules and regulations. This will cover any requirements related to the restriction on public access and movement, types of activities for which the area can be used, etc. The subsidence rate of the landfills post-closure will be monitored annually based on geo-technical assessments, and suitability and sustainability of each site's safe and beneficial use will be evaluated by a technically competent team prior to clearance for any future use or public access.

72. In the design stage, the PMO will coordinate between the design institute and the EIA institute to incorporate the EMP mitigation measures into the detailed engineering designs with allocated environmental mitigation budgets. Any changes to the designs will be reviewed and approved by the government and ADB, and the EMP will be updated as needed. The EMP includes a comprehensive monitoring plan which covers both internal monitoring (by contractors during construction and operation) and external monitoring. The results of monitoring will be included in the project progress reports. A loan implementation environmental consultant (LIEC) will be engaged using the ADB loan. The EMP will be a part of the bidding documents when procuring all civil work packages. To ensure that bidders respond to the EMP provisions, the PMO and the implementing agencies will prepare and provide the following specification clauses for incorporation into the bidding documents: (i) budget for EMP implementation in the bidders' proposals; (ii) environmental clauses for contractual terms and conditions; and (iii) updated project EIA and EMP, and the domestic environmental impact assessment reports. In the design stage, the PMO will coordinate between the design institute and the EIA institute to incorporate the EMP mitigation measures into the detailed engineering designs with allocated environmental mitigation budgets.

73. HURD and the implementing agencies will be responsible for ensuring that the project will be designed, constructed, and operated in accordance with (i) the domestic environmental, health, and safety laws, regulations, procedures, and guidelines; (ii) ADB's SPS, and (iii) the project EIA and EMP. HURD holds the final responsibility for the implementation and compliance with the EMP and submission of semiannual environmental monitoring reports to ADB for review and disclosure on the ADB website.

74. Project county and county-level city governments will supervise and provide guidance to the contractors to ensure that the EMP is effectively implemented. They will consolidate monthly environmental monitoring reports; ensure timely disclosure of the project EIA and/or EMPs in locations and forms accessible to the public; and take corrective actions when necessary to ensure no environmental impacts. Their capacity to implement the EMP, as well as the capacity of the operation and maintenance unit to manage project facilities, will be strengthened through capacity building and training activities defined under project output 6. The responsible parties for environmental management and supervision are outlined in Table 13.

Table 13: Institutional Arrangement and Environmental Management

Agency	Environmental Management Roles and Responsibilities
Executing Agency HURD	• Responsible for overall policy and direction control • Responsible for project coordination with all project county/county-level city governments, liaison with ADB, and financial management and administration • Providing guidance to PMO
PMO	• Primarily responsible for implementation of project components, including finance and administration, technical and procurement matters, monitoring and evaluation, and safeguard compliance • Assign one environment specialist as EMP officer/coordinator who will (i) supervise contractors and their compliance with the EMP; (ii) conduct regular

Agency	Environmental Management Roles and Responsibilities
	site inspections; (iii) act as local entry point for the project GRM; and (iv) review environmental quality monitoring results provided by the implementing agencies • Communicate and coordinate with ADB for project management and implementation; submit the project implementation progress reports and safeguard compliance monitoring reports to ADB • Submit bidding documents, bid evaluation reports and other necessary documentation to ADB for review and approval • Engage loan implementation consultants, including environmental specialists to assist in supervision, tracking and reporting on EMP implementation for all packages • Engage local environmental monitoring stations and external environment monitoring for environmental impact monitoring according to the EMP environment monitoring plan • Consolidate data from environmental monitoring reports into semiannual environmental monitoring reports and submit them to ADB for review and disclosure
ADB	• Monitor and supervise the overall environmental performance of the project • Review and approve the semiannual environment monitoring reports and disclose the reports on ADB website in line with ADB Public Communications Policy (2011) • Conduct due diligence of environment issues and advise on corrective actions during project review missions
Implementing Agencies 10 project counties/county-level cities	• Responsible for day-to-day management work during the project preparation and implementation periods • Assign an environmental specialist to supervise and monitor the implementation of the EMP, and liaise with PMO • Communicate and coordinate with HURD and PMO for project management and implementation • Incorporate EMP clauses in bidding documents for civil works • Establish local level dedicated Project Complaints Coordinating Unit in accordance with the project GRM • Supervise and monitor EMP implementation and reporting to the PMO • Participate in capacity building and training programs
Contractor, CSC, Environmental Supervision Consultant	• Construction contractors will develop site-specific EMPs on the basis of the project EMP and will be responsible for implementing mitigation measures during construction under the supervision of the CSCs • CSCs will be selected through the People's Republic of China bidding procedure by the implementing agencies • CSCs will be responsible for supervising construction progress and quality, and EMP implementation on construction sites • Each CSC shall have at least one environmental engineer on each construction site to (i) supervise the contractor's EMP implementation performance; (ii) prepare the contractor's environmental management performance section in monthly project progress reports to be submitted to the implementing agencies and PMO; and (iii) ensure occupational health and safety management at work sites
Loan Implementation Environmental Consultant	• Provide technical assistance to the PMO and implementing agencies for EMP implementation • Provide training to the staff of the PMO, implementing agencies, contractors, and CSCs • Assist the PMO and implementing agencies in preparing site specific EMPs • Review updated EMP • Confirm that mitigation measures have been included in engineering detailed design • Review bidding documents to ensure that the EMP clauses are incorporated • Advise on mitigation measures, provide technical support, and conduct environmental training

Agency	Environmental Management Roles and Responsibilities
	• Conduct annual EMP compliance review • Support PMO in preparing project progress reports including EMP implementation status summary and any additional mitigation measures taken
County/County-Level City Environmental Monitoring Station or Certified Environmental Entity	• Conduct environmental impact monitoring according to the EMP monitoring plan and submit monitoring results to the PMO
External Monitoring Agency	• Review and analyze project-related significant environmental impacts and progress on implementation of mitigation measures as outlined in the project EIA and EMP, participating in ongoing stakeholder consultations and evaluation and reporting on how environmental grievances, if any, are handled • Provide recommendations and suitable actions to PMO on any corrective actions • Prepare and submit semiannual external monitoring reports to ADB for review and disclosure on the ADB website
County/County-Level City EPB	• Inspect the facilities during construction and operation to ensure compliance • Enforce applicable environmental laws and regulations

ADB = Asian Development Bank, CSC = construction supervision company, EIA= environmental impact assessment, EMP = environmental management plan, GRM = grievance redress mechanism, HURD = Hunan Provincial Housing and Urban–Rural Development Department, PMO = project management office.
Source: Transaction technical assistance consultants.

75. ADB will review and approve semiannual EMP monitoring reports and disclose on the ADB website in line with ADB's Public Communications Policy (2011).

76. Site specific EMP (Contractor's Environmental Management Plan) based on the EMP must be prepared prior to the commencement of civil works construction activities. The contract should specify that the contractor should report monthly on the implementation of the Contractor's Environmental Management Plan.

77. HURD shall make available, and cause the implementing agencies to make available, the necessary budgetary and human resources to fully implement the EMP. If there are any changes in project scope or unanticipated environmental and/or social risks and impacts that arise during construction, implementation or operation of the project that were not considered in the EIA and the EMP, the PMO shall promptly inform ADB. The PMO shall (i) assess the significance of any unanticipated impacts; (ii) evaluate the options available to address them; and (iii) prepare or update the EIA and EMP to incorporate these impacts.

B. Involuntary Resettlement

78. The project is category B for involuntary resettlement. The project will require the acquisition of about 23.5 hectares of land for the 127 waste transfer stations. Of these, only three households will be marginally affected due to partial loss of their garden land and forest land. The rest of the waste transfer stations will be located on wasteland or unallocated arable and forest land owned by village collectives. There will be no impact on houses or structures except one abandoned village office. Six resettlement plans have been prepared in accordance with the PRC laws and regulations and ADB's Safeguard Policy Statement (SPS). For the existing waste transfer stations, landfill sites, and kitchen waste sites which are either owned by HURD or leased from the village, due diligence have been carried out and no legacy or outstanding issue was found.

79. The government will ensure that (i) the resettlement plans agreed between the government and ADB are updated based on final technical design and submitted to ADB for review and concurrence prior to land acquisition activities, and implemented in accordance with applicable government laws and regulations and ADB's SPS; in case of any inconsistency between government laws and ADB's policy, the latter will prevail; (ii) all affected persons are given adequate opportunity to participate in resettlement planning, updating, and implementation; (iii) counterpart funds for land acquisition and resettlement activities are provided according to the budget and project schedule; (iv) any additional costs in excess of the resettlement plan budget estimates are met within the project schedule; (v) the PMO and all implementing agencies will designate adequate staff and resources to supervise and monitor updating and implementation of the resettlement plans and submit semiannual internal monitoring reports to ADB; and (vi) a functional and effective grievance mechanism is established.

80. The implementing agencies will not handover a specific section of a contract to the civil works contractor until (i) payment of compensation has been fully disbursed to the affected people and rehabilitation measures are in place for that specific section as per the resettlement plan; (ii) affected people who were compensated for that specific section have vacated the site; and (iii) the specific section is free from any encumbrances.

C. Ethnic Minorities

81. The project is category B for indigenous people following ADB's SPS. In the four prefectural cities, there are 0.64 million ethnic minorities, including the ethnic minority of Tujia, Miao, Dong, Yao, Bai, and Hui, accounting for 9.91% of the total ethnic minority population in Hunan Province. However, the Yao minority group is the biggest accounting for 83.43% minority's population in Hunan Province. An EMDP has been prepared to facilitate the inclusion of ethnic minority people in all project activities.

82. The government will ensure that (i) the EMDP agreed between the government and ADB is implemented in accordance with applicable government laws and regulations and ADB's SPS; (ii) all ethnic minorities are given adequate opportunity to participate in the planning and implementation process; (iii) counterpart funds for EMDP activities are provided; (iv) the PMO and all implementing agencies will designate at least one person to supervise and monitor, and submit semiannual internal monitoring reports to ADB; (v) a functional and effective grievance mechanism is established; and (vi) ethnic and religious affairs bureau in each project county/county-level city will provide support as necessary, as well as the community offices, the project county/county-level city centers for disease control, and the labor bureaus.

83. Prior to the commencement of any component, the PMO and the implementing agencies will ensure that briefings on ADB's safeguards policies with respect to ethnic minorities, and on the EMDP, are provided both for their own members and the implementing agencies. The ethnic and religious affairs bureaus will assist in these briefings. The government will also ensure that contractors, their supervisors, and workers will be required to undergo briefings on local ethnic minority customs and beliefs to ensure that the beliefs, traditions, and culture of ethnic minorities are respected.

D. Grievance Redress Mechanism

84. A project safeguards GRM, as detailed in the resettlement plans, EMDP, and EMP is established within 60 days of the loan effectiveness date or before implementation of land acquisition and resettlement or other advance construction activities, whichever is the earliest.

The GRM sets out procedures for managing public concerns and safeguard issues which may arise during project implementation. The GRM comprises a set of clear procedures to receive, record, and address any concerns or complaints raised; and specific contact details of individuals from the executing and implementing agencies, contractors' teams, and other relevant authorities and stakeholders. All contractors and work staff will be briefed on the project safeguards GRMs. Multiple entry points to the GRM will be available such as face-to-face meetings, written complaints, hotline number and telephone conversations, anonymous drop-boxes for written comments, and/or e-mail. During implementation and prior to the project completion review, complaints and their resolution will be reported to ADB in quarterly project progress reports and/or semiannual safeguard monitoring reports.

85. **Prohibited investment activities.** Pursuant to ADB's SPS (2009), ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth at Appendix 5 of the SPS.

VIII. GENDER AND SOCIAL DIMENSIONS

86. A poverty and social assessment (PSA) was undertaken during the project preparation phase in accordance with ADB guidelines on gender and social dimensions. The PSA included a review of secondary data, a household survey, focus group discussions, and key informant interviews. The PSA assisted in the design of the various subcomponents to ensure they are socially inclusive and implemented with a high degree of community participation, especially for the local people including women, ethnic minorities, poor and other vulnerable persons in the project areas.

87. The government will ensure that the PMO and implementing agencies will implement the SGAP.[37] The following measures are included in the SGAP: (i) participation and consultation of women during project design and implementation (at least 50% women participants in public consultations and public hearings); (ii) gender sensitive training for all staff from the executing and implementing agencies; (iii) providing women with employment opportunities associated with project construction activities (at least 40% hired are women); (iv) training on environmental protection, MSW management and 3Rs principle (at least 40% women participants); and (v) training on leadership or management during project construction and operation, including awareness building (at least 50% women participants).

88. In addressing the risk of spread of HIV/AIDS/STI, the government will ensure that there will be (i) inclusion of clauses on HIV/AIDS/STI and other communicable disease awareness for the contractors/subcontractors and employees into contract bidding documents; (ii) conduct of public health and HIV/STI prevention education to the civil works' contractors and labor force; (iii) establishment of health measures for construction workers (e.g., setting up a temporary infirmary and using local medical resources); (iv) conduct of diverse publicity activities on HIV/AIDS (e.g., brochures, posters, and leaflets); and (v) construction workers hired from the local communities will be trained on sanitation knowledge campaigns, health and occupational safety measures while working at the construction sites. Sexual harassment awareness and prevention program will also be included in the contract bidding documents.

89. **Labor issues.** The government will ensure that core labor standards will be complied with based on national laws. Civil works contracts will stipulate priorities to (i) employ local people for

[37] SGAP is accessible from the list of linked documents in Appendix 2 of the Report and Recommendation of the President for this project.

works, (ii) ensure equal opportunities for women and men, (iii) pay equal wages for work of equal value, (iv) pay women's wages directly to them, and (v) not employ children or forced labor. Specific targets for employment are included in the EMDP and SGAP. HURD in conjunction with the implementing agencies will be responsible for coordinating activities and monitor contractors' compliance in cooperation with the Human Resources and Social Security Bureau, and the Civil Affairs Bureau.

IX. PERFORMANCE MONITORING, EVALUATION, REPORTING AND COMMUNICATION

A. Project Design and Monitoring Framework

Impact the Project is Aligned with Environment in the Xiangjiang River watershed in Hunan Province improved (PRC Thirteenth Five-Year Plan, 2016–2020)[a]			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting**	**Risks**
Outcome Long-term pollutants discharged to the Xiangjiang River watershed reduced	By 2024: a. Landfill sites closed and restored and/or remediated at 11 localities, with 32.85 ha of MSW landfill area (2017 baseline: 0)[b] b. Integrated MSW management systems established in seven localities with a capacity of 4,340 tons per day (2017 baseline: 0)[c] c. Replication of project's best practice at three landfills for closure and restoration and/or remediation and/or upgrading and at two localities for the establishment of MSW systems in up to five locations (2017 baseline: Not applicable)	a–c. Hunan EPD environmental statistics; provincial, city, and county statistical yearbooks; environmental monitoring reports; and quarterly reports	Ineffective environmental monitoring and enforcement by environmental authorities
Outputs 1. Substandard MSW landfills closed	By 2023: 1a. Nine landfills of 31.75 ha site area (approximately 497,600 m^3 solid waste material) closed (2017 baseline: 0) 1b. 362 jobs created (108 full-time managerial and technical positions and 254 part-time unskilled jobs) during construction, of which at least 30% are women and 20% from low-income households (2017 baseline: 0)[d]	1a–b. Hunan EPD environmental statistics; project progress reports, environmental monitoring reports, and social action plan monitoring reports	Staff assigned to the project by the government are frequently rotated, including staff trained under the project before project completion and commencement of initial O&M activities
2. Substandard MSW landfills mined and remediated	2a. Two landfills of 1.1 ha site area (approximately 170,000 m^3 solid waste material) mined and remediated (2017 baseline: 0) 2b. 63 jobs created (19 full-time managerial and technical positions and 44 part-time unskilled jobs) during construction, of which at least 30% are women and 20% from low-income households (2017 baseline: 0)[d]	2a–b. Hunan EPD environmental statistics; project progress reports, environmental monitoring reports, and social action plan monitoring reports	
3. New urban–rural integrated MSW management systems established	3a. Seven urban–rural MSW collection and transport systems with 4,340 tons per day capacity established (2017 baseline: 0) 3b. 377 jobs created (113 full-time managerial and technical positions and 264 part-time unskilled jobs) during construction; in addition, 659 jobs created (274 full-time managerial and technical positions and 385 part-time unskilled jobs) during operation, of which at least 30% are women and 20% from low-income households (2017 baseline: 0)[d]	3a–b. Hunan EPD environmental statistics; project progress reports, environmental monitoring reports, and social action plan monitoring reports	
4. Sanitary landfill	4a. Four sanitary landfill facilities of 55 ha site	4a–b. Hunan EPD	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
facilities upgraded	area (approximately 12.1 million m^3 capacity) upgraded (2017 baseline: 0)	environmental statistics; project progress reports, environmental monitoring reports, and social action plan monitoring reports	
	4b. 87 jobs created (26 full-time managerial and technical positions and 61 part-time unskilled jobs) during construction, of which at least 30% are women and 20% from low-income households (2017 baseline: 0)[d]		
5. New kitchen waste treatment and management system established	5a. A kitchen waste treatment and management system in Yongzhou City with 100 tons per day capacity established (2017 baseline: 0)	5a–c. Project progress reports, environmental monitoring reports, and social and gender action plan monitoring reports	
	5b. At least 100 staff in the concerned bureaus report improved knowledge and skills for O&M of the project facilities, of which at least 40% are women (2017 baseline: 0)		
	5c. 24 jobs created (7 full-time managerial and technical positions and 17 part-time unskilled jobs) during construction; in addition, 23 jobs created (1 full-time managerial and technical position and 22 part-time unskilled jobs) during operation, of which at least 30% are women and 20% from low-income households (2017 baseline: 0)[d]		
6. Capacity for environmentally sustainable MSW management enhanced	6a. Loan implementation consulting services mobilized; 5 training workshops provided; 4 studies on MSW management and implementation, and O&M delivered; and at least 500 staff in the concerned bureaus report improved knowledge and skills for environmentally sustainable MSW management, with at least 40% women participants from bureaus; 100% staff of implementing agencies receive SGAP training (2017 baseline: 0)	6a. Project progress reports and training reports	
	6b. 2,500 participated in 3Rs awareness-raising activities, with at least 50% women participation and 20% from low-income households (2017 baseline: 0)	6b–c. Project progress reports, and social and gender action plan monitoring reports	
	6c. Residents participated in public consultations during design of project components, and public consultations on tariff, of which at least 50% are women and 20% are from low-income households (2017 baseline: 0)		

Key Activities with Milestones

1. Substandard MSW landfills closed

1.1 Prepare preliminary design, Q2–Q3 2018.
1.2 Prepare construction drawings, Q3–Q4 2018.
1.3 Implement land acquisition and resettlement, Q3 2018.
1.4 Implement SGAP and EMDP, Q2 2018–Q4 2021.
1.5 Prepare bidding documents, Q3–Q4 2018.
1.6 Procure and award contract, Q3 2018–Q2 2019.
1.7 Construction, Q1 2019–Q4 2021.

2. Substandard MSW landfills mined and remediated

2.1 Prepare preliminary design, Q2–Q3 2018.

2.2 Prepare construction drawings, Q3–Q4 2018.
2.3 Implement land acquisition and resettlement, Q3 2018.
2.4 Implement SGAP and EMDP, Q2 2018–Q4 2021.
2.5 Prepare bidding documents, Q3–Q4 2018.
2.6 Procure and award contract, Q3 2018–Q2 2019.
2.7 Construction, Q1 2019–Q4 2021.

3. New urban–rural integrated MSW management systems established

3.1 Prepare preliminary design, Q2–Q3 2018.
3.2 Prepare construction drawings, Q3–Q4 2018.
3.3 Implement land acquisition and resettlement, Q3 2018.
3.4 Implement SGAP and EMDP, Q2 2018–Q4 2021.
3.5 Prepare bidding documents, Q3 2018.
3.6 Procure and award contract, Q3 2018–Q2 2019.
3.7 Construction, Q1 2019–Q4 2022.
3.8 Purchase equipment, Q1 2020–Q4 2022.

4. Sanitary landfill facilities upgraded

4.1 Prepare preliminary design, Q2–Q3 2018.
4.2 Prepare construction drawings, Q3–Q4 2018.
4.3 Prepare bidding documents, Q3–Q4 2018.
4.4 Procure and award contract, Q4 2018–Q2 2019.
4.5 Construction, Q1 2019–Q4 2022.
4.6 Purchase equipment Q1 2020–Q4 2022.
4.7 Implement SGAP and EMDP, Q2 2018–Q4 2021.

5. New kitchen waste treatment and management system established

5.1 Develop legal and institutional proposals, Q3–Q4 2019.
5.2 Prepare preliminary design, Q3–Q4 2020.
5.3 Prepare construction drawings, Q1 2021.
5.4 Prepare bidding documents, Q2 2021.
5.5 Procure and award contract, Q3 2021.
5.6 Purchase and install equipment, Q4 2022–Q1 2023.
5.7 Construction, Q4 2021–Q4 2022.
5.8 Commissioning, Q2–Q3 2023.
5.9 Implement SGAP and EMDP, Q2 2018–Q4 2021.

6. Capacity for environmentally sustainable MSW management enhanced

6.1 Recruit and mobilize consultants, Q4 2018.
6.2 Establish PPMS, Q1 2019.
6.3 Establish environmental impact assessment, resettlement plan, and PPMS monitoring, Q1 2019.
6.4 Support project implementation, Q1 2019–Q4 2023.
6.5 Conduct studies and research, workshops, and trainings, Q4 2019–Q4 2022.
6.6 Implement SGAP and EMDP, Q2 2018–Q4 2021.

Inputs

ADB: $150 million – ordinary capital resources (regular loan)
Government: $108 million

Assumptions for Partner Financing

Not applicable

3Rs = reduce, reuse, and recycle; ADB = Asian Development Bank, EMDP = ethnic minority development plan; EPD = Environmental Protection Department; ha = hectare; m^3 = cubic meter; MSW = municipal solid waste; O&M = operation and maintenance; PPMS = project performance management system; PRC = People's Republic of China; Q = quarter; SGAP = social and gender action plan.

[a] Government of the PRC, State Council. 2016. *Thirteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China, 2016–2020.* Beijing.

[b] Landfills restored (with geomembrane capping) at 11 localities with a total area of 32.85 ha (without baseliners and no containment of pollutants) or remediated (with waste removal) in accordance with best practice, offsetting leachate generation estimated at 185,000 m^3 of leachate per year (based on a "business as usual" scenario). The leachate generation was assessed in accordance with Government of the PRC, Ministry of Environmental Protection. 2013. *GB50869-2013: Technical Guidelines for Municipal Solid Waste Landfills.* Beijing.

[c] MSW management systems, including collection and transport facilities, that diverts solid waste from substandard disposal to conforming disposal and treatment facilities with leachate and landfill gas treated in compliance with the relevant effluent and emission standards, with baseline established as substandard disposal of 4,340 tons MSW per day generating an estimated 225,000 m^3 of untreated leachate per year (based on "business as usual" scenario).

[d] About 40% of jobs first made available to women, with at least 30% hires being for women.

Source: ADB.

B. Monitoring

1. Project Performance Monitoring

90. The PPMS indicators, their relevance, and monitoring practicalities will be discussed with the executing agency, implementing agencies, and project beneficiaries during project implementation. Disaggregated baseline data for output and outcome indicators gathered during project processing will be updated and reported quarterly through the semiannual progress reports of the PMO and after each ADB review mission. These semiannual reports will provide information necessary to update ADB's project performance reporting system.[38] At the start of project implementation, the PMO and implementing agencies, with the project implementation consulting services, will develop integrated PPMS procedures to generate data systematically on the inputs and outputs of the components, as well as the indicators to be used to measure the project's impact and outcome taking into account the components' scope. The PMO will be responsible for monitoring and reporting on project performance. The basis for performance monitoring will be the design and monitoring framework (DMF), which identifies performance targets for the impact, outcomes, and outputs of the project. By collecting data from the sources identified in the DMF, the PMO will be able to report on an annual basis the performance of the project. Specific reporting requirements will be set out in the agreement between ADB and the government. The PMO will collect the data, calculate the indicators, analyze the results, and prepare a brief report describing the extent to that the project is generating the intended outputs and outcomes, as well as the overall impact on the project municipalities. The relevance and practicability of data collection for indicators was confirmed with the PMO and the implementing agencies. Meanwhile, the agreed socioeconomic and environmental indicators to be used will be further enhanced to measure project impacts. The PMO and the implementing agencies agreed and confirmed that they will (i) refine and integrate the PPMS framework at the start of project implementation; (ii) confirm that targets are achievable; (iii) develop recording, monitoring, and reporting arrangements; and (iv) establish systems and procedures no later than 6 months after project inception.

2. Compliance Monitoring

91. The executing agency, implementing agencies, and the project management consultant, will conduct compliance monitoring, submit reports and information to ADB concerning the use of the loan proceeds, project implementation, project implementation performance, and compliance of loan and project covenants. These reports will include (i) semiannual progress reports on project implementation; and (ii) midterm adjustment report, and (iii) a project completion report (PCR), which should be submitted not later than 3 months after the completion of the project facilities. The compliance status of loan and project covenants will be reported and assessed through the semiannual progress report. ADB review missions will verify these statuses.

3. Safeguards Monitoring

a. Environment

92. **Internal monitoring and reporting by construction supervision companies.** During construction, construction supervision companies (CSCs), and designated environmental supervision consultant (internal) will be responsible for conducting internal EMP monitoring and

[38] ADB's project performance reporting system is available at: http://www.adb.org/Documents/Slideshows/PPMS/default.asp?p=evaltool

supervision in accordance with the monitoring plan defined in the EMP. The results will be reported through the CSCs' reports to the implementing agencies.

93. **Environmental impact monitoring by environmental monitoring stations.** The implementing agencies will contract the local environmental monitoring stations (EMSs) to conduct environmental impact monitoring in accordance with the monitoring plan. Monitoring will be conducted during the construction and operation periods, until a PCR is issued.

94. **Environmental management plan implementation monitoring and progress reporting.** The LIEC will review project progress and compliance with the EMP based on consultation with environmental supervision consultant (internal), field visits, and the review of the environmental impact monitoring conducted by the EMSs. The findings of the LIEC will be reported to ADB through the semiannual EMP monitoring and progress reports. The reports will include (i) progress made in EMP implementation, (ii) overall effectiveness of the EMP implementation (including public and occupational health and safety), (iii) environmental monitoring and compliance, (iv) institutional strengthening and training, (v) public consultation (including GRM), and (vi) any problems encountered during construction and operation, and the relevant corrective actions undertaken. The LIEC will help the PMO prepare the reports and submit the English report to ADB for appraisal and disclosure.

95. **External monitoring by independent agency.** The PMO shall employ a qualified and experienced external environment monitoring agency for environmental monitoring using loan proceeds. The external environment monitor shall monitor the project on a semiannual basis until a PCR is issued. The monitoring will include the review and analysis of project-related significant environmental impacts, progress of implementation of mitigation measures as outlined in the project EIA and EMP, participation in ongoing stakeholder consultations and evaluation and reporting on how environmental grievances, if any, are handled. The external monitor/agency, through its report, will provide recommendations and suitable actions to the PMO. The external monitoring report will be provided to ADB for review and disclosure on the ADB website.

96. **Project completion environmental audits.** Within 3 months after each subproject completion, or no later than 1 year with permission of the city EPBs, environmental acceptance monitoring and audit reports of each subproject completion shall be (i) prepared by a licensed environmental monitoring institute in accordance with the PRC Guidelines on Project Completion Environmental Audit (2001), (ii) reviewed for approval of the official commencement of individual subproject operation by environmental authorities, and (iii) reported to ADB through the semiannual EMP monitoring and progress reporting process.

b. Resettlement

97. Internal monitoring will be conducted. The PMO will submit semiannual monitoring reports to ADB. The monitoring methodologies and indicators are included in the resettlement plans. The PMO will prepare and submit a resettlement completion report to ADB.

c. Ethnic Minority Development Plan

98. Internal monitoring of the EMDP will be conducted semiannually. Monitoring and reporting methodologies are specified in the EMDP. Each implementing agency will carry out internal supervision and monitoring to ensure compliance with the provisions of the EMDP. The PMO will prepare and submit an EMDP completion report to ADB.

d. Social and Gender Action Plan Monitoring

99. The PPMS will include monitoring of the SGAP. Clear targets and indicators have been established and some indicators, such as those on employment, are also captured in the DMF. The SGAP will be monitored semiannually and reported via the quarterly project progress reports and during ADB missions.

C. Evaluation

100. ADB, the executing agency, and implementing agencies will undertake semiannual review missions to evaluate the progress of project implementation. ADB, the executing agency, and implementing agencies will undertake a comprehensive midterm review within 2 years after the start of project implementation to have a detailed evaluation of the scope, implementation arrangements, resettlement, achievement of scheduled targets, and progress on the agenda for policy reform and capacity building measures. Feedback from the PPMS activities will be analyzed. Within 3 months of physical completion of the project, the PMO will submit a PCR to ADB.[39]

D. Reporting

101. The PMO and implementing agencies will provide ADB with (i) semiannual progress reports in a format consistent with ADB's project performance reporting system; (ii) consolidated annual reports including (a) PPMS progress achieved by output as measured through the indicator's performance targets, (b) key implementation issues and solutions, (c) updated procurement plan, (d) audited financial statements, and (e) updated implementation plan for the next 12 months; (iii) submission of semiannual reports on the progress of resettlement and ethnic minority development activities, environment safeguards monitoring, and social action plans; (iv) submission of midterm adjustment report after 2 years of implementation, (v) submission of project completion report 6 months after completion of the project; and (vi) submission of audited project accounts and financial statements 6 months after the end of fiscal year.

102. Table 14 summarizes the key reporting requirements during project implementation.

Table 14: Key Reporting Requirements

Report	Reference	Timing of Reporting
Project performance management system		
Develop comprehensive project performance management system procedures	Project Agreement, Schedule, Paragraphs	No later than 6 months after loan effectiveness
Reporting of baseline and progress data including environmental management plan		Annual, may be included in the project progress reports
Semiannual project progress reports	Project Agreement, Schedule, Article	Semiannual, within 1 month after the end of each quarter
Audited project accounts and financial statements auditor's report (including auditor's opinion on the use of the advance account and statement of expenditures)	Project Agreement, Schedule, Article	Not later than 6 months after the closure of fiscal year (end of June)
Resettlement monitoring		
Internal monitoring reports for the executing and implementing agencies (semiannually)	Project Agreement, Schedule, Paragraphs	Include summary in the semiannual project progress reports

[39] Project completion report format available at: http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar

Report	Reference	Timing of Reporting
Resettlement completion report		Prior to loan closure (within 3 months after project completion)
Environmental reports	Project Agreement, Schedule, Paragraphs	
Construction phase–environmental management plan monitoring and progress report		Semiannual
Construction phase–external environmental management plan		Semiannual
Operations phase; external monitoring report		Semiannual, until a project completion report is issued
Social safeguard monitoring of SGAP and EMDP	Project Agreement, Schedule, Paragraphs	Semiannually; may be included in the progress reports
Project completion report	Project Agreement, Schedule, Article	Not later than 6 months after the physical completion of the project

EMDP = ethnic minority development plan, SGAP = social and gender action plan, SDAP = social development action plan.
Source: Asian Development Bank.

E. Stakeholder Communication Strategy

103. Project information will be communicated through public consultation, information disclosure mechanism in ADB's and government's website, meetings, interviews, focus group discussions, and community consultation meetings, in accordance with ADB's requirements of information disclosure policy (footnote 34).

104. **Environment.** Meaningful consultation at each project county/county-level city has been conducted during feasibility study and environmental impact assessment in accordance with the PRC Interim Guidelines on Public Consultation in EIA (2006) and ADB's SPS. During construction, the affected people will be consulted through questionnaire surveys and interviews by the environmental management unit of the PMO and the external environmental monitor. The project's environmental information shall be disclosed by the local EPBs and ADB as follows: (i) the project EIA is disclosed at www.adb.org; (ii) the Chinese EIAs are disclosed on the website of the relevant environmental protection bureaus; and (iii) the semiannual EMP progress and monitoring reports will be disclosed at www.adb.org.

105. **Involuntary resettlement.** Consultations with affected households and other stakeholders have been undertaken and will continue during resettlement plan updating and implementation.

106. **Ethnic minority, and social and gender action plan.** Consultations with communities have taken place and will continue at different points in the implementation of the EMDP and SGAP not only to inform people about the components or specific activities, but also to enable people in the community to ask questions, make suggestions, state preferences, and express concerns. Special attention will be paid to the participation of women, ethnic minorities, and any other vulnerable groups, such as the poor. The PMO and implementing agencies will disclose the EMDP in their offices as well as the community offices and to ethnic minority beneficiaries in local languages where needed.

107. Public awareness and education program on solid waste recycling, sanitation, road safety etc. will be conducted as part of the project components and actions to enhance the involvement of women are included in the SGAP. Public hearings will be held for any proposed adjustments

in solid waste tariff attended with adequate representation of poor, women, and ethnic minorities, should the local government decide to set tariff for improved water services in the future.

108. **Public disclosure.** Public disclosure of all project documents will be undertaken through the project PMO and on the ADB website, including the project datasheet, DMF, environmental impact assessment, resettlement plan, EMDP, SGAP, and the report and recommendation of the President. Disclosure of external social monitoring reports will be undertaken during project implementation.

X. ANTICORRUPTION POLICY

109. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the project.[40] All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all project contractors, suppliers, consultants and other service providers. Individuals/entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the project.[41]

110. To support these efforts, relevant provisions are included in the loan agreement, and the bidding documents for the project. ADB's Anticorruption Policy (1998, as amended to date) will be explained to and discussed with the executing and implementing agencies. Consistent with its commitment to good governance, accountability and transparency, ADB reserves the right to investigate any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project. To address the risks on governance and corruption related to procurement of civil works, relevant provisions of ADB's Anticorruption Policy will be included in the loan agreement and the bidding documents for the project. In particular, all contracts financed by ADB in connection with the project will include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency, implementing agencies, and all contractors, suppliers, consultants, and other service providers as they relate to the project. The executing agency has indicated its commitment to promote good governance and establish a corruption-free environment under the project. Further to this, a number of good governance and anticorruption provisions have been included in the loan and project agreements.

111. The executing and implementing agencies will comply with ADB's Anticorruption Policy (1998, amended from time to time). The executing agency agrees (i) that ADB reserves the right to investigate any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project; and (ii) to cooperate fully with, and to require contractors and suppliers to cooperate fully with, any such investigation and to extend all necessary assistance, including providing access to all relevant books and records, as may be necessary for the satisfactory completion of any such investigation.

112. The executing agency will (i) conduct periodic inspections on the contractors' activities related to fund withdrawals and settlements; and (ii) ensure that all contracts financed by ADB in connection with the project include relevant provisions of ADB's Anticorruption Policy (1998, as amended to date) in all bidding documents for the project specifying the right of ADB to audit and examine the records and accounts of the PMO, implementing agencies, and all the contractors, suppliers, consultants, and other service providers as they relate to the project.

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[40] Available at: http://www.adb.org/sites/default/files/pub/1998/anticorruption.pdf.
[41] ADB's Integrity Office web site is available at: http://www.adb.org/integrity/unit.asp.

113. The executing agency and the implementing agencies will also (i) involve the agencies responsible for oversight of each implementing agency in bidding and construction to enhance construction quality control and supervise effective work; (ii) introduce a dual-signing system in which each works contract winner also signs an anticorruption agreement with the employer; (iii) periodically inspect the contractors' activities related to fund withdrawals and settlements; (iv) require the project management consulting service to support the PMO and implementing agencies to ensure good governance, accountability, and transparency in project operations; and (v) in consultation with relevant ministries at the central level, update rules and regulations on corporate governance and anticorruption to enhance the transparency of operations of the executing agency and implementing agencies.

XI. ACCOUNTABILITY MECHANISM

114. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, they should approach the Accountability Mechanism.[42]

XII. RECORD OF CHANGES TO THE PROJECT ADMINISTRATION MANUAL

115. All revisions and/or updates during course of implementation should be retained in this section to provide a chronological history of changes to implemented arrangements recorded in the PAM.

No.	Changes/Updates	Date	Remarks
1	Project Administration Manual	July 2018	Agreed at loan negotiations

[42] For further information see: http://www.adb.org/Accountability-Mechanism/default.asp.

ENVIROMENTAL MANAGEMENT PLAN

A. Introduction

1. This Environmental Management Plan (EMP) has been prepared for the proposed Hunan Xiangjiang River Watershed Exiting Solid Waste Comprehensive Treatment Project (the project). The project has ten subprojects located in central and south Hunan province, the People's Republic of China (PRC). This EMP has been prepared in accordance with the requirements of Asian Development Bank's (ADB's) Safeguard Policy Statement (SPS, 2009) on the basis of (i) a consolidated domestic environmental impact assessment (DEIA) prepared by a certified domestic EIA institute from Hunan province, (ii) a project feasibility study report (FSR), (iii) social and economic assessments conducted under the project preparatory technical assistance (PPTA), (iv) discussions held during ADB missions, PPTA consultants, Hunan project management office (PMO), Hunan Department of Environment Protection, ten subproject city/county governments, including local environmental protection bureaus (EPBs), (v) two rounds of public consultation meetings at the ten subproject cities/counties attended by PPTA consultants and surveys. The EMP covers all project implementation phases, including planning, design & pre-construction, construction, and operation of all project components, and the impacts identified in relation to physical, biological, cultural and socio-economic resources, as discussed in Section VI (Anticipated Impacts and Mitigation Measures) of the Environmental Impact Assessment (EIA) for the project.

B. Objectives

2. The objectives of the EMP are to ensure the implementation of: (i) identified mitigation and management measures to avoid, reduce, mitigate, and compensate for anticipated adverse environment impacts, and (ii) monitoring and reporting against the performance indicators while ensuring that the project complies with PRC's environmental laws, standards and regulations and ADB's Safeguard Policy Statement (SPS 2009). Organizational responsibilities and budgets are identified for execution, monitoring and reporting.

3. The EMP defines appropriate mitigation measures for the anticipated project environmental impacts, and the institutional responsibilities and mechanisms to monitor and ensure compliance. The EMP specifies (i) objectives; (ii) implementing organizations and responsibilities; (iii) major environmental impacts and mitigation measures; (iv) environmental monitoring and reporting arrangements; (v) training and institutional strengthening; (vi) future public consultation; (vii) a feedback and adjustment mechanism; and (viii) the project level GRM. The EMP will be reviewed and updated, if necessary, before construction starts, and will further be revised during the project implementation if determined that mitigation measures need to be amended or new measures needed. The updated EMP will be reviewed by ADB and disclosed on ADB's website.

C. Implementation Arrangements

4. Hunan Provincial Housing and Urban–Rural Development Department (HURD) is the executing agency (EA) for the project and it will provide the overall direction and guidance during project preparation and implementation. The PMO has been set up under the EA and is responsible for coordinating the implementation of the project activities on behalf of the HURD.

5. The PMO is responsible for implementing EMP. At the design stage, the PMO and the ten implementation agencies (IAs) will request design institutes to incorporate mitigation measures

specified in the EMP in the detailed designs. The EMP will be updated at the end of the detailed design phase, and construction contractors are requested to comply with the updated EMP. To ensure the contractors comply with the EMP, the PMO and the implementing agencies assisted by the environmental consultants will prepare and provide the following specification clauses to incorporate in the bidding documents: (i) a list of environmental management requirements to be budgeted by the bidders in their tendering documents; (ii) environmental clauses for contractual terms and conditions; and (iii) environmental monitoring requirements in domestic EIAs, the EIA and the EMP. The PMO supported by the loan implementation environmental consultant (LIEC), will prepare semi-annual environment progress reports and submit them to ADB and the provincial EPB.

6. The PMO will nominate a qualified environment officer to undertake effective environmental management activities specified in the EMP. Environmental engineers of construction supervision companies (CSCs) contracted by each implementing agency will be responsible for the daily inspection, monitoring, and evaluation of implementation of mitigation measures.

7. Each implementing agency will establish a project implementation unit (PIU) under which an environmental management unit (EMU) will be assigned. The EMU consists of a leader and an appropriate number of staff to coordinate environmental issues. The EMU will be in charge of (i) implementation of EMP at each subproject level; (ii) supervising the implementation of mitigation measures during construction; (iii) supervising environmental monitoring contractors for environmental safeguards monitoring (EMP monitoring); (iv) implementation of training programs for contractors with support from CSCs; (v) incorporating environmental management, monitoring, and mitigation measures into the construction and operation management plans; (vi) reporting monthly their environmental monitoring to the PMO; and (vii) arranging reviews of environmental monitoring and responding to any unanticipated impacts. The EMU will be technically supported by the LIEC and supervised by the PMO.

8. Municipal Environment Protection Bureaus (EPBs) are responsible for ensuring the project to comply with all the relevant PRC environmental laws and regulations. For that purpose, EPB, if appropriate, will direct the PMO and implementing agencies to address any subproject deficiencies.

9. Contractors are responsible for implementing relevant mitigation measures and monitoring during construction specified in EMP supported by the CSC, and under the supervision of the IAs.

10. During the operational stage, the PMO and the municipal EPBs will supervise the environmental management and implementation of mitigation measures conducted by the IAs. The cost of mitigation measures will be borne by the IAs.

11. An external Environmental Monitoring Agency (EMA) will be hired by the PMO for conducting independent EMP compliance monitoring and verification during the project implementation. Semi-annual external EMP monitoring report will be prepared by the external EMA.

12. Loan Implementation Environment Consultant (LIEC) will (i) assist the PMO to update the EMP and environmental monitoring program; (ii) verify the implementation of the environmental protection measures specified in the EMP; (iii) review monitoring reports and the semi-annual environment performance reports; (iv) prepare EMP monitoring section of the semi-annual/annual

project progress reports; (v) provide training to the staff of the PMO, the implementing agencies, contractors and CSCs on environmental management implementation and monitoring; (vi) identify any environment-related implementation issues and suggest necessary corrective actions; and (vii) undertake site visits as required.

13. ADB is responsible for monitoring and supervising the overall environmental performance of the project. ADB will also disclose the project EIA and subsequent semi-annual EMP monitoring reports on its website. ADB will review the semiannual EMP monitoring reports submitted by the PMO, and conduct due diligence on environment issues and the EMP performance indicators during the project review missions.

14. If the EA/IAs fail to comply with legal agreements on safeguard requirements, including those described in EIA and EMP, ADB will seek corrective measures and work with the EA/IAs to bring the project back into compliance. If the EA/IAs fail to reestablish compliance, then ADB may exercise legal remedies, including suspension, cancellation, or acceleration of maturity, that are available under ADB legal agreements.

15. Before resorting to such measures, ADB will use other available means to rectify the situation satisfactorily to all parties to the legal agreements, including initiating dialogue with the parties concerned to achieve compliance with the legal agreements.

16. The EMP implementation arrangements and responsibilities of each organization are summarized in Table EMP-1.

Table EMP-1: Institutional arrangement for the EMP

Organization	**Management Roles and Responsibilities**
Executing agency: Hunan Provincial Housing and Urban–Rural Development Department (HURD)	• Provide overall direction and guidance during project preparation and implementation; • Responsible for project coordination with all project city and county governments, liaison with ADB, financial management and administration; • Ensure counterpart contributions are provided for project implementation on time; • Providing guidance to PMO; and • Hold final responsibility to ensure the project comply with the EMP.
Project Management Office(PMO)	• Coordinate the implementation of the project on behalf of HURD; • Primarily responsible for implementation of project components, including finance and administration, technical and procurement matters, monitoring and evaluation, and safeguard compliance; • Assign one environment specialist as EMP officer/coordinator who will (i) supervise contractors and their compliance with the EMP; (ii) conduct

Organization	Management Roles and Responsibilities
	regular site inspections; (iii) act as local entry point for the project GRM; (iv) review environmental quality monitoring results provided by the IA; • Communicate and coordinate with ADB for project management and implementation; submit the project implementation progress reports and safeguard compliance monitoring reports to ADB; • Submit bidding documents, bid evaluation reports and other necessary documentation to ADB for review and approval; • Engaging loan implementation consultants, including environmental specialists to assist in supervision, tracking and reporting on EMP implementation for all packages; • Engage local environmental monitoring stations and external environment monitoring organization for environmental impact monitoring according to the EMP environment monitoring plan; and • Consolidate data from environmental monitoring reports into semi-annual environmental monitoring reports and submit them to ADB for review and disclosure.
Implementing Agencies (IAs) and Project Implementation Units (PIUs)	• Establish an environmental management unit (EMU); • Responsible for day-to-day management work during the project preparation and implementation periods; • Hold direct responsibility of the implementation of the EMP; • Communicate and coordinate with PMO/EA for project management and implementation; • Incorporate EMP clauses in bidding documents for civil works; • Hire CSCs to monitor and supervisor EMP implementation; • Establish local level dedicated Project Complaints Coordinating Unit in accordance with the project GRM; • Participate in capacity building and training programs; and • Prepare monthly environmental reports and submit them to the PMO.
Environmental management Units (EMUs)	• Coordinate environmental issues on behalf of PIUs; • Implement EMP at each subproject level; • Supervise the implementation of mitigation measures during construction; • Supervise CSCs and contractors for EMP implementation;

Organization	Management Roles and Responsibilities
	• Implement training programs for contractors and CSCs with support from LIEC; • Incorporate environmental management, monitoring, and mitigation measures into the construction and operation management plans; and • Arrange reviews of environmental monitoring and responding to any unanticipated impacts.
Contractors, Construction supervision companies (CSCs)	• Construction contractors will develop site-specific EMPs on the basis of the project EMP and will be responsible for implementing mitigation measures during construction under the supervision of the CSCs; • CSCs will be selected through the PRC's procedures by the IAs; • CSCs will be responsible for supervising construction progress and quality, and EMP implementation on construction sites; • CSCs are responsible for the daily inspection, monitoring, and evaluation of implementation of mitigation measures during the construction; and • Each CSC will have at least one environmental engineer on each construction site to: (i) supervise the contractor's EMP implementation performance; (ii) prepare the contractor's environmental management performance section in monthly project progress reports to be submitted to the IAs and PMO; (iii) ensure occupational health and safety management at work sites.
County/city EMS or certified environmental entity	• Conduct environmental impact monitoring according to the EMP monitoring plan; and • Prepare ad submit monitoring results to the PMO.
External Environmental Monitoring Agency (EMA)	• Conduct independent assessment of EMP compliance during the project implementation; • Review and analyze project related significant environmental impacts, progress of implementation of mitigation measures as outlined in the project EIA/EMP, participation in ongoing stakeholder consultations and evaluation and reporting on how environmental grievances, if any, are handled; • Provide recommendations and suitable actions to PMO on any corrective actions; and • Prepare and submit semi-annual external monitoring reports to ADB through PMO for review and disclosure at ADB website.

Organization	Management Roles and Responsibilities
Loan Implementation Environment Consultant (LIEC)	• Assist the PMO to update the EMP and environmental monitoring program; • Provide training to the staff of the PMO/IAs, contractor and CSCs on EMP implementation; • Assist the PMO/IAs in preparing site-specific EMPs; • Confirm that mitigation measures have been included in engineering detailed design; • Review bidding documents to ensure that the EMP clauses are incorporated; • Advise on mitigation measures, provide technical support, and conduct environmental training; • Undertake site visits as required and verify the implementation of the environmental protection measures specified in the EMP • Review monitoring reports and the semi-annual environment performance reports • Identify any environment-related implementation issues and suggest necessary corrective actions • Conduct annual EMP compliance review; and • Support PMO in preparing project progress reports including EMP implementation status summary and any additional mitigation measures taken.
Asian Development Bank (ADB)	• Provide orientation to HURD, PMO and IAs; • Monitor and supervise the overall environmental performance of the project; • Review and approve the semi-annual environment monitoring reports and disclose the reports on ADB website in line with ADB Public Communications Policy (2011); and • Conduct due diligence of environment issues and advise on corrective actions during the project review missions.
Environment Protection Bureau (EPB)	• Ensure the project to comply with all the relevant PRC laws and regulations; and • If necessary and appropriate, direct the PMO and implementing agencies to address any subproject deficiencies.

Source: PPTA Consultants.

D. Project Readiness Indicators

17. **Table EMP-2** presents the Readiness Indicators which provide a measure of whether environmental commitments are being carried out and environmental management systems are in place before construction.

Table EMP-2: Readiness Indicators Pre-Construction

Indicator	Measurement Methods	Measurement
Environmental Supervision in place	➢ EMUs established before construction. ➢ LIEC and external EMA contracted. ➢ Site specific GRM established.	Yes No Yes No Yes No
Bidding documents and contracts with environmental safeguards	➢ Bidding documents and contracts incorporate the environmental loan assurances	Yes No
	➢ Bidding documents and contracts incorporate the EMP mitigation and monitoring requirements	Yes No
EMP financial support	➢ The fund from ADB is in place to support the EMP implementation	Yes No
Contract documents	➢ Environmental requirements of EMP included in contract documents for civil works construction contractors ➢ Contractor EMP developed and submitted to PMO and LIEC for review and approval	Yes No Yes No

Source: PPTA consultants.

18. Performance indicators for monitoring environmental performance in relation to key project risks and impacts during construction are set out in **Table EMP-3**.

Table EMP-3: Performance Indicators During Construction

Indicator	Measurement Methods	Measurement
Stakeholder Interviews	➢ Interviews with stakeholders in project area before each construction season	Yes No
External Environmental Monitoring	➢ Semi-annual external EMP monitoring reports submitted to PMO	Yes No

Indicator	Measurement Methods	Measurement
EMP Implementation	➢ EMUs monitor mitigation implementation and confirm compliance, reporting monthly to PMO	Yes No
Sanitary Wastewater Effluent Monitoring	➢ IAs monitoring effluent wastewater in accordance to the requirements of the applications PRC national standards and submit the monitoring results to local EPBs and PMO	Yes No

Source: PPTA consultants.

E. Potential Impacts and Mitigation Measures

19. The potential impacts of the project during project implementation as identified by the domestic EIAs and the project Environmental Impact Assessment (EIA) and corresponding mitigation measures are summarized in **Tables EMP-4** (general impacts) and **EMP-5** (project component specific impacts). The common potential impacts and mitigation measures for all or most components are summarized in Table EMP-4 to avoid repeating for each component while component specific impacts and corresponding mitigation measures are presented in Table EMP-5. Both general and project component specific mitigation measures will be incorporated in detailed design, bidding documents and civil works contracts by design institutes, contractors and IAs, and supported by LIEC, PMO, and local EPBs of the ten project cities and counties. The effectiveness of mitigation measures will be evaluated through environmental inspections by construction supervision staff and LIEC and independent monitoring by the EMA to be recruited by the PMO.

Table EMP-4: Potential Impacts and Mitigation Measures – General

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
A. Design & Preconstruction Phases					
Pre-construction planning and detailed design stage	Environment management readiness	➢ Appointment of one environmental officer within each PIU to coordinate EMP implementation. ➢ Recruiting LIEC by the PMO for training on EMP implementation, site specific EMP development, project specific environmental quality monitoring, developing detailed monitoring plan for construction and operation periods in accordance to the monitoring plan. ➢ Recruiting an EMA to conduct independent monitoring of EMP implementation. ➢ Updating of the EMP prior to tendering and construction as necessary and including EMP requirements in tender and contract documents. ➢ Developing a plan to implement the GRM, including developing subproject operational GRMs; provide training for PIU staff and GRM access points; disclose GRM phone numbers, addresses, and emails to the public on information boards at each construction site; establish database for feedbacks. ➢ Consulting and informing residents and key stakeholders near the construction sites regarding construction timing and approach, especially for MSW mining sites in Lanshan and Zixing.	IA and PMO	PMO and EA	PIU and PMO budget and ADB loan for consulting services
	Contractor environment management plan	➢ Prior to contraction, prepare a site-specific EMP which shall fully respond to the requirements set in the project EMP, and shall	Contractors	PMO	Included in contractors' bids and contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		include a number of sub-plans, including the following: ➢ Soil erosion protection plan, identifying likely areas of soil erosion and the mitigation measures which the contractor will employ to minimize potential erosion around any excavations and construction areas. ➢ Borrow and spoil management plan, specifying location of borrow pits, quarries and spoil disposal sites, as needed. Contractors will ensure that (i) borrow areas will be located away from residential areas, water bodies and will avoid valuable pasture/grazing land, (ii) after use borrow pit areas will be graded to ensure drainage and visual uniformity, and (iii) borrow pit restoration will follow the completion of works in full compliance with all applicable standards and specifications; ➢ Water protection plan, defining measures to be taken during construction to avoid/mitigate pollution arising from construction site drainage (silt), use of chemicals, construction around existing landfills containing leachate and other potential pollution sources; ➢ Health and safety risk management plan for management of community and occupational health and safety. Civil work contractors shall also consult with relevant local departments to double check location of utilities prior to any construction activities at all MSW transfer sites; ➢ Spill management plan, defining the specific requirements, protocols, responsibilities, and materials necessary to implement an emergency spill response following an incident; ➢ Waste management plan, defining procedures for management of household waste, construction waste, detailing arrangements for			

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		storage and transportation of the waste to landfills; ➢ Traffic management and access plan, identifying construction activities that may affect the local traffic and communicating with local traffic control agencies on the timing and locations of construction activities; and ➢ Service interruption plan, defining the steps and procedures to avoid interruption of operations of existing sanitary MSW landfills in Hengyang, Leiyang, Lanshan and Lengshuijiang including the leachate collection and treatment facilities.			
Baseline establishment (Component 1, 2 & 4)	Groundwater	➢ The sampling location should be set in the upstream, downstream and both sides of the groundwater flow in the landfill when monitoring the groundwater quality of a landfill and its surrounding areas. Groundwater sampling can be taken from the existing groundwater monitoring wells. New groundwater monitoring wells should be drilled if there is no suitable groundwater monitoring well. ➢ The groundwater monitoring will be carried out during the dry season. The number of monitoring should not be less than 3 times and the interval time should be 10-15 days.	DEIA institute	PMO	Included in DEIA contracts
	Surface water	➢ A survey should be conducted to find out the locations of discharge outlets and discharge water quality of landfill leachate treatment facilities. ➢ The surface water quality within 1 km downstream of the landfill area should be investigated and monitored. The surface water to be investigated should include lakes, rivers, fish ponds, and water basins with constant water every year.	DEIA institute	PMO	Included in DEIA contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	Atmosphere environment	➢ The quality monitoring points for atmosphere environment should be set on landfill, environmentally sensitive areas around the landfill, downwind of the annual or summer dominant wind direction, and 50 m to 100 m away from the boundary of the landfill. ➢ Atmosphere environment quality monitoring should focus on the total suspended particulates (TSP) and odor concentration, and record weather conditions such as wind speed, wind direction, atmospheric pressure, temperature, and relative humidity. It should be carried out separately under two meteorological conditions, favorable for pollutants dispersion condition and unfavorable for pollutants dispersion condition.	DEIA institute	PMO	Included in DEIA contracts
	Landfill gas	➢ The concentrations of methane gas in the landfill and inside surrounding buildings (structures) should be investigated. ➢ The existing landfill gas collection and treatment (utilization) system and waste pile should be examined to determine whether there are gas leaks and any other safety hazards such as fire and explosion. ➢ The gas monitoring well should be installed at 3 m to 5 m from the building (structure) foundation between the building (structure) and the waste pile. The number of gas monitoring wells should be 3 to 5 and the well spacing should be 2 m to 3 m. Methane gas in each gas monitoring well should be monitored at least 10 times. The monitoring frequency can be determined according to the gas migration amount and should be monitored every 2 to 3 days. The monitoring frequency should be adjusted according to the rate of methane accumulation in the wells.	DEIA institute	PMO	Included in DEIA contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	Solid waste characterization	➢ Solid waste samples will be collected from each of the two MSW landfills, Lanshan Xiaowujia landfill and Zixing landfill, to be mined/removed and transported to sanitary landfills. ➢ The samples will be analyzed to determin whether the waste in these landfills contains hazardous sustances, such as asbestos and hazardous chemicals.	Contractor	PIUs, PMO	Included in contractors' bids and contracts
Environmental Impact Minimization Planning	Soil resources: Loss of land and topsoil, increasing risk of erosion	➢ Minimize land take for development. ➢ Incorporate landscape and revegetation features in design; ➢ Retain/incorporate landscape features in design. ➢ Optimize balance between cut and fill and avoid deep cuts and high embankments to minimize earthworks. ➢ Maximize reuse of spoil and other material within the construction or adjacent construction works. ➢ Select spoil disposal sites and develop spoil management and rehabilitation plan. ➢ Specify removal and storage of topsoil for restoration works prior to main earthworks. ➢ Specify vegetation that serves specific bioengineering functions and is of local provenance. ➢ Design appropriate drainage systems for slopes to reduce soil erosion.	Design institute	PIUs, PMO	Included in the design contract
	Emission: Minimize air emissions.	➢ Specify local materials to minimize transport distance. ➢ Locations for borrow areas and concrete batching stations must	Design institute	PIUs, PMO	Included in the design contract

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		be at least 300 m downwind of the nearest household.			
	Water bodies: Minimize risk of polluted run-off into water bodies	➢ Technical design must ensure that drainage design and discharge locations minimize risk of polluting nearby water bodies. ➢ Design the on-site wastewater treatment facilities with appropriate technology and adequate capacities. ➢ Ensure water is treated to the relevant standard prior to discharge to the municipal sewer system.	Design institute	PIUs, PMO	Included in the design contract
B. Construction Phase					
Ambient air quality	Construction fugitive dust will be generated during the levelling of landfill piles, landfill capping, storage and transportation of construction materials, and other civil works activities.	➢ Construction site in rural areas will be enclosed with walls. ➢ The road at construction site, operating area, living area must be ground hardening with fine stones, or other equivalent material. ➢ Spray water on haul road surface and construction areas to reduce fugitive dust emissions. Spraying water 1-2 times a day, and increase the frequency in wind or dry weather conditions. ➢ Avoid high fugitive dust generating construction activities during strong wind period. ➢ Install wheel washing equipment or conduct wheel washing manually at each exit of the works area to prevent trucks from carrying muddy or dusty substance onto public roads. ➢ Tarpaulin will be used to cover materials to prevent fugitive dust emission and spillage during transportation. ➢ Strengthen the supervision and management of transportation of materials to avoid spillage along the way. ➢ Use enclosed MSW trucks when hauling waste. If there is no	Contractors	PIUs and PMO	Included in contractors' bids and contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		enclosed dump truck, loads will be covered during truck transportation to avoid spillage or dust generation. ➢ Construction waste and spoil will be treated and removed in a timely manner to prevent dust emission, reduce land occupation, and improve the environment of the construction sites. ➢ Vehicle's haulage routes will be planned to avoid the residential area, traffic intensive areas, and other sensitive receptors as far as possible. Vehicle speed on unpaved haul roads will be restricted to 15 km/hr or less. ➢ Use commodity concrete as much as possible. ➢ Develop and implement a site housekeeping program to effectively manage the disposal, removal, and stacking of spoil, construction waste, and construction materials on the construction site.			
	Exhaust gas from construction machinery and vehicles, including excavators, dozers, haul trucks and other supporting service vehicles.	➢ Select high-quality equipment and fuel, improving the efficiency of various types of fuel combustion machineries. ➢ Develop and implement an operation management and maintenance program for construction vehicles to keep them in good working order and inspect them regularly. ➢ Ensure emissions from vehicle and construction machineries are in compliance with the PRC standards. ➢ Turn off engines to reduce idle time emissions if anticipated waiting period is longer than normal and turn off engines when not in use. ➢ Provide masks for operating personnel.	Contractors	PIUs and PMO	Included in contraction contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Open burning of construction waste material and trash/refuse shall be strictly prohibited and shall be subject to penalties for the contractor, and withholding of payment.			
Wastewater	Wastewater is mainly generated from the following construction activities: washing construction machinery and vehicles; pouring of concrete; stormwater from construction sites during rain; and domestic wastewater of construction workers.	➢ Construction work will stop during heavy rain to avoid contaminated water generation. ➢ Uncompacted soil layer and construction material will be covered with waterproof tarpaulin. ➢ Construction wastewater will be collected and treated with sediment traps and then used for water spray for on-site dust suppression. ➢ Stormwater will be collected a rainwater catchment area at each construction site. Rainwater will go to the sedimentation traps before reuse or discharging the rainwater. ➢ Portable toilets and small package wastewater treatment plants and or septic tanks will be provided on construction sites for the workers. Construction sites and construction camps shall also have drainage provisions to collect and treat site runoff. ➢ Domestic wastewater of construction workers will be used for dust suppression after an on-site septic-tank treatment and biochemical treatment. ➢ To avoid construction waste contaminating water at construction sites, waste bins will be set up at each construction site to collect waste in the construction area, and the local sanitation department will pick up the waste regularly for disposal to sanitary landfills. ➢ Intercepting drainage ditches are constructed around the	Contractors, CSCs	PIUs and PMO	Included in contraction contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		construction sites to collect wastewater and stormwater. After the sedimentation treatment, it is used for water sprays to control dust emission at construction sites. ➢ Cement, sand and lime building materials will be managed effectively to avoid water pollution during rain. ➢ Construction machinery will be maintained on a regular basis to prevent dripping or leaking oil and contaminating soil and water. ➢ Place storage facilities for fuels, oil, and other hazardous materials within secured areas on impermeable surfaces, and provide bunds and cleanup installations; ➢ Contractors' fuel suppliers must be properly licensed and follow proper protocol for transferring fuel and the PRC standard of JT3145-88 (Transportation, Loading and Unloading of Dangerous or Harmful Goods). ➢ Any spills are to be cleaned up according to PRC norms and codes within 24 hours of the occurrence, with contaminated soils and water treated according to PRC and Hunan requirements. Records must be handed over without delay to the PMO and local EPB. An emergency spill contingency plan shall be prepared by the contractors as part of the site-specific EMP and personnel will be trained in its use.			
Acoustic environment	Noise and vibration are generated from activities involving different construction machineries, mainly including	➢ During daytime construction, the contractor will ensure that: (a) noise levels from equipment and machinery conform to the PRC standard for Noise Standards for Construction Sites (GB12523-2011) and the WBG EHS Standards; (b) only low noise machinery or the equipment with sound insulation is employed; and (c) concrete mixers and similar activities will be located at least 300	Contractors, CSCs	PIUs and PMO	Included in contraction contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	excavators, bulldozers, loaders, piling machines, equipment lifting machinery and transport vehicles and other types of construction machineries.	m away from the nearest sensitive receptor. ➢ Strictly control construction time, reasonably arrange the construction plan, avoid construction work at night (22:00 to 6:00) when construction activities are near sensitive receptor. ➢ Night transportation activities will be limited. To reduce noise at night, restrict the operation of machinery generating high levels of noise, such as piling, and movement of heavy vehicles along urban and village roads between 8 pm to 6 am. ➢ Apply noise reduction devices or methods where piling equipment is operating, such as construction within 300 m of sensitive sites. ➢ Locate sites for rock crushing, concrete-mixing, and similar activities at least 1000 m away from sensitive areas. ➢ Use low-noise mechanical equipment as much as possible, and keep equipment well-maintained to minimize noise and vibration impact. ➢ Various types of machinery with low noise will be included in the bidding documents; ➢ Provide training of the on-site staff on proper use of various heavy equipment; ➢ Forbid the use of horns when near residential areas, schools, hospitals and other sensitive points unless absolutely necessary, minimize the use of whistles. ➢ Monitor noise at construction site boundaries and at sensitive areas; consult potentially affected people at regular intervals. If noise standards are exceeded, equipment and construction conditions shall be checked, and mitigation measures shall be			

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		implemented to rectify the situation; place temporary hoardings or noise barriers around noise sources during construction, if necessary; ➢ Limit the speed of vehicles travelling on construction sites and haul roads (less than 15 km/h). ➢ Basic shock absorber and workshop sound insulation, fan installation silencer and low-noise equipment will be implemented. ➢ Avoid using multiple high-noise machinery and equipment at the same time. ➢ Construction vehicles will avoid sensitive residential buildings, schools, and other sensitive buildings. ➢ Commercial concrete will be used as far as possible. Compared with concrete mixers installed on construction sites, commercial concrete has features such as less land occupation, less construction volume, convenient construction, and less noise pollution, and at the same time, it greatly reduces the traffic volume of cement and sand and reduces road traffic noise and dust pollution. ➢ Provide the construction workers with suitable hearing protection (ear muffs) according to the worker health protection law of the PRC.			
Solid waste	Solid waste generated during the construction phase is mainly the waste earthwork produced by the	➢ Minimize waste generation by managing materials on site effectively through good house-keeping and work planning. ➢ Construction waste earthwork and spoil will be used as closure covering soil or greening soil. It can be consumed by the project	Contractors, CSCs	PIUs and PMO	Included in contraction contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	construction activities such as the landfill pile levelling, access road construction, and the waste produced by construction workers.	without any external transport. ➢ Construction waste will be collected, stored at fixed points, classified and disposed of the local sanitation department. ➢ Waste iron and steel in construction waste, waste packaging materials, can be recovered by a waste recycling company. ➢ Waste bins shall be set up at the construction site to collect domestic waste in the construction area, and the local sanitation department will collect the waste and dispose it in the sanitary landfill. ➢ Strip and store topsoil in a stockpile for reuse in restoration. ➢ Use approved spoil disposal sites and borrow areas and contractors will only use material from borrow pits that have been approved. ➢ Spoil disposal sites and borrow areas shall be away from water body and residential areas. ➢ Contractors should plan their work in borrow areas and spoil disposal sites so that the open area is minimized and rehabilitation can be completed progressively. ➢ Restoration of spoil disposal sites and borrow areas will follow the completion of works in full compliance with all applicable PRC standards and specifications, and will be required before final acceptance and payment under the terms of contracts. ➢ If spoil occurs, properly remove and dispose of any significant residual materials, wastes and contaminated soils that remain on the ground during and after construction to the spoil sites. Any planned paving or vegetation of the area shall be done as soon as			

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		the materials are removed to stabilize the soil. ➢ Burning of waste is strictly prohibited. ➢ Conduct construction completion assessment to confirm that spoil disposal site and borrow area rehabilitation meets required standard and contractor is liable in case of noncompliance.			
Physical Cultural Resources	Destruction of buried cultural relics	➢ Stop work immediately and notify the local cultural authority when encountering potential cultural relics; adopt measures to protect the site. ➢ Contractor must comply with PRC's *Cultural Relics Protection Law and Cultural Relics Protection Law Implementation Regulations* if such relics are discovered during construction.	Contractors	IA, Bureau of Cultural Relics, PMO	None
Socio-economic resources	Community Health and Safety Emergency preparedness and response	➢ Keep the public informed of construction schedules, dusty and noisy activities, and access to the grievance redress mechanism. ➢ Prepare a traffic control plan and consult local transport bureaus before the construction starts to minimize interpretation to traffic. The plan shall include provisions for diverting or scheduling construction traffic to avoid morning and afternoon rush hours. With the proper implementation of the plan, community safety risks will be effectively addressed. ➢ An emergency response plan for accidents and emergencies, including environmental and public health emergencies associated with hazardous material spills and similar events will be prepared, and submitted to the IA for review and appraisal. A fully equipped first-aid base in each construction site will be provided.	Contractors	IA, local transport bureau, PMO	

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Underground utilities will be identified prior to any earth moving work. Construction activities will be planned so as to minimize disturbances to these utilities if they are located near the construction sites. ➢ Regulating traffic at road crossings, selecting transport routes to reduce disturbance to regular traffic, reinstating roads, and opening them to traffic as soon as the construction is completed. ➢ Plan construction activities to minimize disturbances to utility services, if any. ➢ Inform residents and businesses in advance through media of the construction activities, given the dates and duration of expected disruption; ➢ Place clear signs at construction sites in view of the public, warning people against potential dangers such as moving vehicles, hazardous materials, excavations, and raising awareness on safety issues; ➢ Heavy machinery will not be used at night. ➢ Secure construction sites and equipment, to prevent access by the public through appropriate fencing or security personnel			
Grievance redress mechanism	Handling and resolving complaints on contractors	➢ Establish a subproject-level GRM for each subproject, appoint a GRM coordinator within PIUs. ➢ Brief and provide training to GRM access points (IA, PMO, contractors). ➢ Disclose GRM to affected people before construction begins at the main entrance to each construction site.	IAs, PIUs	PMO	PIU budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Post the complaint hotline number at all work site and construction camp entrances. ➢ Maintain and update a database to document all complaints.			
Occupational health and safety (OHS)	Construction site sanitation	1. Each contractor shall ➢ Provide adequate and functional systems for sanitary conditions, toilet facilities, waste management with waste separation, labor dormitories and cooking facilities. ➢ Effectively clean and disinfect the site. During site formation, spray with phenolated water for disinfection. Disinfect toilets and refuse bins and ensure timely removal of solid waste. ➢ Exterminate rodents on site at least once every 3 months, and exterminate mosquitoes and flies at least twice each year. ➢ Provide public toilets in accordance with the requirements of labor management and sanitation departments in the living areas on construction site, and appoint designated staff responsible for cleaning and disinfection. ➢ Work camp wastewater shall be discharged into the municipal sewer system or treated on-site using a portable system.	Contractors, CSCs	PIUs and PMO	Included in construction contracts
	Occupational safety	➢ Provide personal protective equipment (safety hats and shoes) to all construction workers ➢ Provide ear defenders to workers operating and working near noisy areas. ➢ Prepare and obtain approvals of method statements for hazardous activities such as excavation.	Contractors, CSCs	PIUs and PMO	Included in construction contracts

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Provide clean water for all construction sites and workers' camps. ➢ Provide an adequate number of latrines and other sanitary arrangements at construction sites and work camps, and ensure that they are cleaned and maintained in a hygienic state. ➢ An emergency response plan to take actions on accidents and emergencies will be prepared, including environmental and public health emergencies associated with hazardous material spills and similar events. A fully equipped first-aid base in each construction camp will be organized. ➢ Ensure awareness and other training will be provided to all persons working or visiting the construction sites. ➢ Safety posters will be displayed prominently in relevant areas of the site.			
Cumulative Impacts	Cumulative impacts during construction	➢ PIUs will coordinate with contractors and other project contracts and other projects in the area of influence in terms of construction schedule, access roads and disposal sites sharing. ➢ Contractors shall develop material transport plans in consultation with local traffic management authorities, other contractors, and local community.	Contractors, PIUs	PIU and PMO	None
C. Operation Phase					
Ambient air quality	Landfill gas generated from landfill affecting air quality	➢ Landfill gas is collect and treated using bio-oxidation technology.	IAs	Local EPBs	Included in IAs' operating budget
	Odor generated in waste compaction, loading, and	➢ Use deodorization system and air odor treatment system	IAs	Local EPBs	Included in IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	unloading processes				
	Emissions from MSW transportation trucks affecting local air quality	➢ Conduct periodic examination of emission of vehicle exhaust pollutants for each vehicle in accordance with PRC standards. ➢ Conduct periodic air quality monitoring in accordance with the monitoring program in the EMP.	IAs	Local EPBs	Included in IAs' operating budget
Wastewater	Leachate generated from MSW landfills	➢ Leachate will be collected and treated in sanitary landfill treatment facilities. ➢ Effluent from the leachate treatment facilities will be monitored in accordance with PRC standards (GB ➢ Concentrated solution will be treated using submerged combustion evaporation treatment technology.	IAs	Local EPBs	Included in IAs' operating budget
Noise and vibration	Traffic noise from MSW trucks; pumps and fan noise of the leachate treatment facilities	➢ Conduct ambient noise monitoring and inspection, determine whether mitigation measures will be required for sites where noise levels are expected to exceed the standard. ➢ Low-noise equipment will be procured and installed and it will be specified in the bidding documents	IAs	Local EPBs	Included in IAs' operating budget
Solid waste	Solid waste transportation and sludge produced by leachate treatment facilities	➢ MSW will be compressed at MSW transfer stations, which will be cleaned daily and MSW will hauled away daily. ➢ Only totally enclosed MSW trucks will be used for transporting waste from MSW stations to sanitary landfills. ➢ Sludge from the leachate treatment system is dewatered by the filter and sent to sanitary landfills.	IAs	Local EPBs	Included in IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
Site Stability	Subsidence rate of a landfill after closure	➢ Consolidation of closed landfill will be monitored on a regular basis. ➢ Post closure use of the landfill site for any other activity and public access will be allowed only after technical audit and clearance by a competent team to establish suitability and sustainability of the proposed use of the sites.	IAs IAs/PMO	PMO	Included in operations phase monitoring.
Community Health and Safety	Traffic safety impact from MSW trucks and emergency preparedness.	➢ Strictly enforce traffic law to improve road safety and reduce traffic accidents. ➢ Employ traffic control when necessary. ➢ An emergency response plan for accidents and emergencies, including environmental and public health emergencies associated with hazardous material spills and similar events will be prepared, and submitted to the PMO for review and appraisal.	IAs with support from LIEC	PMO	IA's operating budget
Occupational Health and Safety	Safety training, awareness and competence	➢ Set speed limit to 15 km/hr within the landfills. ➢ Provide safety training to all employees, especially truck drivers. Staff will be trained in basic sanitation and health care issues, occupation health and safety, and the specific hazards and/or safety risks associated with their work. ➢ A fully equipped first-aid base in each sanitary landfill will be provided.			

Source: DEIAs, PPTA consultants, and *Technical Code of Municipal Solid Waste Sanitary Landfill Closure* (GB51220-2017) (According to General Provisions 1.0.2, this technical code is adaptive for both existing MSW sanitary landfill closure and existing MSW landfill closure).

Table EMP-5: Potential Impacts and Mitigation Measures for Each Component

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
Component 1: On-site Closure of Existing MSW Landfills 9 sites in 8 cities/counties (Hengyang County, Changning city, Hengshan county, Yongzhou city (Lengshuitan district and Lingling district), Lanshan county, Dongan county, Guiyang county and Lengshuijiang city subprojects)					
A. Pre-construction Phase					
Detailed design of landfill closure[43]	Preliminary and detailed design of MSW leachate treatment shall follow the PRC national standard CJJ150-2010 *Technical Code for Leachate Treatment of Municipal Solid Waste.*	➢ For landfill with no leachate collection facilities or poor leachate collection facilities, some effective leachate collection remediation measures shall be considered during landfill closure to minimize groundwater pollution by leachate. ➢ Leachate collection remediation measures shall be developed based on the topography and conditions of the landfill. The alternatives include laying of leachate diversion ditch in the downstream of the landfill, installing wells and pumps, and lateral well diversion on the landfill slope. ➢ The original flood control system of the landfill should be evaluated and checked. The total catchment area should include the surface area of the landfill, when checking the flood peak discharge of the flood interception trench outside the landfill area. ➢ The impermeable layer should be designed according to	Design Institute	PIUs, PMO	Included in the design contracts

[43] The EIA / EMP will be updated at the detailed design stage as required based on the additional information available after further investigation of the site, leachate movement and groundwater table.

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		the conditions of damages, depth of waste, geological conditions, and economic and technical feasibility. ➢ The landfill status investigation should be conducted before the schematic design of the landfill closure is finalized. The investigation should include, but not limited to: structure of impermeable layer; status of leachate collection system; area, height and shape of the waste pile; status of leachate level in waste pile; collection, treatment and utilization of landfill gas; flood control and drainage facilities; stability of the waste pile; amount of landfilled waste; and non-domestic wastes, if any. ➢ The stability analysis and settlement calculation shall be carried out for the waste pile. The stability analysis and settlement calculation shall comply with the relevant provisions in the current industry standard of "Technical Code for Geotechnical Engineering of Domestic Wastes Landfill" CJJ176. ➢ The status of the landfill area should be analyzed based on the investigating data and material. A topographic map of the landfill area should be developed, and the location of hidden hazards should be marked on the map. ➢ When the landfill closure project plans to adopt vertical anti-seep barrier measures, the engineering geology and hydrogeology of the landfill surroundings should be investigated. It should confirm if there are any			

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		obstructions at the proposed vertical anti-seep barrier.			
B. Construction Phase					
The construction of landfill landscape shall comply with the relevant provisions in the industry standard CJJ/T 82 "Code for Construction and Acceptance of Urban Landscape Engineering Projects". The landfill cover layer, landfill gas collection, surface runoff, and leachate collection facilities shall not be damaged during construction.					
Ambient air	Odor Emission. During construction, odor mainly comes from existing waste in the landfills.	➢ Earth covering work will be implemented immediately after reshaping the landfill pile to mitigate the odor emission. ➢ Gas-guiding cages will be constructed where the cages are buried in the landfill pile.	IAs	Local EPBs	Included in IAs' operating budget
Wastewater	Leachate seepage in Hengyang Doupi existing MSW landfill due to no anti-seepage membranes and the middle and lower reaches of the drainage channels are already cracked.	➢ A new anti-seepage and drainage system will be built in the landfill area (about 2000 m2) in front of the MSW dam. ➢ A new exudation drainage groove will be built on the inner side of the floodgate trench. Leachate was drained through a guide trench and connected to a leachate collection tank through a HDPE solid pipe.	Contractor	CSC, IA	Included in construction contract
Solid waste	Construction waste in Dongan existing MSW landfill. About one-third of the landfill area is covered by illegal dumping of construction waste.	➢ Develop a plan to manage the construction waste in the design and move the waste to the locations within the landfill according to the design before on-site closure work can begin. ➢ Restrict access to the landfill and stop all illegal dumping	Contractor	CSC, IA	Included in construction contract

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		activities immediately. ➢ Implement the closure construction activities accordingly the design.			
Cumulative impact: Groundwater	Since the mine tailing pond and the Guiyang MSW landfill are located next to each other, they have cumulative impact to the shallow groundwater below the two sites.	➢ Implement the Guiyang landfill closure project as soon as possible since the mine tailing pond treatment project is already underway. ➢ Implement the EMP including environment monitoring program. ➢ Coordinate with responsible party of the mine tailing pond treatment project to collect and treat the wastewater generated from both sites and achieve the maximum environment benefits of both projects.	Contractor	CSC, IA	Included in construction contract
Cumulative impact: Noise and vibration	Noise will be generated from the construction activities of Guiyang MSW landfill closure as well as the mining tailing pond treatment project construction activities. These two sites are next to each other.	➢ Two project coordinate with each other on construction schedule, especially using high-level noise/vibration equipment to minimize the impact to the nearest residents about 300 m away from both construction sites. ➢ In the unlikely event that the construction activities at both sites overlap, the cumulative impact is expected to be minimal if all measures in Table EMP-4 are implemented effectively to control the noise levels.	Contractor	CSC, IA	Included in construction contract
Leachate collection and treatment	Minimize leakage and ensure occupational safety	➢ If there is any leachate leakage, a leachate collection drain should be built at the leachate leakage position.	Contractor	CSC, IA	Included in construction contract

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Pumping equipment shall be explosion-proof when using vertical diversion well.			
Flood control and surface runoff diversion	The damaged flood control facilities or flood control facilities that do not meet the flood control requirements should be rehabilitated and repaired.	➢ If a landfill does not have a flood control system, such a system should be included in the landfill closure process. ➢ Slope protection shall be carried out around the landfill area with potential landslide hazards. ➢ The surface drainage ditch should be built on the top of the waste pile, slope, and the platform. The design of the drainage ditch shall meet the following requirements: (i) Drainage ditch should not form a slope by the settlement of the waste pile. (ii) Different section sizes of drainage ditch should be adopted according to the different catchments in the upstream and downstream of the waste pile. The parameters such as the size of the ditch, water flow, and flow velocity should meet the requirements of the national flood control standards. (iii) The structures and materials of drainage ditch should resist uneven settlement. (iv) The layout of drainage ditch should be effective in preventing surface runoff from eroding the cover soil. ➢ The platform between the waste pile slopes should be	Contractor	CSC, IA	Included in construction contract

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		equipped with a drainage ditch that receives upstream surface runoff and shall be connected to the drainage ditch in the downstream. ➢ The combination of drainage and slope protection should be considered for landfill slopes in areas with large precipitation.			
Landfill area landscape	Greening	➢ Except for the necessary gas diversion, flood control and stormwater diversion, and leachate diversion facilities, the other surfaces should be covered with vegetation. ➢ The landscape soil layer will be laid on the top layer of the landfill. The thickness of the soil layer should be at least 500 mm. ➢ The landscape soil layer will be compacted by layer and the degree of compaction should not be less than 80%. ➢ The fertilizing and tillage methods for the vegetation will be determined according to the characteristics of the proposed vegetation. ➢ The organic matter content, moisture, aeration, and pH value of the vegetation soil layer should meet the soil requirements of the selected vegetation cultivation. Artificial soil can be used in key landscape areas. ➢ The parameters such as soil compaction, grain size, and contents of other materials in the landscape soil layer should conform to the relevant requirements in the	Contractor	CSC, IA	Included in construction contract

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		industry standard CJ/T 340 “Landscape Planting Soil". ➢ If the slope is larger than 1:3, top soil stabilization measures should be adopted.			
Landfill reshaping	Ensure the stability of landfill and occupational safety	➢ The shallow layering operations should be adopted and deep excavation shall not be used during landfill excavation. ➢ The excavation personnel should wear gas mask during manual excavation. The depth of trench should not exceed the height of workers during manual trenching. ➢ During landfill shaping, the excavated waste should be backfilled timely. The backfilled waste should be compacted layer-by-layer, and the compaction density of waste should not be less than 0.8 t/m3. ➢ During landfill shaping, the surface of the exposed waste should be temporarily covered with low-permeability material to prevent odor and fugitive dust emission and stormwater penetration. ➢ Any cracks, gullies and holes that appear in the landfill should be filled and compacted. ➢ The status of existing landfill gas and leachate collection systems shall be checked before landfill shaping. Protection measures should be taken to the functional systems to prevent damage caused by the landfill shaping.	Contractor	CSC, IA	Included in construction contract

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ The basic functions of the drainage, transportation, landfill gas collection and treatment, and leachate treatment facilities in the landfill should be maintained during landfill shaping.			
C. Operation Phase					
Wastewater	Leachate collection and treatment	➢ 9 existing landfills will be closed on-site and leachate collection system will be installed. ➢ Leachate collected will be sent to one of 4 upgraded leachate treatment facilities under the project for treatment. ➢ Leachate collected will not be allowed to be discharged into the public sewer system and/or surface water bodies without treatment from an approved leachate treatment facility.	IAs	Local EPBs	Included in IAs' operating budget
Landfill closure maintenance	According to the local climate, soil conditions, and characteristics of different plants, proper maintenance of the landscape on landfill surface should be conducted after the landfill closure.	➢ When dead plants are found in the landfill landscape area, it will be checked if it is related to the leakage of landfill gas or the discharge of leachate. Then, necessary corrective measures will be taken accordingly. ➢ The fire and explosion hazards may still exist in landfill gas after landfill closure. Fire safety signs shall be equipped in accordance with the requirements of the "Safety Color and Safety Signs" and "Standards for Environmental Health Signs". Traffic safety signs and speed limit signs are required for vehicles access. High-	IAs	Local EPBs	Included in IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		voltage warning signs are required for power distribution rooms.			
Component 2: Mining of Existing MSW Landfills (Lanshan Xiaowujia MSW landfill and Zixing MSW landfill subprojects)					
A. Construction Phase					
Air quality	Odor generated from excavation process on the bare operating surface.	➢ Mobile spray gun, water spraying and LDPE temporary coverage will be used to reduce odor emissions. ➢ MSW extracted from the landfill will be quickly loaded to enclosed MSW trucks to minimize exposure time before it's hauled away from the site. ➢ Gas detection equipment will be set up at the construction site with an automatic alarm function. ➢ Open burning will be forbidden at the construction site.			
Asbestos	The two MSW landfills to be extracted (mined) are located in small towns of Lanshan and Zixing with little industry in the 1970s and 1980s. The landfills were for municipal solid waste. Thus, it's unlikely the waste to be extracted from the landfills contains ACM.	➢ Before project implementation, an asbestos risk assessment will be conducted by the local EPB. ➢ Asbestos and ACM will be transported in sealed vehicles to the hazardous waste landfill in Hengyang ➢ The local EPBs will supervise the removal of ACM waste and transport process, with the support of the specialist from the loan implementation environmental consultant. ➢ The masks shall be provided to workers from contractor for the MSW extraction.			

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Training on identifying and managing asbestos and ACM will be provided to the contractors. ➢ The monitoring plan consists of a visual inspection to confirm that all identified ACM wastes have been removed, and a clearance monitoring of airborne asbestos to confirm safe working environment.			
B. Operation Phase					
Land Redevelopment	Once the solid waste is mined and removed from these two MSW landfills, there will be no facility to operate. The sites will be redeveloped according the local cities' master plans.	➢ Establish a special institute for closed landfill redevelopment, recruit specialists of soil, plants, flowers, pest control, and marketing; ➢ Consider constructing the closed landfill area as a suburb ecological park, according to the development situation of city urban area and the surrounding area of landfill; and ➢ The closed landfill area is prohibited to be used as permanent construction land without the authentication of sanitation, rock-soil, and environmental specialists.	IAs	Local EPBs	Included in IAs' operating budget
Construction Transportation	During the construction period, a large amount of construction materials need to be brought in. Construction waste and a small amount of domestic waste generated on site must be transported out. Transportation vehicles will	➢ Avoid busy roads and traffic rush hour; ➢ The construction unit should work with the transportation department to enhance the driver's professional ethics education; ➢ Transport on the required route, and dispose the waste according to the prescribed location.	IAs	Local EPBs	Included in IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	have a certain impact on surrounding traffic.				
Component 3: Urban-rural Integrated MSW Management System 7 subprojects in Hengyang county, Changning city, Leiyang, Yongzhou, Lanshan county, Zixing city, and Lengshuijiang city					
A. Construction Phase					
Construction Transportation	During the construction period, a large amount of construction materials need to be brought in. Construction waste and a small amount of domestic waste generated on site must be transported out. Transportation vehicles will have a certain impact on surrounding traffic.	➢ Avoid busy roads and traffic rush hour; ➢ The construction unit should work with the transportation department to enhance the driver's professional ethics education; ➢ Transport on the required route, and dispose the waste according to the prescribed location.	IAs	Local EPBs	Included in IAs' operating budget
B. Operation Phase					
Air quality	Dust generated from the refuse collection vehicle dumping waste into the discharge chute	➢ Install high-pressure spray pipes and nozzles in the pour chamber to suppress and settle dust	IAs	Local EPBs	Included in IAs' operating budget
	Odor generated in waste compaction, loading, and unloading processes	➢ Use deodorization and air odor treatment system to control odor emissions.	IAs	Local EPBs	Included in IAs' operating budget
	Dust and odor generated along the transporting route.	➢ Only used totally enclosed MSW truck to transport waste from collection and transfer stations to sanitary landfills.	IAs	Local EPBs	Included in IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
Wastewater	Vehicle washing wastewater	➢ Install oil separation precipitation tanks, separate vehicle washing wastewater and discharge to septic tank and treat with domestic sewage.	IAs	Local EPBs	Included in IAs' operating budget
	Rainwater at MSW collection and transfer stations.	➢ Keep all collected MSW inside the collection building to avoid MSW in contact with rainwater. ➢ Good housekeeping procedures will be implemented at all MSW stations. ➢ Stormwater within the property of the MSW stations will be collected with sedimentation traps before discharging.	IAs	Local EPBs	Included in IAs' operating budget
Noise and vibration	Noise sources of this project mainly include noise generated by equipment such as compressors, fans, and pumps, and traffic noise generated by transfer vehicles.	➢ Use functional and low noise equipment and strengthen equipment maintenance. ➢ Take basic measures such as vibration reduction, distance attenuation, and sound insulation to ensure that the noise levels at boundaries are in compliance ➢ MSW trucks will slow down when passing through residential or other sensitive areas. ➢ Loud noise horns will be avoided to reduce the impact of vehicle noise on the acoustic environment around the transportation route; ➢ Loading and unloading at MSW stations at night will be avoided. ➢ GPS will be equipped on transportation vehicles to select	IAs	Local EPBs	Included in IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		optimum routes and monitoring haul truck activities during operation of MSW stations.			
Solid waste	Domestic solid waste collection and compression.	➢ Domestic waste from the MSW stations will collected and compressed together with the waste outside the station. ➢ Domestic waste outside the station will be classified before entering the stations. ➢ Solid waste such as industrial solid waste, hazardous waste and medical waste will not be allowed to enter the transfer station. ➢ Only totaled enclosed MSW trucks will be used to transport the waste to sanitary landfills.	IAs	Local EPBs	Included in IAs' operating budget
Component 4: Four Existing Sanitary Landfill Upgrades (**Hengyang** county Lida Sanitary landfill, Leiyang Nanjiang sanitary landfill, Lanshan Qijiacun sanitary landfill, and Lengshuijiang engjiachong sanitary landfill)					
A: Construction Phase					
Wastewater	Leachate seepage due to insufficient anti-seepage solutions.	Geosynthetics HDPE geomembrane will be installed in strict accordance with the specifications to design the impermeable layer at the bottom and slope of the landfill site.			
B. Operation Phase					
Ambient air	Main impact is odor from wastewater treatment stations.	Leachate pond will be enclosed to reduce odor emission to ambient air.	IAs	Local EPBs	Included in IAs' budget
	Odor caused by trucks transporting leachate to	Repair or upgrade the leachate transporting trucks of Lida sanitary landfill, ensuring the truck hopper can be properly	IAs	Local EPBs	Included in IAs' budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	Hengyang Lida sanitary landfill for treatment are not properly closed.	closed without any leachate leakage.			
Wastewater	Leachate concentrated solution generated by leachate treatment facilities.	A leachate concentrated solution treatment system using submerged combustion evaporation will be built to reduce the impact.	IAs	Local EPBs	Included in IAs' budget
Noise and vibration	Noise mainly from sewage pumps, aerators, sludge dewatering machines and sludge pumps	Develop and implement a good O&M program to ensure all equipment is good working order; Keep the doors and windows closed for building with high noise equipment.	IAs	Local EPBs	Included in IAs' budget
Solid waste	Domestic waste of employees, interceptors of filter screens, and sludge from leachate treatment stations	➢ Domestic waste and interceptors of screens can be landfilled and disposed directly in the sanitary landfill. ➢ Leachate treatment facility sludge must be sterilized before being landfilled.	IAs	Local EPBs	Included in IAs' budget
Operation maintenance	Minimize the environmental impact and ensure the occupational safety	➢ Effective landscaping isolation measures shall be maintained around the main leachate treatment processes. ➢ Leachate treatment area shall be equipped with necessary access, obvious signs of vehicle direction, and meet the requirements of the fire codes. ➢ Leachate treatment plants shall be equipped with waste water, exhaust gas, and noise monitoring systems. ➢ Regulating tanks and anaerobic reaction facilities shall be equipped with hydrogen sulfide and biogas concentration monitoring and alarm devices; aeration facilities shall be equipped with ammonia concentration	IAs	Local EPBs	Included in IAs' budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		monitoring and alarm devices. ➢ Each leachate treatment unit shall be equipped with the testing and monitoring devices for production control and operation management. ➢ Landfill leachate production and discharge measurement system shall be established. Daily water consumption report and annual reporting system shall also be developed. ➢ The main odor generation sources, such as regulating tanks and sludge dewatering facilities, should be closed, partially isolated, and suctioned. The odor gases should be collected and treated before discharge. ➢ The noise generated from the different parts of the leachate treatment facility should be controlled and appropriate mitigation measures should be taken. The plant boundary noise shall comply with the national standard GB12348 "Noise Standard for Industrial Enterprise Boundary Noise". ➢ The foam generated by leachate treatment during aeration shall be suppressed by spray water or foam reduction agents.			
Occupational health and safety	Adaptive for both construction and operation phase	➢ Control and protection measures shall be taken for dangerous gases such as biogas and hydrogen sulfide. ➢ Fire prevention measures shall be taken for the anaerobic treatment facilities, biogas storage, utilization	Contractor, IAs	CSC, local EPBs	Included in construction budget and IAs' operating budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		facilities, and transmission pipelines. ➢ The open structures shall be equipped with guardrails. ➢ The obvious location shall be equipped with necessary protection and life-saving supplies and medicines. The protection and life-saving supplies and medicines shall be managed by specially-assigned persons and checked and replaced from time to time. ➢ The construction and operation of the leachate treatment works shall adopt measures that are helpful to the prevention and treatment of occupational diseases and the protection of the workers' health. Occupational disease prevention equipment and protective articles shall be in normal working condition and shall not be dismantled or used without authorization.			
Component 5: Kitchen Waste Treatment (Yongzhou subproject)					
A. Construction Phase					
Noise and vibration	Noise from various activities	➢ Maximize utility of perimeter site buffers, particularly along site boundaries with sensitive adjoining properties. ➢ Increasing the distance between the noise source and the receiver, or providing natural or man-made barriers are the most effective ways of reducing noise when the sound generation level cannot be reduced. ➢ Orienting buildings so the site topography and the	IAs	Local EPBs	Included in IAs' budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		structure's walls buffer adjacent noise-sensitive properties from direct exposure to noise sources. ➢ Providing sound-absorbent materials on building walls and ceilings. ➢ Arranging the facility layout to eliminate steep uphill grades for waste delivery trucks, as driving uphill can significantly increase noise levels. ➢ Facing building openings such as entrances away from noise-sensitive adjoining property. ➢ Confining noisy activities within specified buildings or other enclosures.			
B. Operation Phase					
Ambient air	Odor from kitchen waste treatment plant, compost bin odor, odor from sewage treatment station, and boiler exhaust gas	➢ Odors of the workshops are collected and deodorized by a biological deodorization tower and discharged through a 15-m high exhaust pipe. ➢ Boiler exhaust gas is discharged through a 20m high exhaust. ➢ No sensitive points such as residents, schools and hospitals will be built within the sanitation protection distance of 500m from the waste treatment site.	IAs	Local EPBs	Included in IAs' budget
Wastewater	Waste water is mainly generated during the processing of kitchen waste, such as biogas slurry,	➢ Wastewater will be treated with "MBR + NF + RO" treatment process and be used for greening and dust	IAs	Local EPBs	Included in IAs' budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
	vehicle washing wastewater, ground washing wastewater, and domestic sewage.	reduction on the road. ➢ Domestic waste of this project is timely cleared and transported by the environmental sanitation department. ➢ Sludge and waste residue generated at the treatment facility are collected and sent to the existing sanitary landfill in a timely manner.			
Noise and vibration	Heavy truck traffic and heavy-duty equipment are the primary sources of noise. Equipment noise includes engines, backing alarms (beepers), hydraulic power units.	➢ Turn off idling equipment and queuing trucks. ➢ Avoiding traffic flows adjacent to noise sensitive property. ➢ Considering alternatives for beeping backing alarms, such as strobe lights and proximity detectors. ➢ Confining noisy activities within specified buildings or other enclosures. ➢ Properly maintaining mufflers and engine enclosures on mobile equipment operating within the treatment facility.	IAs	Local EPBs	Included in IAs' budget
Solid waste	The solid waste generated by this project is mainly the biogas residue from the treatment of kitchen waste, the sludge from the sewage treatment plant, and the daily domestic waste of employees.	➢ Solid wastes in the plant area will be classified and collected, temporarily stored at fixed points, and disposed of in a timely manner. ➢ Temporary storage sites for solid waste shall adopt measures such as protection against wind, rain, and seepage. The storage site will be hardened, seepage prevention, and the prevention of leakage of leachate to pollute the groundwater.	IAs	Local EPBs	Included in IAs' budget

Item/Activity	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Fund
			who implement	who supervise	
		➢ Clean and hygienic work will be done at the storage site during the operation, and the waste will be cleaned up in time to prevent the trash can from breeding mosquitoes and flies, and the odor will affect the local atmosphere.			

Source: DEIA, project EIA, *Technical code of Municipal Solid Waste Sanitary Landfill Closure* (GB51220-2017), *Technical Code for Leachate Treatment of Municipal Solid Waste* (CJJ150-2010), and *Construction Standard of Municipal Solid Waste Landfill Closure Projects* (CJ140-2010).

F. Environment Monitoring Plan

20. An environmental monitoring plan (EMoP) focuses on the environment impacts within the project's areas of influence for each of the ten subprojects. The EMoP for the project has been developed to ensure the environmental impacts and mitigation measures are implemented. A summery the EMoP is shown in **Table EMP-6**, which covers the scope of monitoring, monitoring parameters, time and frequency, and implementing agencies. The monitoring will comply with the methodology provided in the relevant PRC national environmental monitoring standards. Environmental Monitoring during the detail design phase will be conducted as per the EMoP including further investigations for high mercury concentration in surface and groundwater at Loudi and Chenzhou city. Other associated compliance standards to be followed are the national environmental quality standards for ambient air, Groundwater, surface water and noise, and the effluent discharge standards (see project EIA Chapter II). Environmental monitoring program include the following:

21. **Internal monitoring by contractors**. Civil works contractors will develop site EMP with environmental management and internal supervision systems based on the approved project EMP and the DEIAs, undertake self-check activities and fully cooperate with the local EPBs. Each contractor will have designated EHS staff responsible for site EMP implementation.

22. **Internal monitoring/supervision and reporting by CSCs.** During construction, the designated EHS staff from CSCs will be responsible for conducting internal environmental monitoring (consisting mainly of visual site inspection) in accordance with the monitoring plan. The CSCs will be supported the EMU staff and the LIEC. Supervision results will be reported through the monthly reports to the PMO.

23. **Internal environmental monitoring and reporting by PMO.** The LIEC will conduct regular site visits to monitor the EMP implementation progress. Results of site visits, project EMP implementation and environmental impact monitoring will be communicated to ADB through the semi-annual project progress reports prepared by the PMO.

24. **Independent/external EMP compliance monitoring.** The PMO will contract a qualified independent environment monitor agency (EMA) to conduct periodic environmental quality monitoring and EMP compliance verification in accordance with the monitoring program (**Table EMP-6**). The EMP will visit each construction site at least twice a year and submit semi-annual EMP monitoring reports during the construction phase to the PMO, which will forward the reports to ADB for review and disclosure on ADB's website. A detailed cost breakdown will be provided by the EMA when the environmental monitoring program is updated and finalized at the start of each subproject implementation.

Table EMP-6: Environmental Monitoring Plan

Subject	Parameters	Location	Frequency	Standard
1. On-site Closure of Existing MSW Landfills 2. (Hengyang County, Changning city, Hengshan county, Lanshan county Dongan county, Guiyang county and Lengshuijiang city subprojects) 3. Monitoring plan is made based on Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008) and *Technical code of Municipal Solid Waste Sanitary*				

Subject	Parameters	Location	Frequency	Standard
Landfill Closure (GB51220-2017).				
Leachate	Suspended Solid, COD, BOD5, ammonia nitrogen, coliform bacteria	Outlet of leachate treatment facilities	Monitor once per quarter and monitoring for 3 consecutive days	Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008)
Surface water	COD, BOD5, ammonia nitrogen, suspended solid, total phosphorus, total nitrogen, total mercury, total cadmium, total lead, total chromium, hexavalent chromium, total arsenic and coliform bacteria	Nearby rivers and/or streams	Monitor once per annual wet, normal, and dry season; monitor for 3 consecutive days each time	Surface Water Quality Standard (GB3838-2002)
Groundwater	pH value, total hardness, total dissolved solid, ammonia nitrogen, nitrates, nitrite, sulfate, chloride, cyanide, volatile phenols, total hardness, total dissolved solids, permanganate index, total bacteria, total mercury, total cadmium, total lead, hexavalent chromium, total arsenic, fluorine, copper, iron, zinc, and manganese	A baseline monitoring well in 30-50m groundwater upstream of landfill sites; Two pollution dispersal monitoring wells at 30-50m of both sides of landfill sites; Pollution monitoring wells in 30m and 50m of groundwater downstream of landfill sites	Monitor once per annual wet, normal, and dry season; monitor for 3 consecutive days each time	Ground Water Quality Standard (GB/T 14848-93)
Ambient air	CH4, H2S, NH3, PM10	Two monitoring points in the upwind and downwind direction of project sites	CH4 : once or twice per month in the landfill area and landfill gas outlet. other parameters once per quarter; monitor for 7 consecutive days each time。	Ambient Air Quality Standard (GB3095-2012)
Noise	Equivalent continuous A sound level (L_{Aeq})	Five monitoring sites at the access road and around the project sites	Twice in the construction period	Noise Limit of Construction Site Boundary (GB12523-2011)
2. Mining of Existing MSW Landfills				

Subject	Parameters	Location	Frequency	Standard
4. (Lanshan Xiaowujia existing MSW landfill Mining and Zixing existing MSW landfill mining) 5. Monitoring plan is made based on Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008) and *Technical code of Municipal Solid Waste Sanitary Landfill Closure* (GB51220-2017).				
Ambient air	CH_4, H_2S, NH_3, PM_{10}	Two monitoring points in the upwind and downwind direction of project sites	Twice in the construction period	Ambient Air Quality Standard (GB3095-2012)
Construction noise	Equivalent continuous A sound level (L_{Aeq})	Five monitoring sites at the access road and around the project sites	Twice in the construction period	Noise Limit of Construction Site Boundary (GB12523-2011)
3. Urban-rural Integrated MSW Management System 6. (Hengyang county, Changning city, Leiyang, Yongzhou, Lanshan county, Zixing city, and Lengshuijiang city subprojects) 7. Monitoring plan is made based on Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008) and *Technical code of Municipal Solid Waste Sanitary Landfill Closure* (GB51220-2017).				
Surface water	COD, BOD5, ammonia nitrogen, suspended solid, total phosphorus, total nitrogen, total mercury, total cadmium, total lead, total chromium, hexavalent chromium, total arsenic and coliform bacteria	Nearby rivers and streams	Monitor once per annual wet, normal, and dry season; monitor for 3 consecutive days each time	Surface Water Quality Standard (GB3838-2002)
Discharge	COD, BOD5, ammonia nitrogen, suspended solid, total phosphorus, total nitrogen, total mercury, total cadmium, total lead, total chromium, hexavalent chromium, total arsenic and coliform bacteria	Discharge outlets of wastewater	Monitor once semi-annually; monitor for 3 consecutive days each time	Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008)
Dust	PM_{10}	Two monitoring points in the upwind and downwind direction of project sites	Monitor once per quarter; continuously monitor seven days per time	Ambient Air Quality Standard (GB3095-2012)

Subject	Parameters	Location	Frequency	Standard
Odor	H_2S, NH_3	Two monitoring points in the upwind and downwind direction of project sites	Monitor once per quarter; monitor for 7 consecutive days each time	Ambient Air Quality Standard (GB3095-2012)
Construction noise	Equivalent continuous A sound level (L_{Aeq})	Five monitoring sites at the access road and around the project sites	Monitor once per quarter; three days divided by day and night per time	Noise Limit of Construction Site Boundary (GB12523-2011)
Operation noise	Equivalent continuous A sound level (L_{Aeq})	Four monitoring sites around the project sites	Monitor once semi-annually; three days divided by day and night per time	Noise Limit of Construction Site Boundary (GB12523-2011)
4. Existing Sanitary Landfill Upgrade 8. (Hengyang county Lida Sanitary landfill, Leiyang Nanjiang sanitary landfill, Lanshan Qijiacun sanitary landfill, and Lengshuijiang engjiachong sanitary landfill) 9. Monitoring plan is made based on Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008) and *Technical code of Municipal Solid Waste Sanitary Landfill Closure* (GB51220-2017).				
Groundwater	pH value, total hardness, total dissolved solid, ammonia nitrogen, nitrates, nitrite, sulfate, chloride, cyanide, volatile phenols, total hardness, total dissolved solids, permanganate index, total bacteria, total mercury, total cadmium, total lead, hexavalent chromium, total arsenic, fluorine, copper, iron, zinc, and manganese	A baseline monitoring manhole in 30-50m groundwater upstream of landfill sites; Two pollution dispersal monitoring manholes at 50m of both sides of landfill sites; Pollution monitoring manholes in 50m and 150m of groundwater downstream of landfill sites	Monitor once per year wet, normal, and dry season; monitor for 2 consecutive days each time	Ground Water Quality Standard (GB/T 14848-93)
Leachate	Suspended Solid, COD, BOD5, ammonia nitrogen, coliform bacteria	Outlet of leachate treatment facilities	Monitor once per quarter; monitor for 3 consecutive days each time	Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008)
Ambient air	CH4, H_2S, NH_3, PM_{10}	Two monitoring points in the upwind and downwind	Monitor once per quarter; monitor for 7 consecutive days each time	Ambient Air Quality Standard (GB3095-2012)

Subject	Parameters	Location	Frequency	Standard
		direction of project sites		
Noise	Equivalent continuous A sound level (L_{Aeq})	At boundaries of all sites	Monitor once per quarter; three days divided by day and night per time	Noise Limit of Construction Site Boundary (GB12523-2011)
5. Kitchen Waste Treatment (Yongzhou subproject) 10. Monitoring plan is made based on Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008) and Technical Requirement for Environment Monitor of Sanitary Landfill Site of Domestic Refuse (GB/T18772-2008).				
Discharge	pH, COD, BOD5, suspended solid, total phosphorus, total nitrogen, total mercury, total cadmium, total lead, hexavalent chromium, and total arsenic	Discharge outlets of wastewater treatment facilities	Monitor once per quarter; monitor for 3 consecutive days each time	Standard for Pollution Control on Landfill Site of Municipal Solid Waste (GB16889-2008)
Construction noise	Equivalent continuous A sound level (L_{Aeq})	At boundaries of construction site	Monitor once per quarter	Noise Limit of Construction Site Boundary (GB12523-2011)
Construction ambient air	SO2, PM10, NO2	In the upwind and downwind of construction site	Monitor once per quarter; monitor for 7 consecutive days each time	Ambient Air Quality Standard (GB3095-2012)
Operation ambient air	H2S, NH3, PM10	In the upwind and downwind of treatment facilities	Monitor once per quarter; monitor for 7 consecutive days each time	Ambient Air Quality Standard (GB3095-2012)
Operation noise	Equivalent continuous A sound level (L_{Aeq})	At boundaries of the site	Monitor once per quarter; three days divided by day and night per time	Noise Limit of Construction Site Boundary (GB12523-2011)

Source: DEIA (March 2018), PPTA consultants, and *Technical code of Municipal Solid Waste Sanitary Landfill Closure* (GB51220-2017).

G. Reporting Requirements

25. The PMO, with the assistance from LIEC, will prepare the EMP implementation section of the semi-annual project progress reports to be submitted to ADB. If any unanticipated environmental and/or social risks and impacts arise during construction, implementation or

operation of the project that were not considered in the EIA and EMP are discovered, the PMO shall promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan. The environmental reporting requirements are described below and also summarized in Table EMP-7.

26. **Monthly environment report.** The IAs supported by the local CSCs will submit the monthly environment monitoring report to the PMO. Information to be provided in the report includes: (i) project implementation status; (ii) environmental mitigation measures implemented; (iii) monitoring and observation of activities; (iv) environmental training conducted; (v) occupational health and safety reporting (e.g. accidents during construction, etc.); (vi) major events or issues that happened during the reporting period; and (vii) complaints received from the public and how these were resolved through the GRM. The LIEC will be responsible to develop a template for monthly report and provide training to CSCs and EMU/IAs. The CSCs will prepare such reports while the IAs will verify the information provided in the report. Both the CSCs and the IAs are required to sign the report before sending to the PMO.

27. **Environmental monitoring report.** The PMO will be recruited a licensed organization to conduct environment monitoring according the EMoP described in previous section of the EMP. All monitoring shall be conducted in accordance with the procedures and requirements of the applicable PRC national and Hunan provincial standards. The environmental monitoring organization will communicate with the PMO and LIEC to fully understand the requirement of the EMoP before going to the field for environmental monitoring. The monitoring data and report will be submitted to the PMO by the organization.

28. **Semiannual project progress report.** The PMO supported by LIEC under the loan supervision consulting package will prepare the EMP implementation section of the project progress reports to be submitted to ADB semiannually during the construction and annually during operation. The report include information such as (i) project implementation status; (ii) environmental mitigation measures implemented; (iii) monitoring activities including compliance monitoring; (iv) monitoring data; (v) analysis of monitoring data against relevant standards; (vi) violations of environmental regulations and standards; (vii) any additional mitigation measures and corrective actions required; (viii) environmental training conducted; (ix) occupational health and safety reporting (e.g. accidents during construction, etc.); (x) major events or issues that happened during the reporting period and follow-up actions needed; and (xi) complaints received from the public for all subprojects and how these were resolved through the GRM. The report will be discussed for both subprojects financed by ADB and associated facilities such as environmental performance of Guiyang County Tailing Pond.

29. **Semiannual external EMP compliance monitoring report.** The PMO will recruit an external EMA to conduct independent EMP compliance monitoring and reporting. The EMA will visit each construction site, review information/data from the contractors and CSCs, review the semiannual project progress report, review and evaluate the environmental monitoring report prepared by the monitoring organization, assess construction site safety management, review EMP training program implementation and training records, and evaluate the effectiveness the internal EMP monitoring. Semiannual external EMP compliance monitoring report will be submitted to the PMO. The report will include a comprehensive assessment of the EMP implementation, findings and recommended corrective actions to be taken. The PMO will forward the report to ADB semiannually for review and disclosure on ADB's website.

30. **Environmental acceptance monitoring report.** Within two months after project completion, environmental acceptance monitoring report for each subproject shall be completed.

The report will be (i) prepared by an authorized organization in accordance with the *PRC Regulation on Environmental Check-and-Acceptance of Project Completion* (State Environmental Protection Agency, 2001); (ii) reviewed for approval by the local EPBs, and (iii) reported to the PMO by the IAs. The report will be submitted to ADB by the PMO for information purpose.

Table EMP-7: Environmental Reporting Requirements

Report	Prepared by	Submitted to	Frequency
A. Construction Phase			
Monthly environment report	IAs supported by Contractors, CSCs	PMO	Monthly
Environment monitoring report	Licensed monitoring organization	PMO	Semiannually
Environmental section of Project progress report	PMO, LIEC	ADB	Semiannually
External EMP compliance monitoring report	External EMA	PMO, ADB	Semiannually
Environmental acceptance report	Authorized organization	Local EPBs, PMO	Within two months after project completion
B. Operation Phase			
Environmental section of Project progress report	PMO, LIEC	ADB	Annually
External EMP compliance monitoring report	External EMA	PMO	Annually

ADB = Asian Development Bank, CSC = construction supervision company, EMA = environmental monitoring agency, EPB = environment protection bureau, IA = implementing agency, LIEC= loan implementation environmental consultant, PMO = project management office.
Source: PPTA consultants.

H. Training and Capacity Building

31. To ensure effective implementation of the EMP, the capacity of the PMO, PIU, CSCs, contractors will be strengthened, and all parties involved in implementing mitigation measures and monitoring of environmental performance must have an understanding of the goals, methods, and the best practices of project environmental management. The EPB and LIEC will offer series of trainings to strengthen the capacity of the PMO and IAs concerned for EMP implementation. The main training emphasis will be to ensure that the contractors, CSCs, PIUs and PMO are well versed in environmentally sound practices and are able to undertake all construction and operation with the appropriate environmental safeguards.

32. The training program also addresses long-term capacity building and awareness raising needs, i.e. for the operational phase of the sanitary MSW landfills. Training and awareness raising campaigns will be provided by qualified operation and maintenance experts and the consultants.

33. Training Needs Assessments will be conducted by the LIEC to tailor the training for maximum impact. The trainer will include in their program a before/after assessment to evaluate the success of the training. An evaluation questionnaire will be used to assess the effectiveness of the training and the training program will be adjusted based on feedbacks. Training will be

provided throughout the implementation of the project and the training program is summarized in **Table EMP-8**.

Table EMP-8: Institutional Strengthening and Training Program

Training topic	Scope of Training	Trainer	Trainee
Procurement and contract management	➢ ADB's procurement guideline and bidding procedure ➢ Bidding document preparation, including EMP clauses ➢ Risk of improper procurement and mitigation measures ➢ Handling variation orders and contract management	PICS	PMO, IAs, PIUs, DIs, CSC,
Implementation of EMP and other health and safety requirements	- EMP contents and EMP implementation, including implementation responsibilities, environmental monitoring, supervision, inspection and reporting, consultation and participation, mechanism of EMP review, feedback and adjustment; - Site EMP preparation and implementation - reporting procedures, - EHS considerations during project construction and operation; - Monitoring and inspection methods, data collection and processing, interpretation of data, reporting system; - Communication with the public by different means (innovative community-based advocacy campaigns); - Review of first year experience (after 12 months)	LIEC, or experts from EPBs	CSC, IAs, PIUs Contractor GRM access points, other related local bureaus
Grievance redress mechanism (GRM)	- GRM structure, responsibilities and timeframe - Types of grievances, eligibility assessment; - Use and purpose of GRM; - Subproject level GRM; - ADB requirements for GRM; - GRM procedures; - Roles and responsibilities; - Review of first year experience (after 12 months)	LIEC	CSG, IAs, PIUs, other related local bureaus

Training topic	Scope of Training	Trainer	Trainee
Municipal solid waste management	- Integrated MSW management system - Kitchen waste management - Construction waste management - MSW reduce, reuse, and recycle - Policies and regulations for MSW management - MSW sorting and recycling - MSW source utilization - New technologies in MSW treatment and management - Waste charging to incentivize higher waste minimization, waste reuse, and recycling rates - Public awareness program and public willingness on 3Rs	PICS, LIEC	CSG, IAs, PIUs, other related local bureaus
Emergency preparedness and response planning	- Response mechanism to incidents such as spills - Response plan development - Mitigation measures for similar events - Emergency response team, procedure and actions - Drills of emergency response plan	Experts from EPB, LIEC	CSC, IAs, PIUs, other related local bureaus,
Construction safety	- International and national good practice for safety at construction sites - Policies for improving construction safety - Safety risk and hazard assessment - Safety training program development and implementation - Public awareness program and education	PICS	CSC, IAs, PIUs, other related local bureaus
Operation of sanitary landfill and leachate facility	- Good practice of sanitary MSW landfill management; - O&M of sanitary MSW landfills; - O&M of leachate facilities - Effluent monitoring from the leachate facilities	PICS	CSC, IAs, PIUs, other related local bureaus

ADB = Asian Development Bank, CSC = construction supervision company; EA = executing agency, EHS = environment health and safety, EMP = environment management plan, EPB = environment protection bureau, GRM = grievance redress mechanism, IA = implementing agency, LIEC = Loan implementation environment management consultant, PICS = project implementation consulting service; PIU = project implementing unit.
Source: PPTA consultants.

34. **Capacity Building.** In addition to short-term training courses, the project includes a capacity building and institutional strengthening output, which is relevant to mitigation measures and EMP implementation. Under Output 6(b), the project will provide support to the project IAs to assist in improving the efficiency and effectiveness of the organizations and their ability to manage the sanitary MSW landfill facilities. Specific tasks under the output will include:

i) Study on kitchen waste treatment in the developed countries and the implementation in the PRC;
ii) Study on urban-rural integrated MSW management system
iii) Leachate and leachate residuals treatment study
iv) Study on construction waste treatment and the development in China
v) MSW reduce, reuse and recycle and the development in China
vi) MSW sorting and recycling and the development in China

I. Estimated Budget for Mitigation and Monitoring

35. The mitigation measures related to construction works, which will be shouldered and budgeted by contractors. The environmental management (including supervision, mitigation, monitoring and training) requiring specific budgets outside the civil works contracts and they are shown in **Table EMP-9**. All costs will be required to be included in the bidders bids and thus covered by successful contractors' budget.

Table EMP-9: Mitigation cost during the construction

Subject	Number	Cost per Unit	Total Cost (RMB)	Remarks
1. On-site Closure of Existing MSW Landfill & Mining of Existing MSW Landfill				
Dust Suppression	11	80,000	880,000	Renting and operation management of water sprinkling trucks
Wastewater Treatment	11	10,000	110,000	Dry toilet and septic tank
Sanitation Belt and Greening	9	400,000	3.6 million	
2. Urban-rural Integrated MSW Management System				
Wastewater Treatment	130	2,000	26,000	Temporary intercepting ditches; wastewater precipitation tanks
Dust Suppression	130	5,000	65,000	Covering material, car washing, dust suppression equipment
Waste Cleaning	130	4,000	52,000	Waste bins
Construction Waste Disposal	130	4,000	52,000	Ex-situ transfer
3. Existing MSW Sanitary Landfill Upgrade				

Dust Suppression	4	80,000	320,000	Renting and operation management of water sprinkling trucks
Wastewater Treatment	4	10,000	40,000	Dry toilet and septic tank
Sanitation Belt and Greening	4	400,000	1.6 million	
4. Kitchen Waste Treatment				
Dust Suppression	1	80,000	80000	Renting and operation management of water sprinkling trucks
Wastewater Treatment	1	10,000	10000	Dry toilet and septic tank

Source: PPTA Consultants estimate.

Table EMP-10: Monitoring cost during the construction and operation

Subject	Monitoring time	Unit Cost (CNY)	Total Cost (CNY)	Source of Fund
1. On-site Closure of Existing MSW Landfill & Mining of Existing MSW Landfill				
Leachate	132	2400	316,800	IAs
Surface water	99	2400	237,600	IAs
Groundwater	99	5000	495,000	IAs
Air	132	6000	792,000	IAs
Noise	44	1500	66,000	IAs
2. Urban-rural Integrated MSW Management System				
2.1 Collection Stations				
Construction Dust	130	1500	195,000	Contractors
Construction Noise	130	1500	195,000	Contractors
Operation Odor	390	6000	2.34 million	IAs
Operation Nosie	390	1500	585,000	IAs
2.2 Transfer Stations				
Construction Dust	16	1500	24,000	Contractors
Construction Noise	16	1500	24,000	Contractors
Surface Water	48	2400	115,200	Contractors

Subject	Monitoring time	Unit Cost (CNY)	Total Cost (CNY)	Source of Fund
Discharge	48	2400	115,200	IAs
Operation Odor	48	6000	288,000	IAs
Operation Nosie	48	1500	72,000	IAs
3. Existing MSW Sanitary Landfill Upgrade				
Leachate	48	2400	115,200	IAs
Groundwater	36	5000	180,000	IAs
Air	48	6000	288,000	IAs
Noise	48	1500	72,000	IAs
4. Kitchen Waste Treatment				
Construction Noise	4	1500	6,000	Contractors
Construction Dust	4	1500	6,000	Contractors
Wastewater	9	2000	18,000	IAs
Air	12	6000	72,000	IAs
Noise	12	1500	18,000	IAs
		Total (CNY)	**6,636,000**	
		Total (USD)	**1,045,204**	

Source: DEIA and PPTA Consultants estimate.

Table EMP-11: Cost of Environmental Management

Oversea Study Tour				
Topic	**Person**	**Day**	**Rate**	**Cost**
Integrated Sustainable MSW Management	6	8	$1,278	$61,320
MSW Reduce, Reuse and Recycle	6	8	$1,278	$61,320
MSW Seperation and Recycling	6	8	$1,278	$61,320
Waste to Energy	6	8	$1,278	$61,320
Domestic Tours, Training and Education				
Study Tours (8 tours)				$80,000
Seminars and Workshops (8)				$80,000

Public awareness/campaign on MSW management		$50,000
Technical Assistance (TA)		
MSW separation and application of integrated municipal solid waste management (IMSWM)		$300,000
Integrated urban-rural MSW management		$300,000
Existing MSW landfill treatment and redevelopment		$200,000
Kitchen waste and construction waste management and resource recovery		$200,000
Waste resource recovery		$200,000
	Total	**$1,655,280**

Source: PPTA Consultants estimate.

J. Public Consultation

36. Two rounds of public consultations were held during the preparation of the DEIAs and the project EIA. The results of the stakeholder consultation process demonstrated that all components under the project have strong local support. In compliance with ADB's SPS (2009), environmental information related to the project was and/or will be disclosed to affected people as follows:

(i) this EIA is disclosed on ADB's project website (www.adb.org), and is available for consultation in the PIUs' and PMO's offices;
(ii) the DEIAs will be reviewed, disclosed and approved by the municipal EPBs where the subprojects are located; and
(iii) semi-annual external monitoring reports on project's compliance with the EMP as well as the Project Completion Report (PCR) will be disclosed ADB's website at www.adb.org.

37. During project implementation, affected people will be consulted and informed through formal questionnaire surveys, site visits and informal interviews by the PIUs and the LIEC. Public meetings will be organized by the PIUs prior to mid-term mission to present and discuss EMP implementation progress, solicit community opinions and concerns, and agree on required corrective actions. The LIEC will, prior to the PCR mission, organize a survey to assess community satisfaction with project implementation and project outputs. The EMA will assess the EMP implementation performance.

K. Grievance Redress Mechanism

38. A grievance redress mechanism (GRM) will be established for each subproject level. Each PIU will assign one staff prior to construction to establish a Project Complaint Unit (PCU) at subproject level to deal with complaints from affected people throughout implementation of the project. The PCU will be the key contact point for local community representatives who may require information about the project or who have an issue they would like to discuss. The PCU's phone number, fax, address, email address will be disseminated to the public and each construction sites. Each PIU will maintain a complaints database and communicate with contractors, construction supervision engineers, local EPBs, the PMO, and representatives of affected local communities. All costs involved in resolving the complaints (meetings,

consultations, communication and reporting/information dissemination) will be borne by the respective PIUs. Costs related to escalated grievances will be covered by the PMO.

39. Once a complaint is received and filed, the PCU will assess if complaints are eligible. Eligible complaints include those where (i) the complaint pertains to the project; and (ii) the issues arising in the complaint fall within the scope of environmental issues that the GRM is authorized to address. Ineligible complaints include those where: (i) the complaint is clearly not project-related; (ii) the nature of the issue is outside the mandate of the environmental GRM (such as issues related to resettlement, allegations of fraud or corruption); and (iii) other procedures are more appropriate to address the issue. Ineligible complaints will be recorded and passed to the relevant authorities, and the complainant will be informed of the decision and reasons for rejection.

40. The procedures and timeframes for the grievance redress process are described in the following five steps and also shown in Figure EMP-1.

41. **Stage 1**: **Resolution at Subproject Level.** If a concern arises, the affected person (AP) may try to resolve the issue of concern with the GRM designated staff at the subproject or complain to the local authorities, such as local EPB. If the concern is resolved successfully by the subproject, no further follow-up is required. Nonetheless, the GRM designated staff at the subproject shall record any complaint and actions taken to resolve the issues and report the results to the GRM designated staff of PMO. If no solution is found within 7 working days or if the complainant is not satisfied with the suggested solution, proceed to Step 2.

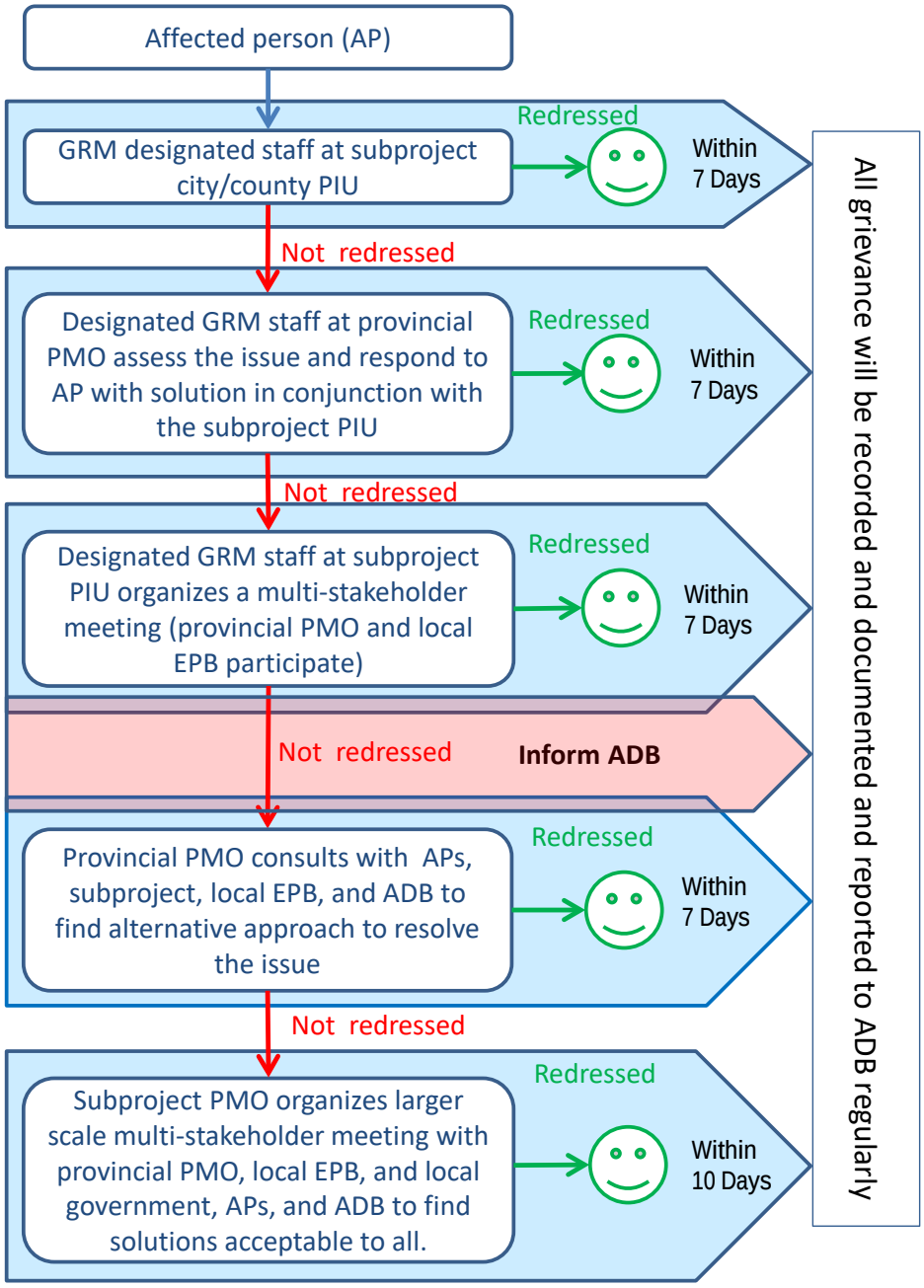
42. **Stage 2**: **Official Complaint to PMO**. The AP will submit the grievance directly, or via the PCU at the subproject, to the GRM designated staff of PMO who must assess the eligibility of the complaint, including whether Step 1 has been implemented properly, identify a solution in conjunction with the subproject, and give a clear reply within 7 working days to the complainant and to the GRM designated staff at the subproject with the suggested solution. The subproject PIU shall implement the redress solution and convey the outcome to the PMO within 7 working days.

43. **Stage 3**: **Stakeholder Meeting**. If no solution is identified or if the complainant is not satisfied with the suggested solution under Step 2, the subproject PCU will organize, within 7 days, a multi-stakeholder meeting where all relevant stakeholders, including the complainant, the GRM designated staff at the subproject or other representative(s), the GRM designated staff of PMO, and local EPB will be invited. The meeting will aim to find in a solution acceptable to all parties, and identify responsibilities and an action plan. The subproject PIU will implement the agreed-upon redress solution and convey the outcome to the PMO within 7 working days.

44. **Stage 4: Special consultation.** If the multi-stakeholder hearing process under Step 3 cannot resolve the complaint successful, PMO in consultation with the PIU, the relevant EPBs, and ADB, will review the situation and attempt to develop an alternative approach to resolve the complaint within 7 working days.

45. **Step 5: Large Scale Stakeholder Meeting.** If the complainant is not satisfied with the suggested solution under Step 4, the subproject PIU, PMO, relevant EPBs, and other local government authorities, shall organize another multi-stakeholder hearing process within 10 days and shall find a solution acceptable to all parties. Based on the agreement, an action plan shall be developed and implemented by the subproject PIU within the agreed timeframe.

Figure EMP-1: Flow chart of Proposed GRM



L. Mechanisms for Feedback and Adjustment

46. Based on site inspections and monitoring reports, including internal and external environmental monitoring reports, the PMO with the assistance from the LIEC will decide whether (i) EMP is adequate and effective and further mitigation measures are required as corrective actions, or (ii) some improvements are required for environmental management practices.

47. The effectiveness of mitigation measures and monitoring plans will be evaluated by a feedback reporting system. Adjustment to the EMP will be made, if necessary. The PMO will play a critical role in the feedback and adjustment mechanism with the support from the LIEC.

48. The effectiveness of mitigation measures and monitoring plans will be evaluated by a feedback reporting system. Adjustment to the EMP will be made, if necessary. The PMO will play a critical role in the feedback and adjustment mechanism with the support from the LIEC.