



Report and Recommendation of the President to the Board of Directors

Project Number: 47047-002
June 2016

Proposed Loan People's Republic of China: Shandong Groundwater Protection Project

This document is being disclosed to the public prior to its consideration by ADB's Board of Directors in accordance with ADB's Public Communications Policy 2011.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 2 June 2016)

Currency unit	–	yuan (CNY)
CNY1.00	=	\$0.1521
\$1.00	=	CNY6.5751

ABBREVIATIONS

ADB	–	Asian Development Bank
EIA	–	environmental impact assessment
EMP	–	environmental management plan
m ³	–	cubic meter
NCP	–	North China Plain
PMO	–	project management office
PRC	–	People's Republic of China
SPG	–	Shandong Provincial Government
SWRD	–	Shandong Water Resources Department

NOTES

- (i) The fiscal year (FY) of the Government of the People's Republic of China and its agencies ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

Vice-President	S. Groff, Operations 2
Director General	A. Konishi, East Asia Department (EARD)
Director	Q. Zhang, Environment, Natural Resources and Agriculture Division, EARD
Team leader	F. Radstake, Principal Environment Specialist, EARD
Team members	M. Bezuijen, Environment Specialist, EARD C. Carreon, Project Officer, EARD S. Ferguson, Principal Social Development Specialist (Safeguards), EARD S. Kawazu, Senior Counsel, Office of the General Counsel A. Sebastian-Mercader, Senior Operations Assistant, EARD T. Ueda, Senior Natural Resources Economist, EARD L. Wang, Senior Project Officer (Urban Development), EARD
Peer reviewers	Y. Siddiqi, Principal Water Resources Specialist, Sustainable Development and Climate Change Department H. Woldring, Senior Water Resources Specialist, Central and West Asia Department

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

	Page
PROJECT AT A GLANCE	
I. THE PROPOSAL	1
II. THE PROJECT	1
A. Rationale	1
B. Impact and Outcome	3
C. Outputs	3
D. Investment and Financing Plan	4
E. Implementation Arrangements	5
III. DUE DILIGENCE	7
A. Technical	7
B. Economic and Financial	7
C. Governance	8
D. Poverty and Social	8
E. Safeguards	9
F. Risks and Mitigating Measures	10
IV. ASSURANCES	10
V. RECOMMENDATION	10
APPENDIXES	
1. Design and Monitoring Framework	11
2. List of Linked Documents	14

PROJECT AT A GLANCE

1. Basic Data		Project Number: 47047-002	
Project Name	Shandong Groundwater Protection Project	Department /Division	EARD/EAER
Country Borrower	China, People's Republic of Government of the People's Republic of China	Executing Agency	Shandong Provincial Government
2. Sector	Subsector(s)	ADB Financing (\$ million)	
✓ Agriculture, natural resources and rural development	Rural flood protection		50.00
	Rural water policy, institutional and capacity development		10.00
	Water-based natural resources management		90.00
		Total	150.00
3. Strategic Agenda	Subcomponents	Climate Change Information	
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Adaptation (\$ million)	18.00
Environmentally sustainable growth (ESG)	Environmental policy and legislation	Climate Change impact on the Project	Medium
	Global and regional transboundary environmental concerns		
	Natural resources conservation		
4. Drivers of Change	Components	Gender Equity and Mainstreaming	
Knowledge solutions (KNS)	Pilot-testing innovation and learning	Some gender elements (SGE)	✓
5. Poverty Targeting		Location Impact	
Project directly targets poverty	No	Rural	High
6. Risk Categorization:	Complex		
7. Safeguard Categorization	Environment: A Involuntary Resettlement: A Indigenous Peoples: C		
8. Financing			
Modality and Sources		Amount (\$ million)	
ADB		150.00	
Sovereign Project loan: Ordinary capital resources		150.00	
Cofinancing		0.00	
None		0.00	
Counterpart		194.03	
Government		194.03	
Total		344.03	
9. Effective Development Cooperation			
Use of country procurement systems		Yes	
Use of country public financial management systems		Yes	

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of China (PRC) for the Shandong Groundwater Protection Project.¹

2. The proposed loan for the Shandong Groundwater Protection Project will contribute to providing sustained groundwater supply for the agriculture sector in Weifang and Zibo prefectures in the North China Plain (NCP). The project will serve as a demonstration of an integrated approach for environmental restoration of overexploited groundwater aquifers through improving allocation of water resources, improving retention of storm water, and rehabilitating the water environment. The project will protect groundwater quantity and quality in Weifang and Zibo prefectures and safeguard a sustainable groundwater source for the agriculture sector, and contribute to improving food security in the PRC.²

II. THE PROJECT

A. Rationale

3. Falling groundwater tables as a result of over extraction of groundwater is a major concern in the PRC, particularly in the northern parts of the country. The PRC heavily depends on extraction of groundwater, with an estimated 20% of its annual water supply coming from groundwater, reportedly ranging from 110 billion cubic meters (m³) to 150 billion m³ per year. The largest groundwater user is the agricultural sector (60%), with domestic and industrial usage sharing the remaining 40%. There are more than 100 large cones of groundwater depression with an estimated total area of 150,000 square kilometers in the PRC. In the NCP, the total area of the cone of groundwater depression already extends to 70,000 square kilometers.

4. Weifang and Zibo prefectures in Shandong Province also depend heavily on groundwater, especially for its intensive and high-value agricultural production. Domestic and industrial water use, although still less than agricultural water use, is also on the rise as a result of the rapid economic development in the area. The project area, covering Changle and Hantai counties, and Gaomi, Qingzhou, and Shouguang cities, is the main vegetable producer for Beijing and has a high concentration of greenhouses. The greenhouses that use drip irrigation require fresh and sediment-free water, which, in most cases, is provided from shallow groundwater sources. As a result of extensive groundwater abstraction, the project area has become the largest overexploited aquifer in Shandong Province, and the second largest in the PRC.³ In some downstream areas, agricultural production stopped due to lack of suitable water sources. Some of the industrial or domestic water users that are still using groundwater are encouraged by the government to switch to surface water.⁴

5. Current groundwater recharge of both shallow and deep groundwater resources is insufficient to recover from the excessive pumping during the dry periods. Seasonal rainfall fluctuates widely, with an average of 70% of the rainfall occurring from June to September, followed by drought during the rest of the year. Flooding occurs during the summer months, but storm waters flow to the sea unutilized. The pattern of irregular rainfall is expected to worsen as

¹ The design and monitoring framework is in Appendix 1.

² The Asian Development Bank (ADB) provided project preparatory technical assistance for the Shandong Groundwater Allocation and Protection Project (TA 8423-PRC).

³ The overexploited area of the Weifang–Zibo aquifer covers approximately 5,422 square kilometers.

⁴ Usage of shallow (unconfined) groundwater causes overexploitation of groundwater sources that are used by many farmers. The use of deep (confined) groundwater causes land subsidence.

a result of climate change, and rainfall is predicted to decrease. Excessive groundwater usage also occurs because of lack of pricing of the resource, a weak licensing and permitting system, and insufficient abstraction metering and groundwater level monitoring.

6. The consequences of the current unsustainable groundwater utilization are serious: (i) pumping costs have increased; (ii) groundwater quality is deteriorating due to seawater intrusion and environmental pollution; (iii) domestic water supplies and agricultural (particularly vegetable) production are at risk; and (iv) the project area is suffering from significant financial and economic damages caused by land subsidence. Seawater intrusion and upconing has extended 35 kilometers inland from the coast, and some areas have already experienced subsidence of more than 2 meters.⁵ The process of land subsidence is irreversible, and urgent action is needed to avoid worsening.

7. Acknowledging the serious concerns, the PRC Government selected Shandong Province as a demonstration province for modernized water administration. The Shandong Provincial Government (SPG) has already taken multiple initiatives to address water scarcity in the NCP, including promoting water productivity and reuse, and introducing regulations on groundwater pumping. Several water-saving technologies, such as drip irrigation, are already widely used in the project area.⁶ The results have been successful, but more efforts are needed to fully address the risk of further decline of groundwater levels in the NCP.⁷ The national government has constructed the South–North Water Transfer Project, which started providing additional water for Shandong Province in 2014. The diverted water, which is mainly intended for domestic and industrial use, will not be sufficient to mitigate the current overexploitations of the groundwater resources in the NCP.

8. Lessons learned from past and ongoing support for the water sector, including the preparation of policy recommendations for the PRC's Thirteenth Five-Year Plan, 2016–2020, show that there is still lack of good examples of implementing integrated water management approaches and increasing water productivity in the PRC. Most counties in the project area lack (i) integration of good international practices to provide new alternatives for groundwater conservation, (ii) adequate implementation of water-saving strategies and regulatory stipulations, and (iii) introduction of up-to-date water environmental monitoring technologies. Existing government programs also lack the support to link efficient and reduced groundwater usage with the retention of surface and storm water to increase groundwater recharge and water availability for water-scarce areas.

9. The project will be the first Asian Development Bank (ADB) supported major investment in the PRC that specifically focus on groundwater resources protection, recognizing the strategic importance of these resources. Moreover, the project will support the development and introduction of economic policy instruments, critical to controlling groundwater usage. The project will contribute to the PRC's Thirteenth Five-Year Plan, 2016–2020, which pursues regionally balanced and environmentally sustainable growth; and the PRC's first National Plan to Protect the Safety of Groundwater Resources, 2011–2020.⁸ The project will support the PRC in

⁵ Process by which saline water underlying freshwater in an aquifer rises upward into the freshwater zone as a result of pumping water from the freshwater zone.

⁶ In Shouguang City, which is among the worst affected in the project area, two-thirds of the farmers reportedly apply drip irrigation already.

⁷ The amount of groundwater usage in Shandong Province declined from 13.4 billion m³ in 2001 to 8.9 billion m³ in 2012.

⁸ On 10 October 2011, the PRC Government approved the National Plan to Protect the Safety of Groundwater Resources, 2011–2020. The adoption of the plan is an important step to mobilize additional financial resources to

achieving the Sustainable Development Goals, in particular Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture and Goal 6: Ensure availability and sustainable management of water and sanitation for all. The project is in line with the country partnership strategy, 2016–2020 for the PRC of ADB in supporting the government's overarching strategic goal by focusing on environmentally sustainable growth.⁹ The project will contribute to ADB's Water Operational Plan, 2011–2020 to (i) increase water productivity across the range of users; (ii) embed integrated water resources management, including improved risk management, to mitigate floods, droughts, and other water-related disasters; and (iii) expand knowledge and capacity development that uses technology and innovation more directly.¹⁰

B. Impact and Outcome

10. The impact will be a sustained groundwater supply for the agriculture sector in the Weifang–Zibo area. The outcome will be improved conservation and sustainable use of groundwater resources in Weifang and Zibo prefectures. The project will serve as a demonstration of different integrated approaches for environmental restoration and improved management of overexploited groundwater areas. The project will promote the integration of innovative demonstration activities like (i) groundwater recharge through water harvesting and storage in smart greenhouses; (ii) demonstration of comprehensive water management information systems; and (iii) capacity development in water resources management, including water resource policy and regulation, water pricing, and water markets.

C. Outputs

11. The project will have three outputs: (i) groundwater recharged and conserved, (ii) surface water allocation improved and monitored, and (iii) capacity development for water resources management enhanced. Demonstration activities will be implemented in Changle and Huantai counties, and Gaomi, Qingzhou, and Shouguang cities in Weifang and Zibo, which are representative for critical water-scarce conditions in intensive agricultural production bases in the Weifang–Zibo area.

12. **Output 1: Groundwater recharged and conserved.** Output 1 will support the introduction of groundwater recharge technologies in the project area to increase shallow groundwater recharge and reduce usage of deep groundwater. Output 1 will have two components: (i) rehabilitation and construction of about 880 hectares of wetland areas, including canals, which will contribute to the recharge of shallow groundwater resources;¹¹ and (ii) technological innovation for monitoring shallow groundwater recharge in Huantai County. Under component 1, two wetland areas will be rehabilitated in Huantai County and Shouguang City to improve the reservoir and ecological functions of the wetlands, and increase shallow groundwater recharge through the canal network. These wetland areas currently suffer from water shortages and are not operational. Component 2 includes the development of a comprehensive management information system for water resources monitoring and management in Huantai County, including monitoring and dissemination of groundwater levels,

protect groundwater resources in the PRC. On 16 April 2015, the government also announced an associated action plan that includes a list of measures to tackle water pollution, with the aim of improving the quality of the water environment around the country by 2030. With regards to groundwater, the plan envisages that by 2020, groundwater overdraft will be reduced and the aggravated pollution of groundwater will be preliminarily controlled.

⁹ ADB. 2016. *Transforming Partnership: People's Republic of China and Asian Development Bank, 2016–2020*. Manila.

¹⁰ ADB. 2011. *Water Operational Plan, 2011–2020*. Manila.

¹¹ The wetlands to be rehabilitated or constructed are all modified habitats, but may have important ecological values.

quality, and abstraction. The management information system will be developed to complement an existing urban water supply management system. The existing system will be expanded to include monitoring of water resources, data analysis, optimizing the allocation of water resources, water regime forecasting, and decision-making support for flood control.

13. **Output 2: Surface water allocation improved and monitored.** Output 2 will improve water allocation and monitoring to increase water availability in water-scarce parts of the project area and indirectly reduce the pressure on groundwater resources. The output will have three components: (i) improvement of surface water allocation, (ii) retention of storm water, and (iii) establishment of hydrological facilities in Changle County. Through the improvement of surface water resources allocations, the exploitation of groundwater can be reduced. Component 1 will support Gaomi and Qingzhou cities and Hantai County to rehabilitate surface water flow systems and construct connections between the wide network of small rivers, canals, and small-sized reservoirs that exist in the Weifang–Zibo area. The connections will enable the local governments to supply areas with additional surface water resources to reduce the pressure on groundwater resources. Similarly, component 2 will support Changle County and Gaomi City to increase their reservoir capacity for improved storage of surface water. It is envisaged that the total storage capacity of the Nanzhai and Juchenghe reservoirs will be increased from 3.7 million m³ per year to 8.3 million m³ per year. Output 3 will support Changle County to establish precipitation and flow monitoring capabilities in the Nanzhai Reservoir watershed.

14. **Output 3: Capacity development for water resources management enhanced.** Output 3 will have two components: (i) policy development support and institutional strengthening of ADB's project management procedures, and (ii) project management. Component 1 will provide support for and training on groundwater policy and new approaches and techniques in water management, including wetland management, water-saving technologies for the agriculture sector such as smart greenhouses, the establishment of a groundwater trading system through pilot water user associations, and an integrated circuit card-controlled water usage system to be developed in Hantai County for monitoring and managing groundwater demand for agricultural and rural water users. Knowledge products will be prepared to document the experiences and achievements. Component 1 will also support capacity development and training of staff from the SPG and local governments in ADB project management procedures, technical design and implementation, and safeguard supervision and monitoring. Component 2 will provide overall project implementation support for staff from the SPG and cities and counties, including the implementation of land acquisition and resettlement.

D. Investment and Financing Plan

15. The project is estimated to cost \$344.03 million (Table 1).

16. The government has requested a loan of \$150 million from ADB's ordinary capital resources to finance the project. The loan will have a 25-year term, including a grace period of 5 years, will follow the straight-line method,¹² will have 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 on undisbursed funds (the interest and other charges during construction will be capitalized), and such other terms and conditions set forth in the draft loan and project agreements. The average maturity is 15.25 years, and the maturity premium payable to ADB is 0.10% per annum. The financing plan is in Table 2.

¹² This is based on the loan terms and the government's choice of repayment option and dates.

Table 1: Project Investment Plan
(\$ million)

Item	Amount ^a
A. Base Cost^b	
1. Groundwater recharged and conserved	76.37
2. Surface water allocation improved and monitored	210.71
3. Capacity development for water resources management enhanced	2.25
Subtotal (A)	289.33
B. Contingencies^c	46.71
C. Financing Charges During Implementation^d	7.99
Total (A+B+C)	344.03

^a Includes taxes and duties of \$11.68 million to be financed from government resources and the Asian Development Bank (ADB) loan resources. ADB loan will cover taxes and duties on items financed by ADB. Financing of taxes and duties is proposed because the due diligence showed that (i) the amount of taxes and duties is within the reasonable threshold identified in the country partnership strategy, (ii) the amount does not represent an excessive share of the investment plan, (iii) taxes and duties apply only in respect to ADB-financed expenditures, and (iv) financing of the taxes and duties is relevant for the success of the project.

^b In 2015 prices.

^c Physical contingencies computed at 8% for all expenditure categories. Price contingencies computed based on cost escalation factors at 1.7% for 2016, 2.0% for 2017, and 2.1% for 2018–2022 on local currency costs; and 1.5% for 2016, 1.4% for 2017, and 1.5% for 2018–2022 on foreign exchange costs.

^d Includes interest and commitment charges. Interest during construction for ordinary capital resources 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 an ordinary capital resources loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: ADB estimates.

Table 2: Financing Plan

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank	150.00	43.60
Government	194.03	56.40
Qingzhou City Government	29.90	8.69
Shouguang City Government	50.14	14.57
Changle County Government	46.33	13.47
Huantai County Government	33.53	9.75
Gaomi City Government	34.13	9.92
Total	344.03	100.0

Source: Asian Development Bank estimates.

17. ADB loan covers civil works, equipment and materials, project management, consulting services and training, and financing charges on the loan during construction. Taxes and duties are included in the base cost. The government will finance land acquisition and contingencies, as well as remaining proportions of civil works.

E. Implementation Arrangements

18. The implementation arrangements are summarized in Table 3. Details are given in paras. 19 and 20, and in the project administration manual.¹³

19. The project will be implemented over a period of 6 years, tentatively from 1 July 2016 to 30 June 2022. The SPG, represented by the Shandong Water Resources Department (SWRD), will be the executing agency responsible for overall implementation of the project. A project management office (PMO), chaired by the deputy director general of the SWRD, has been established to provide oversight and promote coordination across sectors, and to help guide

¹³ Project Administration Manual (accessible from the list of linked documents in Appendix 2).

project preparation and implementation. The PMO comprises staff and representatives from the Shandong Development and Reform Commission, Shandong Finance Department, SWRD, other relevant provincial agencies, and Weifang and Zibo prefectures. The Changle and Hantai county governments, and the Gaomi, Qingzhou, and Shouguang city governments will be the implementing agencies, and will establish similar local project implementation offices to implement project activities under their jurisdiction.

20. The PMO will be responsible for organizing and supervising procurement under the project. All ADB-financed procurement for the project will be conducted in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). A procurement agency will be engaged to procure works and goods under the project on behalf of the implementing agencies.

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	1 July 2016–30 June 2022		
Estimated completion and loan closing date	31 December 2021 (completion); 30 June 2022 (loan closing)		
Management			
(i) Oversight body	Project management office Deputy director general of the Shandong Water Resources Department (chair) Staff and representatives from the Shandong Development and Reform Commission, Shandong Finance Department, Shandong Water Resources Department, other relevant provincial agencies, and Weifang and Zibo prefectures (members)		
(ii) Executing agency	Shandong Provincial Government represented by the Shandong Water Resources Department		
(iii) Key implementing agencies	Changle County Government, Gaomi City Government, Hantai County Government, Qingzhou City Government, and Shouguang City Government		
(iv) Implementation unit	Implementing agencies have established project implementation offices with adequate number of senior staff who will carry out the overall supervision and monitoring of project activities.		
Procurement	National competitive bidding	32 contracts	\$196,060,200
	Shopping	5 contracts	\$231,900
Consulting services	Quality- and cost-based selection	1 contract	\$570,300
	Individual consultant selection	54 person-months	\$520,500
	Single-source selection ^a	84 person-months	\$589,500
Advance contracting and retroactive financing	The Shandong Provincial Government requested advance contracting and retroactive financing for works contracts and consulting services. The amount to be retroactively financed should not exceed 20% of the loan amount and be incurred prior to loan effectiveness but not earlier than 12 months before the date of signing of the related legal agreement.		
Disbursement	The loan proceeds will be disbursed in accordance with the Asian Development Bank's <i>Loan Disbursement Handbook</i> (2015, as amended from time to time) and detailed arrangements agreed upon between the government and the Asian Development Bank.		

^a The Water Resources Research Institute of the Shandong Province is proposed to be engaged through the single-source selection method because (i) it is considered to have unique knowledge of and access to the ongoing discussion on national and provincial water policy development through its previous assignments with (among others) the Ministry of Water Resources and Shandong Water Resources Department; (ii) it has an extensive network of professional contacts that will be required to be an effective stakeholder to discuss and promote water-related policy changes; and (iii) it has accumulated and possesses relevant water assessment data that is needed for this assignment. The Water Resources Research Institute is not affiliated with the Shandong Water Resources Department.

Source: Asian Development Bank estimates.

III. DUE DILIGENCE

A. Technical

21. Due diligence assessed the project's technical feasibility and sustainability. The SPG's domestic feasibility studies are technically sound and provide sufficient information on the design feasibility. International and national consulting services will provide the necessary technical support to ensure that international best practices are integrated into the final detailed design and applied during construction and implementation. The SPG confirmed that it will (i) continue the implementation of its ongoing water saving and conservation programs for the agriculture, industry, and urban sectors to reduce groundwater extraction; and (ii) facilitate the process of introducing water pricing and water rights trading. The SPG will also continue its programs to close industrial well fields to protect groundwater resources in the project area. The SPG will ensure adequate water allocation and management for the Judian and Mata lake areas and maintain adequate water levels.

22. **Climate change.** A climate risk vulnerability assessment was conducted to identify the threat that climate change presents to project viability, assuming a design life of 30–40 years. The project area may be subject to increasing frequency and duration of winter drought, variability in precipitation, and flood severity in summer. Flood volumes and higher flows could exceed the capacity of embankments, channels, pipelines, and the two project pump stations. To guard against this, (i) all structures will be constructed to a flood protection standard of one in 20 years or one in 50 years, and (ii) embankments will be designed to be porous for infiltration. The project is oriented to strengthen resilience to climate risks in the following ways: (i) increased storm water retention and improved water monitoring and allocation will strengthen water security, (ii) channel rehabilitation will improve water flows and reduce flood risk, and (iii) training in water conservation and wetland management will help secure the freshwater resources of two large wetlands in the project area.

B. Economic and Financial

23. The economic analysis indicated that the project is economically viable, with an overall economic internal rate of return of 20.6% and an economic net present value of CNY788.3 million. The analysis also confirmed economic viability of all components, with economic internal rates of return ranging from 18.7% to 23.8%. Sensitivity analysis showed that the project is robust to negative scenarios examined such as increase in investment costs, revenue reduction, and increase in operation and maintenance cost.

24. Financial analysis was conducted with respect to (i) financial sustainability of the project, and (ii) financial management capacity. Financial sustainability of the project was assessed based on fiscal impact of (i) counterpart funds during the project, and (ii) operation and maintenance cost and the loan repayment obligation. The analysis confirmed financial sustainability of the project, as the project will have substantially limited fiscal impact for the SPG and project county and city governments.¹⁴

¹⁴ For the SPG, and the project county and city governments, such expenditure will be far less than 5% of their respective fiscal expenditures.

C. Governance

25. The financial management assessment indicated pre-mitigation risk as “low.” The SWRD, given its experience with donor-funded projects including the ongoing ADB Risk Mitigation and Strengthening of Endangered Reservoirs in Shandong Province Project,¹⁵ will take overall responsibility for financial management of the project. The SWRD's sound financial management capacity is sufficient to support the implementing agencies for the financial management of the project. Nonetheless, training on project financial management, particularly ADB disbursement procedures and reporting and audit requirements, will be provided to strengthen the capacity of the implementing agencies.

26. The procurement capacity assessment indicates that the SWRD (the executing agency) and the five city and county governments (the implementing agencies) (i) have established arrangements for handling procurement, including bid document preparation, tender invitation, bid evaluation, contract award, construction supervision, and contract performance monitoring; and (ii) will engage a professional procurement agency experienced in managing procurement processes financed by international development institutions. The Shandong Finance Department and SWRD have experience with implementing ADB-financed projects. Given the lack of experience by the five city and county governments in managing ADB-financed projects and their lack of familiarity with ADB policies, guidelines, and procedural requirements, training in project management will be provided under the loan.

27. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the SPG, SWRD, and the five city and county governments. It has also been explained that, in line with ADB's Public Communications Policy 2011, the audit reports for the project will be uploaded on ADB's website. The specific policy requirements and supplementary measures are described in the project administration manual (footnote 13).

D. Poverty and Social

28. **Gender and social development.** About 4.0 million people will benefit directly and indirectly from the improved water management in the project area. The project is classified as having *some gender elements*, and includes gender design elements to guide the project in contributing to gender equality. A social and gender action plan has been prepared to (i) promote the accrual of project benefits by women; (ii) promote the participation of beneficiaries in project implementation, in particular through participation in community awareness-raising activities and in training, and through preferential treatment in employment; and (iii) foster public participation, such as through awareness-raising programs and activities in schools, to make all beneficiaries aware of potential contributions to water conservancy. Public consultations on agricultural water use will promote broad acceptance on reformed agricultural water management. Implementation of the social and gender action plan will be monitored throughout project implementation, including the collection of sex-disaggregated data on project activities. Poor and vulnerable households will be made better off through inclusion in cash-transfer programs under the social and gender action plan.

¹⁵ ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant to the People's Republic of China for the Risk Mitigation and Strengthening of Endangered Reservoirs in Shandong Province Project*. Manila.

E. Safeguards

29. **Environment (category A).** The environmental impact assessment (EIA) report, which includes an environmental management plan (EMP), follows ADB's Safeguard Policy Statement (2009).¹⁶ The EIA is consistent with the five domestic EIAs approved during June 2014–March 2015 by the Shandong Environmental Protection Department. Public consultations involved key stakeholders, including affected people and local government agencies, and the outcomes are integrated in the project design. The draft EIA was publicly disclosed on ADB's website on 9 March 2015. The SPG, through the PMO, will be responsible for implementation and compliance with the EMP, including inspection, monitoring, reporting, and initiating corrective actions or measures. The PMO will implement a grievance redress mechanism and have final responsibility for handling any disputes. The PMO is experienced in ADB project implementation, although this is the first ADB-funded project for the five project cities and counties. To support EMP implementation, loan implementation consultants and a capacity development program are part of the project design.

30. The project is expected to achieve environmental benefits, including stabilizing of groundwater levels, recharge of the Weifang–Zibo aquifer, reduced land subsidence, improved channel flows and flood capacity, wetland management, improved water security for over 4 million people, and improved water quality. Anticipated construction impacts are from the planned dredging and embankment (temporary damage of in-channel habitats, elevated turbidity, localized impacts to aquatic fauna, and odor from dredged sediment); air, dust, noise, vibration, and erosion impacts; and occupational and community health and safety. Potential operational risks include inadequate maintenance of project structures, including embankments and noise emissions from two pump stations. The risk of indirect, cumulative, and/or induced impacts has been assessed. Mitigation measures are described in the EMP. These include the use of specialized dredging machinery, timing of dredging, design of embankment habitats, and post-construction monitoring of aquatic invertebrates. The EIA concludes that effective EMP implementation, together with the prescribed training, will result in residual impacts within the limits of the PRC standards defined in the EMP.

31. **Indigenous peoples (category C) and involuntary resettlement (category A).** The project does not involve any distinct ethnic minority community and thus does not trigger ADB's Safeguard Policy Statement (2009) indigenous peoples requirements. With regard to involuntary resettlement, the project will have the following impacts: (i) 1,408 *mu* of collective village land will be permanently acquired and 1,029 people from 255 households on contracted village lands will be affected; (ii) 310 households with 1,167 people will be displaced physically and resettled to a resettlement site; and (iii) temporary land acquisition, mostly for land disposal and construction facilities, will occupy 9,422 *mu* of collective village land for 1 or 2 years, affecting 7,297 households.¹⁷ About 430 households with 1,720 people will be significantly impacted, all of which are in the Changle Nanzhai Reservoir component under the project. Five resettlement plans have been prepared to mitigate the involuntary resettlement impacts and to ensure displaced people are successfully resettled and rehabilitated; the plans have been prepared after extensive consultation with affected villages and farmers. The resettlement plans contain the required elements, such as compensation standards, an entitlement matrix, a livelihood restoration plan, a budget, an implementation schedule, external and internal monitoring, and a grievance redress mechanism. The total costs for resettlement are estimated at CNY291.51 million and are fully included in the project budget. The implementing agencies for resettlement have experience with

¹⁶ Environmental Impact Assessment (accessible from the list of linked documents in Appendix 2).

¹⁷ A *mu* is a Chinese unit of measurement (1 *mu* = 666.67 square meters).

local regulations and procedures, and have been familiarized with ADB's Safeguard Policy Statement (2009) requirements. A resettlement implementation consultant and an external monitor will also be engaged.

F. Risks and Mitigating Measures

32. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.¹⁸ The overall risk rating is medium. Adequate mitigation measures are in place, which are expected to ensure that the integrated benefits and impacts outweigh the risks and associated costs.

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Delays in project coordination and synchronization between agencies.	Ensure that the Shandong Water Resources Department assumes the oversight role to guarantee adequate coordination among the (i) two municipal governments and five city and county governments; and (ii) other key departments in water resources management, notably the Environment Protection Department and Agricultural Department.
Governments of project counties and cities are unfamiliar with ADB policies, procedures, and requirements for project implementation	Provide training during project implementation to city and county governments' staff on ADB's guidelines and policies and ensure early engagement of the procurement agency and project implementation consultant.
Delays in resolving land acquisition and resettlement issues (in particular for the Nanzhai Reservoir in Changle County)	Close monitoring and reporting of resettlement implementation through a professional supervision agency, support from an implementation consultant, and use of an external monitor. The total costs for resettlement are included in the project budget.

ADB = Asian Development Bank.

Source: ADB.

IV. ASSURANCES

33. The government and the SPG have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the project administration manual and loan documents.

34. The government and the SPG have agreed with ADB on certain covenants for the project, which are to be set forth in the loan and project agreements.

V. RECOMMENDATION

35. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of \$150,000,000 to the People's Republic of China for the Shandong Groundwater Protection Project, from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao
President

6 June 2016

¹⁸ Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

DESIGN AND MONITORING FRAMEWORK

Impacts the Project is Aligned with:			
Groundwater supply for the agriculture sector in the Weifang–Zibo area sustained (State Council. 2011. <i>National Plan to Protect the Safety of Groundwater Resources, 2011–2020</i> . Beijing; State Council. 2015. <i>Action Plan to Tackle Groundwater Pollution</i> . Beijing)			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
Outcome Conservation and sustainable use of groundwater resources in Weifang and Zibo prefectures improved	By 2023 a. Average groundwater levels recovering over an area of 120,000 ha in the groundwater depression zone (2014 baseline: 0 ha) b. Additional annual surface water retained to groundwater depression zone to the expected amount of 60 million m ³ (2014 baseline: 0 m ³)	Project technical and progress reports Annual groundwater monitoring and assessment reports from the SPG Other available bulletins and assessment reports from the SPG	Inadequate institutional coordination among the local governments on improved water resource allocation Water demand from urban and industrial sector increases to unsustainable levels
Outputs 1. Groundwater recharged and conserved	By 2022 1a. About 880 ha of wetlands created (2014 baseline: 0 ha) 1b. Annual water supply to Mata Lake and Judian Lake wetlands reaches 47 million m ³ (2014 baseline: 12 million m ³) 1c. Water resources monitoring system in Huantai County operational (2014 baseline: none)	1a. Project technical and progress reports 1b. Annual reports from the SPG and Weifang and Zibo prefectures 1c. Surface water and groundwater monitoring data and reports from the SPG	Late release of counterpart funds
2. Surface water allocation improved and monitored	By 2022 2a. About 345 km of canals constructed, rehabilitated, and improved to reallocate water to water-scarce areas (2014 baseline: 0 km) 2b. Capacity to retain and store up to 8.3 million m ³ of rainwater per year by the Nanzhai and Juchenghe reservoirs (2014 baseline: 3.7 million m ³)	2a. Project technical and progress reports 2b. Annual reports from the SPG and Weifang and Zibo prefectures	Implementation of resettlement plan encounters problems and delays

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
	<p>2c. Capacity of water diversion by the reservoir connection works under the project increases to 49 million m³ per year (2014 baseline: none)</p> <p>2d. 40 km of water supply pipes installed or upgraded in Gaomi and Qingzhou cities (2014 baseline: 0 km)</p>	2c. SPG flow monitoring data and water diversion records	
3. Capacity development for water resources management enhanced	<p>By 2022</p> <p>3a. About 150 qualified SPG and city and county water resources management staff (at least 30% of whom are female) trained on water resources management information system establishment, water users association piloting, and water saving technologies promotion (2014 baseline: 0)</p> <p>3b. At least three knowledge products will be published to document the demonstration activities (2014 baseline: 0)</p> <p>3c. Creation of about (i) 1,680 jobs during construction, with 20% women and 20% poor (with necessary trainings provided); and (ii) 170 jobs during operation of the project, with 20% women and 20% poor (with necessary trainings provided) (2014 baseline: 0)</p>	<p>3a. Project technical and progress reports</p> <p>3b. Annual reports from the SPG</p>	High turnover of trained staff

Key Activities with Milestones

1. Groundwater recharged and conserved

- 1.1 Acquire land and conduct temporary land occupation activities during 2015–2017
- 1.2 Rehabilitate and construct 1,600 ha of wetland areas for Judian Lake for the recharge of shallow groundwater resources by 2020
- 1.3 Implement technological innovation monitoring of groundwater recharge by 2021

2. Surface water allocation improved and monitored

- 2.1 Acquire land and conduct resettlement activities for the Nanzhai Reservoir and canals during 2015–2019
- 2.2 Construct 45 km of new water allocation channels by 2020
- 2.3 Construct 40 km of new water allocation pipes and/or culverts by 2019

Key Activities with Milestones	
2.4	Rehabilitate 300 km of rivers and/or channels by 2020
2.5	Construct 29 million m ³ of wetland retention capacity of storm water by 2020
2.6	Improve surface water allocation by 2019
2.7	Establish modernized digital water flow and quality monitoring, including disclosure and dissemination of groundwater information by 2020
3. Capacity development for water resources management enhanced	
3.1	Support project final design and implementation during 2016–2022
3.2	Conduct capacity development and training for five staff members from the SPG and 30 from the city and county governments in ADB project management procedures, technical design and implementation, and safeguard supervision and monitoring by 2017
3.3	Develop and implement innovative economic and regulatory instruments for groundwater conservation by 2020
3.4	Complete a water pricing strategy by 2020
3.5	Provide overall project implementation support for staff from the SPG and the prefecture, city and county governments, including implementation of land acquisition and resettlement during 2015–2022
Inputs	
ADB	\$150.00 million
Government	\$194.03 million
Assumptions for Partner Financing	
Not applicable.	

ADB = Asian Development Bank, ha = hectare, km = kilometer, m³ = cubic meter, SPG = Shandong Provincial Government.

Source: ADB estimates.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RRPs/?id=47047-002-3>

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Agriculture, Natural Resources, and Rural Development
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Economic and Financial Analysis
8. Country Economic Indicators
9. Summary Poverty Reduction and Social Strategy
10. Environmental Impact Assessment
11. Resettlement Plan: Changle County
12. Resettlement Plan: Gaomi City
13. Resettlement Plan: Huantai County
14. Resettlement Plan: Qingzhou City
15. Resettlement Plan: Shouguang City
16. Risk Assessment and Risk Management Plan