



Completion Report

Project Number: 40017-013
Loan Number: 2494
December 2019

People's Republic of China: Qingdao Water Resources and Wetland Protection Project

This document is being disclosed to the public in accordance with ADB's Access to Information Policy.

Asian Development Bank

CURRENCY EQUIVALENTS

Currency unit – yuan (CNY)

		At Appraisal (15 November 2008)	At Project Completion (31 March 2017)
CNY1.00	=	\$0.1465	\$0.1450
\$1.00	=	CNY6.82	CNY6.89

ABBREVIATIONS

ADB	–	Asian Development Bank
DMF	–	design and monitoring framework
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
ha	–	hectare
km	–	kilometer
JCCB	–	Jiaozhou City Construction Bureau
JCG	–	Jiaozhou city government
m ³	–	cubic meter
MLS	–	minimum living standard
NCB	–	national competitive bidding
O&M	–	operation and maintenance
PMO	–	project management office
PPMS	–	project performance management system
QFB	–	Qingdao Financial Bureau
QMG	–	Qingdao municipal government
SEA	–	strategic environmental assessment
TA	–	technical assistance
WWTP	–	wastewater treatment plant

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 United States dollars.

Vice-President	Ahmed M. Saeed, Operations 2
Director General	Amy S.P. Leung, East Asia Department (EARD)
Director	Qingfeng Zhang, Environment, Natural Resources and Agriculture Division, EARD
Team leader	Rabindra Osti, Senior Water Resources Specialist, EARD
Team members	Margaret Clare P. Anosan, Project Analyst, EARD
	Erika Joy Arcillas, Associate Project Analyst, EARD
	Mark Bezuijen, Senior Environment Specialist, EARD
	Nogendra Sapkota, Senior Social Development Specialist, EARD

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
BASIC DATA	i
I. PROJECT DESCRIPTION	1
II. DESIGN AND IMPLEMENTATION	1
A. Project Design and Formulation	1
B. Project Outputs	2
C. Project Costs and Financing	5
D. Disbursements	6
E. Project Schedule	6
F. Implementation Arrangements	7
G. Technical Assistance	7
H. Consultant Recruitment and Procurement	8
I. Gender Equity	9
J. Safeguards	9
K. Monitoring and Reporting	10
III. EVALUATION OF PERFORMANCE	11
A. Relevance	11
B. Effectiveness	11
C. Efficiency	12
D. Sustainability	12
E. Development Impact	13
F. Performance of the Borrower and the Executing Agency	13
G. Performance of the Asian Development Bank	14
H. Overall Assessment	14
IV. ISSUES, LESSONS, AND RECOMMENDATIONS	14
A. Issues and Lessons	14
B. Recommendations	15
APPENDIXES	
1. Design and Monitoring Framework	16
2. Project Cost at Appraisal and Actual	21
3. Project Cost by Financier	22
4. Disbursement of ADB Loan Proceeds	24
5. Contract Awards of ADB Loan Proceeds	26
6. Chronology of Main Events	28
7. Technical Assistance Completion Report	30
8. Social Impact and Poverty Reduction	32
9. Environmental Safeguards	36
10. Land Acquisition and Resettlement	39
11. Status of Compliance with Loan Covenants	44
12. Economic Analysis	56

BASIC DATA

A. Loan Identification

1.	Country	People's Republic of China
2.	Loan number and financing source	2494, ordinary capital resources
3.	Project title	Qingdao Water Resources and Wetland Protection Project
4.	Borrower	People's Republic of China
5.	Executing agency	Jiaozhou city government
6.	Amount of loan	\$45,000,000
7.	Financing modality	Project loan

B. Loan Data

1.	Appraisal	
	– Date started	7 September 2008
	– Date completed	14 September 2008
2.	Loan negotiations	
	– Date started	13 November 2008
	– Date completed	14 November 2008
3.	Date of Board approval	17 December 2008
4.	Date of loan agreement	25 May 2009
5.	Date of loan effectiveness	
	– In loan agreement	23 August 2009
	– Actual	3 September 2009
	– Number of extensions	1
6.	Project completion date	
	– Appraisal	31 March 2014
	– Actual	31 March 2017
7.	Loan closing date	
	– In loan agreement	30 September 2014
	– Actual	31 March 2017
	– Number of extensions	2
8.	Financial closing date	
	– Actual	13 February 2018
9.	Terms of loan	
	– Interest rate	London interbank offered rate (LIBOR) plus 0.60% less 0.40% credit
	– Maturity (number of years)	20 years
	– Grace period (number of years)	5 years
10.	Terms of relending	
	– Interest rate	LIBOR plus 0.60% less 0.40% credit
	– Maturity (number of years)	20 years
	– Grace period (number of years)	5 years
	– Second-step borrower	Qingdao Financial Bureau and Jiaozhou city government

11. Disbursements

a. Dates

Initial Disbursement 31 March 2010	Final Disbursement 25 November 2016	Time Interval 80 months
Effective Date 3 September 2009	Actual Closing Date 31 March 2017	Time Interval 91 months

b. Amount (\$ million)

Category	Original Allocation (1)	Increased during Implementation (2)	Canceled during Implementation (3)	Last Revised Allocation (4=1+2-3)	Amount Disbursed (5)	Undisbursed Balance (6 = 4-5)
Civil works	36.100	4.329		40.429	40.429	0.000
Vehicles	0.200	0.148		0.348	0.348	0.000
Equipment and materials	6.700	-4.309		2.391	2.391	0.000
Consulting services						0.000
Implementation support	1.700	0.132		1.832	1.832	
Training	0.100	-0.100				0.000
Monitoring and evaluation	0.200	-0.200				0.000
Total	45.000	0.000	0.000	45.000	45.000	0.000

C. Project Data

1. Project cost (\$ million)

Cost	Appraisal Estimate	Actual
Foreign exchange cost	30.80	45.00
Local currency cost	75.00	64.80
Total	105.80	109.80

2. Financing plan (\$ million)

Cost	Appraisal Estimate	Actual
Implementation cost		
Borrower financed	55.00	61.90
Asian Development Bank financed	45.00	45.00
Other external financing	0.00	
Total implementation cost	100.00	106.90
Interest during construction costs		
Borrower financed	5.80	2.94
Asian Development Bank financed	0.00	0.00
Other external financing	0.00	0.00
Total interest during construction cost	5.80	2.94

3. Cost breakdown by project component (\$ million)

Component^a	Appraisal Estimate	Actual
Improving water resources and flood management	73.2	102.0
Strengthening wastewater management and pollution control	6.4	1.3
Integrated water and ecosystem management	1.8	1.0
Strengthened project management capacity	0.9	2.6
Contingencies	17.7	
Financial charges during implementation	5.8	2.9
Total	105.8	109.8

^a No data on total costs, including contingencies, are available in project appraisal documents.

4. Project schedule

Item	Appraisal Estimate	Actual
Date of contract with consultants		
Project management	July 2009	9 August 2010
Strengthening Jiaozhou wastewater services	April 2010	24 October 2016
Community and public consultation	April 2012	24 October 2016
Lake ecology	April 2012	10 November 2016
Jiaozhou integrated information system	April 2012	2 December 2016
Completion of engineering designs	December 2009	December 2009
Civil works contract		
Date of award	August 2009–January 2010	18 April 2010–17 October 2016
Completion of work	December 2009–September 2011	2010–31 March 2017
Equipment and supplies		
Dates		
First procurement	August 2009	17 April 2010
Last procurement	April 2012	25 July 2016
Completion of equipment installation	March 2013	July 2017
Start of operations		
Completion of tests and commissioning	June 2013	October 2017
Beginning of start-up		December 2017
Other milestones		

5. Project performance report ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
From 3 September 2009 to 31 December 2010	Satisfactory	Satisfactory
	Single Project Rating	
From 1 April 2011 to 30 June 2013	On track	
From 1 July 2013 to 31 December 2013	Potential problem	
From 1 January 2014 to 30 June 2014	On track	
From 1 July 2014 to 30 September 2014	Potential problem	
From 1 October 2014 to 30 September 2015	Actual problem	
From 1 October 2015 to 31 March 2018	On track	

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact-finding mission	27 July–2 August 2008	4	20	a, i, l, o
Appraisal mission	7–14 September 2008	4	15	e, k, h, l
Loan negotiations	13–14 November 2008	3	6	e, h, l
Inception mission	10–15 October 2009	2	12	h, l
Review mission 1	18–22 March 2010	3	12	f, r, b
Review mission 2	23–27 May 2011	3	15	b, c, r
Midterm review mission	6–11 June 2012	4	20	c, g, j, o
Review mission 3	23–26 June 2013	3	12	c, d, g
Review mission 4	16–20 May 2016	4	17	g, m, n, r
Review mission 5	18–21 November 2016	2	8	g, r
Review mission 6	22–26 May 2017	2	10	g, r
Project completion review mission	6–8 May 2019	4	12	g, m, p, q

a = assistant economist, b = associate project analyst, c = environmental economist, d = lead water resources specialist, e = principal counsel, f = principal water resources specialist, g = project analyst, h = project officer, i = rural development specialist, j = senior procurement specialist, k = senior social development specialist, l = senior water resources engineer, m = senior water resources specialist, n = social development specialist, o = staff consultant (economist), p = staff consultant (evaluation specialist), q = staff consultant (social development specialist), r = water resources specialist.

I. PROJECT DESCRIPTION

1. Jiaozhou is a county-level city under the administration of Qingdao Municipality on the northwest coast of Jiaozhou Bay in the People's Republic of China (PRC). In 2007, the city had a total area of 1,210 square kilometers and a population of 891,800. Rapid urbanization and industrialization in the city began in the early 2000s. However, the development of municipal facilities could not meet the demand of economic and demographic changes resulting in poor municipal services and environmental consequences both in the city and in Jiaozhou Bay. The rationale for the project arose from the need to address the prevailing problems and constraints confronting Jiaozhou's water resources and environment sector, and to assist the Jiaozhou City Government (JCG) in meeting its environmental protection and improvement objectives. The project was required to ensure the sustainability of JCG's immediate environmental initiatives through infrastructure investments aimed at improving water quality via pollution control and flood management as part of an overall strategy for improving the livelihood, preserving wetland areas, and protecting environmental conditions in Jiaozhou Bay.

2. In Jiaozhou City, the population at appraisal was estimated to increase at an average annual rate of 1.12%. Economic growth in the project area had averaged 20% per year in real terms since 2004 (well above the national average) and was expected to grow at the same pace in the intermediate term. This development's immediate impacts were increased (i) incidence of flooding in the expanding urban areas, (ii) waterborne disease rates, and (iii) environmental damage in Jiaozhou Bay. These factors had a serious impact on continued local development and called for concerted remedial action. Jiaozhou City implemented various water conservation and management projects before 2008, but there remained significant opportunities to improve environmental management related to the (i) collection and interception of industrial and domestic wastewater discharge directly into watercourses; (ii) expansion and enhancement of centralized treatment facilities to protect the Dagu River and Jiaozhou Bay wetlands; (iii) improvement of urban rivers and stormwater networks in the old urban area; (iv) development of an integrated approach to flood management, incorporating structural and nonstructural measures that were operated separately by different entities; and (v) continuation of institutional and financial management reforms to facilitate sustainable environmental management.

II. DESIGN AND IMPLEMENTATION

A. Project Design and Formulation

3. The strategic objectives and operations of the Asian Development Bank (ADB) were identified in the country partnership strategy, 2008–2010 for the People's Republic of China.¹ ADB operations in the country focused on rural development, environment, energy conservation, urban development, and regional cooperation; and were aligned with the government policy defined in the New Socialist Countryside Policy and the Eleventh Five-Year Plan (2006–2010).² The plan shifted the socioeconomic development policy emphasis away from the growth orientation of previous plans to one of sustainability, based on broader and more inclusive rural development and social programs in an increasingly market-oriented economy. The plan's key objectives in the project's context were to combine economic growth with environment protection and to adopt standards and build capacity to address environmental issues. The government prioritized several environmental and natural resource concerns, including (i) land degradation,

¹ ADB. 2008. *Country Partnership Strategy: People's Republic of China, 2008–2010*. Manila.

² Government of the People's Republic of China, Communist Party of China Central Committee. 2006. *New Socialist Countryside Policy*. Document No. 1. Beijing.

(ii) water shortage and pollution, (iii) poor urban environmental infrastructure, (iv) degradation of marine ecosystems and wetlands, (v) increasing frequency and intensity of environmental accidents, and (vi) such global environmental issues as climate change and greenhouse gas emissions.

4. The project was formulated under a project preparatory technical assistance (TA).³ Project design at appraisal largely reflected the design proposed in the TA final report. Project preparation included dialogue with the Qingdao municipal government (QMG) and the Jiaozhou city government (JCG) and input from a cross section of stakeholders in the project area based on a socioeconomic household survey of 12,200 people, eight community meetings, and key informant interviews. The project impact and outcome were consistent with ADB and government objectives on sustainable improvement in the protection of the environment.

B. Project Outputs

5. Project outputs were implemented as designed with the exception of minor changes in certain outputs agreed during the midterm review, which were reflected in the revised design and monitoring framework (DMF).⁴ The achievement of project targets in the DMF is in Appendix 1.

1. Improved Water Resources and Flood Management

6. **River works.** The project proposed river dredging, embankment works, and greening over 19.5 kilometers (km)—9.4 km of the Yunxi River, 3.9 km of the Hucheng River, 3.2 km of the Wushui River (Shidong Canal), and 3.0 km of the Sanli River—to be completed by 2011. During project implementation, works on 1.1 km of the Yunxi River and 3.0 km of the Sanli River were transferred to JCG's build-and-transfer procedure, and based on an assessment of actual need, works on a 3.0 km branch of the Hucheng River were included in the project. The final and approved river reaches to be rehabilitated totaled 18.4 km: 8.3 km of the Yunxi River, 3.9 km of the Hucheng River, 3.2 km of the Wushui River, and 3.0 km of the Hucheng River branch (of which 1.7 km was financed from the ADB loan and 1.3 km from counterpart funds). Works were fully completed on the Yunxi, Hucheng, and Wushui rivers by December 2016 and on the Hucheng River branch by March 2017. The delay in completion by 5 years or more resulted from several implementation issues. During the project completion review mission, the Hucheng River branch had no flow because of insufficient discharge from the nearby wastewater treatment plant (WWTP). Flow is seasonal and, according to project management office (PMO) staff, is expected to remain so until a new WWTP becomes operational in 2020. JCCB handles operation and maintenance (O&M) of the completed works, with funding from JCG.

7. The output was revised to include the construction of a river monitoring and administration center due to be operational by 2016. Funds for construction were reallocated from the consulting services contract for the Jiaozhou integrated information system. Civil works were completed in February 2017, a contract to procure monitoring equipment was signed in March 2017, and installation was completed in July 2017. The system provides water quality and real-time river flow data to facilitate the operation of control gates for flood prevention. The project also proposed to upgrade the Erli'he flood retention facilities from 0.20 million cubic meters (m³) to 0.80 million m³ by 2011, and works were completed as planned in December 2010. The project proposed to construct 11.4 km of storm sewerage facilities in Jiaozhou by 2011, but because of timing

³ ADB. 2006. *Technical Assistance to the People's Republic of China for Preparing the Qingdao Water Resources Management Project*. Manila.

⁴ The changes to the DMF were approved on 7 December 2015.

concerns, it was agreed during the midterm review that this activity would be undertaken using counterpart funds.

2. Strengthened Wastewater Management and Pollution Control

8. The project's report and recommendation of the President defined two activities under this output, which were combined in the DMF target to install 27.7 km of wastewater drainage pipelines by 2011.⁵ This comprised constructing a 15.9 km interceptor sewer along the embankments of the Yunxi River, Hucheng River, and Hucheng River tributaries; and an additional network of 11.8 km to supplement the trunk sewerage system. Works were completed by December 2012, 1 year later than scheduled, with the length of the constructed interceptor sewer totaling 17.6 km. A 1.7 km interceptor sewer that was also constructed on the Hucheng River branch to complement embankment rehabilitation works was completed in September 2016.

3. Integrated Water and Ecosystem Management

a. Shaohai Lake and Jiaozhou Bay Ecosystem Protection Measures Developed

9. Three artificial wetlands were to be established and habitats were to be enhanced by 2011 to improve Shaohai Lake's ecology and ecosystem management by reducing its nutrient loads. The Erli'he River Southwest Wetland Park and the Yunxi River Wetland Park were built in 2011, contributing to water storage, flood control, and improved water quality. The wetlands also provide leisure areas for residents and habitats for microorganisms, plants, insects, and birds. A third wetland, the Shaohai National Wetland Park, was constructed without project funding.

10. **Ecosystem management.** Consultants prepared the *Handbook for the Shaohai Lake Ecosystem Management and Operation*, which was supposed to be in place by 2013, in March 2017.⁶ The handbook is used by the Shaohai Lake Management Office which regularly monitors water quality in Shaohai Lake and has sought expert advice on improving water quality. The Jiaozhou Environmental Protection Bureau is also engaged in river quality monitoring. The project established an ecological health evaluation index system for Shaohai Lake as well.

b. Water Resources and Flood Management Strengthened in Jiaozhou

11. **Information system.** An integrated information system for flood, water, and wastewater management was to be developed and operational by 2012, but was instead established under a consulting services contract in March 2017.

12. **Training.** A total of 30 persons in JCG were to be trained by 2014. In total, training was provided to 62 people, including 54 from the PMO, on flood management, environmental protection, project management, financial management, and procurement.

⁵ ADB. 2008. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Qingdao Water Resources and Wetland Protection Project*. Manila.

⁶ Jiaozhou City Government. 2017. *Handbook for the Shaohai Lake Ecosystem Management and Operation*. Jiaozhou.

c. Environmental Management and Pollution Control Strengthened in Jiaozhou

13. **Community mobilization.** Five communities and surrounding industries were to be mobilized for training and awareness-raising activities by 2011. Five workshops on community participation in environmental protection and flood management with 609 participants (of whom 62% are women) from 20 locations were conducted in 2016. Five community monitoring teams were also established to carry out inspection activities following community monitoring manuals that were developed under the project. As a result, the participation of local communities and industrial enterprises in environmental management and pollution control was strengthened.

14. **Public awareness.** A public education and awareness program was to be implemented by 2012. It was agreed during the ADB review mission in June 2013 to increase the allocation of consulting service funds to community awareness and public consultation to reflect the nature of physical activities being carried out and the need to promote awareness and good behavior with respect to protecting water quality. The consulting services for community awareness and public consultation were contracted in October 2016 and the program was implemented until 31 March 2017 through photo exhibits, short video production, and awareness raising materials such as brochures that were well-received by the communities.

15. **Wastewater services.** Wastewater services were to be corporatized by 2014 as per the DMF. The project proposed to expand the capacity of the Beikong WWTP to 50,000 m³ through a build-operate-transfer arrangement between Jiaozhou authorities and a private company. The report and recommendation of the President indicated that an agreement had been signed with the Zhongkecheng Environmental Company for a 20-year build-operate-transfer contract based on the anaerobic/anoxic/oxic treatment process.⁷ As a result, the plant's treatment level was to be upgraded from class II to class IB and be adapted to treat limited stormwater flows.⁸ The project was also supposed to provide safeguards due diligence support to Jiaozhou authorities with respect to the WWTP. The expansion of the Beikong WWTP was financed by counterpart funds and completed in June 2011. Capacity was increased by 50,000–100,000 m³/day, and discharge content was raised to Class IA. Qingdao Jiaozhou Beikong Water Co. Ltd, which operates the Beikong WWTP, acquired the Zhongkecheng Environmental Company in 2014 and continues to operate the plant. In addition, two sewage treatment plants (Qingdao Binhai and Jiaodong Chongjie) were constructed using counterpart funds started operating in 2014.

16. **Wastewater tariffs.** Wastewater tariffs were to be reformed by 2014, and a study of water pricing was undertaken as part of the consulting services for wastewater management contracted in October 2016. In 2018, JCG proposed to increase wastewater tariffs, but following public consultation and objections from local residents, the proposal was not implemented. Water tariffs remain as they were at the time of project preparation.

⁷ This anaerobic/anoxic/oxic process for treating wastewater removes nitrogen and phosphorus effectively, which are key contributors to eutrophication.

⁸ People's Republic of China National Regulation GB3838-2002 Environmental Quality Standards for Surface Water. Grade I: mainly applicable to the source of water bodies and national nature preserves. Grade II: mainly applicable to class A water source protection area for centralized drinking water supply, sanctuaries for rare species of fish, and spawning grounds for fish and shrimps. Grade III: mainly applicable to class B water source protection area for centralized drinking water supply, sanctuaries for common species of fish, and swimming zones. Grade IV: mainly applicable to water bodies for general industrial water supply and recreational waters in which there is no direct human contact with the water. Grade V: mainly applicable to water bodies for agricultural water supply and for general landscape requirements.

17. **Environmental monitoring.** An environmental monitoring plan to be enforced by 2011 was largely implemented and environmental monitoring reports were submitted for the duration of the project except for the years 2014 to 2016 when no civil works were conducted (Appendix 9, para.5).

d. Strategic Environmental Assessment on Jiaozhou Bay Development Prepared

18. Relevant authorities were supposed to approve a strategic environmental assessment (SEA) incorporating integrated planning methodologies by 2011. The SEA was to be undertaken as part of the TA attached to the loan. After the TA started, the focus changed from the SEA to the preparation of a strategy for low-carbon development in Qingdao.⁹

4. Strengthened Project Management Capacity

19. The PMO was to be established and operational by 2009. The existing PMO in JCCB was to be strengthened through staff training in financial management and reporting, and ADB disbursement and procurement procedures. The PMO must establish and maintain a project performance management system (PPMS) to monitor project implementation and performance in meeting project targets. It was supposed to recruit an international project implementation specialist to provide technical advice on technical design review, procurement, and project supervision. Project management support was to be provided through (i) an adequate counterpart fund, (ii) office equipment, (iii) 13 international person-months and 60 national person-months of consulting services to be contracted by 2014, and (iv) \$0.2 million for logistical support (i.e., computers, equipment, and office supplies). Project management output targets were met to varying degrees. The PPMS was established and training was delivered under the project management consulting services contract. Project management consulting services comprised 13 international person-months and 89 national person-months of inputs rather than the 60 national person-months proposed.

C. Project Costs and Financing

20. Project costs were estimated at \$105.8 million at appraisal. After the midterm review in June 2012, the total costs were revised to \$99.2 million because of minor project scope changes and reduced contingencies and financial charges. The ADB loan amount remained unchanged, increasing ADB's share of financing to 45.4%. To include the rehabilitation of the Hucheng River, \$2.87 million was reallocated to civil works and \$0.06 million to equipment and materials. Further reallocations not related to scope changes were made in 2016 and 2017 in response to the increased loan allocation and ADB disbursement percentage for civil works. The actual costs totaled \$109.8 million (Appendix 2). The increase in actual costs after the midterm review resulted from the increased funding of project activities using counterpart funds.

21. ADB was estimated to finance \$45.0 million (42.5%) and JCG \$60.8 million (57.5%) at appraisal. The ADB loan was intended to finance (i) \$36.1 million of civil works, \$24.1 million (66.6%) of which were for river course rehabilitation; (ii) \$6.9 million for vehicles, equipment, and materials; and (iii) \$2.0 million for capacity building and project management consulting services. During the loan review mission in May 2016, ADB's share of civil works financing was increased from 54.0% in the loan agreement to 75.0%; this ratio applied retroactively to all contracts to fully

⁹ ADB. 2008. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Qingdao Water Resources and Wetland Protection Project*. Manila (Appendix 9: Technical Assistance).

use the loan amount.¹⁰ Of actual costs, ADB financed \$45.0 million (41.0%) and JCG financed \$64.8 million (59.0%), including financial charges during implementation of \$2.9 million. The ADB loan financed civil works (\$40.43 million), vehicles (\$0.35 million), equipment and materials (\$2.39 million), and consulting services (\$1.83 million). Details of project costs are in Appendix 3.

D. Disbursements

22. The ADB loan of \$45.00 million was fully disbursed; the first disbursement took place on 31 March 2010 and the final disbursement on 25 November 2016. Actual cumulative disbursements exceeded projected cumulative disbursements during the first 3 years of project implementation, reaching \$21.60 million (48.0% of loan amount) against projected cumulative disbursements of \$15.50 million (34.4% of loan amount) by end of 2012 (Appendix 4). Annual disbursements fell behind projected levels from 2013 onward because the slow approval process for the project changes agreed at midterm delayed implementation from 2013 to 2015, with disbursements falling to zero in 2014. Disbursements restarted in 2015 at \$2.29 million and totaled \$18.77 million in 2016 (41.7% of loan amount). Details of projected and actual annual and cumulative contract awards are in Appendix 5.

23. The loan proceeds were withdrawn using the imprest fund and statement of expenditure procedures to facilitate disbursement. JCG reported no problems with the procedures and state auditors raised no significant issues on the management of the imprest fund. The imprest account ceiling was initially set at 10% of the approved loan amount, but ADB approved the removal of this ceiling to expedite disbursement during the last months of implementation.

E. Project Schedule

24. The ADB loan was approved on 17 December 2008, the loan agreement was signed on 25 May 2009, and the loan became effective on 3 September 2009. The original closing date was 30 September 2014. On 28 May 2014, the Ministry of Finance requested ADB to extend loan closing to 31 March 2016, which ADB approved on 11 June 2014. On 7 August 2015, the Ministry of Finance requested a second extension of the loan closing date to 31 March 2017 and a change in project scope. ADB approved the extension on 7 December 2015. The actual loan closing date was on 31 March 2017, but the financial closing was delayed to 13 February 2018 as ADB needed time to process the liquidation. Advances to the advance account were made in United States dollars, but payments from the advance account were in Chinese yuan. The spot exchange rate used on payments to contractors from the advance account differed from the ADB exchange rate that applied when ADB was processing the withdrawal application for liquidation. Since the loan of \$45.0 million was fully used, it took time for ADB to reconcile the dollar equivalent of contracts awarded with the total loan amount.

25. The pace of project implementation was adversely affected by several factors. Jiaozhou's urban development plan was revised, and the design of some project activities had to change to align with the new plan and its implementation schedule. The financing source for some activities changed from ADB loan to counterpart funds, and other activities were removed from the project scope. To fully use the loan funds, new and replacement activities were added, but they had to be aligned with other JCG-financed projects to coordinate implementation. This and the need for feasibility studies and preliminary and detailed engineering design for all such activities delayed

¹⁰ To further expedite the use of loan funds, given that \$18.8 million were undisbursed and the advance account could only be replenished twice more before loan closing, the advance account ceiling was raised from \$4.50 million (10% of the loan amount) to \$9.45 million (21% of the loan amount).

implementation. The government also revised the approval process for project activities, and all new activities needed approval from the Jiaozhou Development and Reform Commission, the Qingdao Development and Reform Commission, and the National Development and Reform Commission, as well as land management, planning, environmental protection, financial, and other related departments. The chronology of main events is in Appendix 6.

F. Implementation Arrangements

26. The executing agency for the project was JCG, and the JCG vice mayor headed the project leading group, which comprised JCG bureaus related to planning, environment, and water resources. The PMO in JCCB handled day-to-day project implementation and coordination and oversight of construction and consulting services. Upon completion, O&M of project-financed infrastructure and facilities was assigned to JCCB's Public Utility Division. An assessment made during project preparation of the capacity of the water-related agencies in QMG and JCG concluded that assistance was needed to strengthen their water resources management and conservation capacity. Consulting services were engaged for this purpose during implementation. An assessment of the PMO's financial, technical, and institutional capacity determined that the PMO also needed capacity building in these areas. Implementation support consultants were contracted in 2010 and provided training to PMO staff. The Qingdao Financial Bureau (QFB) maintained the advance account and communicated with ADB on all project-related financial matters. No significant issues were identified regarding implementation arrangements. The midterm review mission noted that the project was being implemented satisfactorily, in line with arrangements agreed at appraisal, and that there was good cooperation between the PMO and consultants and between the PMO and the QFB through the Jiaozhou Financial Bureau. The ADB review mission in June 2013 noted the change in the head of the project leading group and the PMO director. No further implementation issues were identified before project closing.

G. Technical Assistance

27. An ADB-administered TA grant of \$750,000 (footnote 9) was provided to strengthen QMG's capacity in strategic environmental planning and management to support Jiaozhou Bay's sustainable economic development. The original outcome was increased protection of the bay's water quality and wetland ecosystem through the development of a SEA. In response to QMG's request in 2010, ADB approved a change in TA scope since many SEA development tasks were completed using counterpart funds. Under the revised scope, the TA's expected outcome was a well-designed strategy and blueprint for low-carbon development by 2020.

28. Since the scope changed, the TA was implemented in two stages with two consulting firms. The TA completion report (Appendix 7) assessed the performance of both consulting firms, QMG, and ADB as *satisfactory*.¹¹ Overall the TA was rated *successful*.

29. Three major lessons from the TA were (i) QMG must upgrade wastewater treatment technologies with wastewater recycling and reuse provisions to better protect the water quality of Jiaozhou Bay; (ii) low-carbon city planning should be integrated into the urban development master plan and strategy, and QMG could further integrate the key measures proposed in the TA final report into its urban master plan; and (iii) private sector resources are available and could be tapped to disseminate the findings of ADB TA projects and to scale up studies. The key recommendation of the TA was that to overcome market barriers to investment in low-carbon development, an innovative public-private financing partnership is essential.

¹¹ The TA completion report was approved on 10 June 2013 and circulated to the Board on 13 June 2013.

H. Consultant Recruitment and Procurement

30. At appraisal, 31.0 person-months of international and 100.0 person-months of national consulting services were to be contracted to implement nonstructural measures and provide project management support, specifically (i) development of an integrated information system to manage drainage and wastewater assets in Jiaozhou City, (ii) ecological upgrading of the Shaohai Lake wetlands, (iii) construction supervision and quality control, (iv) financial management and corporate governance, and (v) O&M.

31. By completion, five consulting contracts had been implemented: (i) project management capacity building and support, which was extended to coincide with project closing, comprising 13.0 person-months of international and 89.0 person-months of national consultant inputs; (ii) Jiaozhou wastewater service strengthening, comprising 2.0 person-months of international and 19.0 person-months of national consultant inputs; (iii) community awareness and public consultation, comprising 41.0 person-months of national consultant inputs; (iv) study and management of Shaohai Lake's ecology, comprising 1.0 person-month of international and 11.0 person-months of national consultant inputs; and (v) Jiaozhou integrated information system, comprising 10.0 person-months of national consultant inputs.

32. As agreed during the loan review mission in May 2016, the contract for community awareness and public consultation was increased to better facilitate acceptance of project activities by local communities. The contract for the Shaohai Lake ecology study was reduced as some activities had been or were due to be covered by other consulting service contracts. The contract for the Jiaozhou integrated information system was reduced since the original amount included the procurement of hardware that was removed from the consulting services package and included in the construction of the river monitoring center (para. 11).

33. The procurement plan at appraisal covered 18 civil works contracts to be awarded through national competitive bidding (NCB), two goods contracts through international competitive bidding, eight goods contracts through NCB, and three goods contracts through shopping. Based on the change in project scope memo dated 18 April 2012, the following changes were made to the procurement plan: one NCB goods contract was split into two (one NCB and one shopping) and seven civil works NCB contracts were split into 20 civil works NCB contracts.¹² For consulting services, the original procurement plan covered four contracts to be awarded through quality- and cost-based selection and one through least-cost selection. Actual procurement consisted of 37 civil works contracts awarded through NCB, eight goods contracts through NCB, and two goods contracts through shopping. Actual consulting services consisted of four contracts awarded through quality- and cost-based selection and one through consultant qualification selection. Apart from these changes that reflected the agreed changes in project scope and activities and the reallocation of financing from ADB loan to counterpart funds for some activities, no significant procurement issues were reported by ADB review missions other than those relating to delays in government processing of revisions to project activities.

¹² Reasons cited in the memo were (i) the original packages were too large and lack flexibility; (ii) contractors could submit more accurate bid prices on smaller packages; (iii) given the possible absence of large contractors, smaller packages could attract medium-sized, more specialized contractors with lower bid prices and a shorter construction period; and (iv) different requirements separated greening and landscaping works from other civil works.

I. Gender Equity

34. The project was classified as some gender elements. Although no gender action plan was prepared, the PMO promoted gender equality in all project activities. About 480,000 people benefited from the project, of whom 50% were women. Of the 3,659 local residents who worked for the project, 35% were women. Of the 5,000 people trained under the project, 65% were women. Women comprised 73% of the pilot community-based monitoring teams and 50% of the 110 unskilled workers engaged for project O&M. According to a survey conducted under the project in 2016 and 2017, women's awareness and knowledge of public participation, environmental protection, and flood risk management increased more than that of men.¹³ A summary of achievements in relation to the project's social dimensions and safeguards is in Appendix 8.

35. About 480,000 people in Jiaozhou City benefited directly by 2018, 27.9% higher than the DMF target of 370,000 people; and about 3.5 million residents in the broader Jiaozhou Bay area indirectly benefited from the project, 16.7% higher than the target anticipated in 2008. Negative social impacts or risks, such as land acquisition, construction disturbance, and increased water tariffs, were assessed, avoided, minimized, and/or mitigated.

J. Safeguards

36. The project was prepared under ADB's Environment Policy (2002) and was classified *category B* for the environment. JCG prepared an initial environmental examination, including an environmental management plan (EMP), in 2008 and updated the EMP in November 2015 to reflect the withdrawal and addition of some project activities. Overall, EMP implementation is rated *moderately satisfactory* and complied with most EMP requirements. Internal and external monitoring followed EMP requirements. Construction works met the required standards for soil and water protection and occupational and community health and safety, and the government received no public complaints about the project during implementation. However, environmental monitoring reports were not submitted for the years when no civil works were being constructed. The project has achieved significant environmental benefits in reducing flood risk and total pollution loads in Jiaozhou City. A detailed assessment of environmental safeguards is in Appendix 9.

37. The project was classified *category B* for involuntary resettlement per ADB's Involuntary Resettlement Policy (1995). JCG prepared a short resettlement plan during project preparation in 2008 and an addendum in 2015 to reflect the scope changes. The institutional setup for land acquisition followed the resettlement plan. JCG assumed overall responsibility for resettlement, but the PMO handled resettlement compensation payment and supervision. It also coordinated the planning, implementation, financing, and reporting of land acquisition progress to ADB. JCG and the PMO paid great attention to land acquisition, emphasizing public participation throughout the process. There is no remaining issue related to land acquisition. The PMO reported regularly on the implementation of the resettlement plan through quarterly progress reports, but because of delays in recruiting an external resettlement monitoring agency, only two external resettlement monitoring reports were submitted. Drafts of the external reports were improved and finalized after reviews by ADB. An assessment of land acquisition and resettlement is in Appendix 10.

¹³ Jiaozhou Three Rivers Rehabilitation Headquarters. 2017. *Community and Public Consultation Draft Final Report*. Jiaozhou.

38. The area of land acquired was 253% higher than planned at appraisal because of increased project scope. In total, 1,783.5 *mu* or 119 hectares (ha) of land were acquired for project infrastructure and facilities.¹⁴ Of this, 32.5 ha (27.3%) were collectively owned by 10 villages. No land belonged to individual households, no houses were demolished, and there were no negative impacts on local livelihoods. All the collectively owned land was riverside land used for riverbank greening and amenities. The remaining land acquired was state-owned.

39. Land acquisition compensation rates followed the agreed resettlement plans. Payments to the affected villages totaled CNY27.53 million (\$4.05 million), 218% higher than planned because of the increase in the area of land acquired and in the compensation rate to CNY66,000 per *mu* (\$45,888 per ha) in 2016. The affected villages were all satisfied with the compensation.

40. The project was classified *category C* for indigenous peoples per ADB's Indigenous Peoples Policy (1998). No ethnic minorities live in the project-affected villages or in the surrounding area. The project had no impact on indigenous peoples.

K. Monitoring and Reporting

41. JCG complied with all loan covenants, with the following key exceptions:

- (i) **Loan agreement, Schedule 5, para. 4 (c).** There is no information on whether the financial management system of the entity operating the project-financed WWTP was assessed and whether the system in place had met ADB requirements.
- (ii) **Project agreement, Schedule, para. 3.** JCG has not increased water tariffs since project preparation. A recommendation to increase water tariffs was made under the consulting services contract for strengthening Jiaozhou wastewater services. In 2018, JCG proposed to increase tariffs but did not implement it following public consultation.
- (iii) **Project agreement, Schedule, para. 6.** The SEA of Jiaozhou Bay was not completed as the TA focus shifted, with ADB approval, to the development of a strategy for low-carbon development in Qingdao (footnote 9).

42. There was also noncompliance or late compliance with a few minor covenants, but such failure to fully comply with all covenants did not materially affect project implementation. A summary of compliance with loan covenants is in Appendix 11.

43. The project design required a PPMS to be established within 6 months of project start-up. The agreed indicators included (i) physical progress of subproject implementation; (ii) results of the capacity development program; (iii) water quality and quantity improvements in the rivers and in Shaohai Lake, Dagu River, and Jiaozhou Bay; (iv) improvement in biodiversity conservation in Shaohai Lake and Jiaozhou Bay; and (v) social development. The PPMS was established with the help of the project management support consultants, and the design was refined in collaboration with the PMO. Various ADB review missions highlighted the need for the PMO to collect information to facilitate the evaluation of project impact, outcome, and outputs. The government's project completion report provides a description of the PPMS and information on the achievement of targets related to project outputs. Impact and outcome indicators and targets in the DMF were not clearly defined and/or would require the collection and analysis of complex data, and PPMS coverage in this respect is less complete. Eight audited project financial statements were prepared, seven of which were submitted in a timely manner.

¹⁴ A *mu* is a Chinese unit of measurement (1 *mu* = 666.67 square meters).

III. EVALUATION OF PERFORMANCE

A. Relevance

44. At appraisal, the project was highly relevant to government and ADB goals and strategies on water resources management and protection of the environment and biodiversity. The project design remained highly relevant at completion given the significant expansion in residential and commercial building in the project area since project preparation, and the associated increase in demand for wastewater and sewage treatment. The project's structural and nonstructural flood mitigation measures are also highly relevant given the increase in the project area's population. The minor changes in scope and financing arrangements during implementation and completion delays (para. 25) did not undermine the relevance of the project design. However, most output targets were completed later than the 2011 deadline in the DMF. Critically, targets for the major output and focus of project activities, the rehabilitation of river courses, were not completed until March 2017. Apart from project management support, consulting services were not contracted until late 2016, which meant outputs related to nonstructural measures and capacity building were completed much later than expected.

45. Within Jiaozhou City, the construction of riverbank walkways, cycle paths, and other public amenity areas; and riverbank greening to complement the rehabilitation of river embankments were innovative project features that have a significant demonstration effect in Jiaozhou and beyond.¹⁵ The project has transformed the rivers and rehabilitated the associated riverside areas, which were previously undeveloped, derelict, or devoid of life. There has been significant development of residential and commercial buildings, and the PMO has reported a threefold increase in land values since project preparation. Access to improved wastewater and sewage treatment has also delivered positive health benefits to the project area's population. The treated wastewater with monitoring provision is being pumped to critical river sections to maintain the dry flow and improve the local environment. Improved river management and the provision of habitats have benefited the environment and increased biodiversity. The project is rated *highly relevant*.

46. External factors may influence and prolong the achievement of the impact targets. All impact performance indicators were to be achieved by 2015, 1 year after the original project completion date, which was optimistic.¹⁶ The impact and outcome indicators did not have baseline data, and indicators that should have been achieved on project completion did not reflect the fact that 27 rivers discharge into Jiaozhou Bay, passing through urban and rural townships and agricultural areas along the way. The scope for the project to achieve the defined outcome targets and contribute significantly to impact targets was therefore limited.¹⁷

B. Effectiveness

47. Assessing the achievement of certain outcome targets is constrained by the definition of the targets, the lack of baseline data, and the complexity of the data and analysis required to make the assessment. The reduced discharge into Jiaozhou Bay of chemical oxygen demand by

¹⁵ In 2018, a delegation from 11 Central Asia Regional Economic Cooperation member countries visited the project as an example of best practice in river restoration.

¹⁶ Including two target levels, as in the indicator "Water quality in Jiaozhou rivers restored to class IV/V by 2015," is redundant since achieving the lower-class level negates the need to attain the higher level.

¹⁷ Certain indicators were ambitious and overlapping. For instance, maintaining the quality of water in Jiaozhou Bay in a non-eutrophic condition implies an absence of nutrients, and the degree of eutrophication would have been more appropriate. A non-eutrophic condition means algae blooms in the bay are reduced, making the indicator "reduced episodes of algae blooms" redundant.

28% and phosphorous by 40% cannot be attributed to the project alone and were unlikely to have been achieved immediately following project completion in 2014. An assessment of water quality undertaken in November 2016 indicated that water quality in the project's rivers generally did not meet the minimum requirements of the Surface Water Environmental Quality Standard Class V (footnote 8). Original and revised output targets were largely met as intended, notwithstanding minor changes in project scope and reallocation of financing of certain activities from ADB loan to counterpart funds. A key unmet output target was wastewater tariffs reform, which has implications for sustainability.

48. The PMO estimates that the project had directly benefited 480,000 people by 2018, compared with the 370,000 target at appraisal, through (i) protection from flooding and an associated reduction in the loss of assets and livelihoods, (ii) reduced incidence of waterborne disease, (iii) increased job opportunities and incomes, and (iv) a general improvement in living conditions in the project area. The project is rated *effective*.

C. Efficiency

49. An economic analysis of the project based on the reevaluation of the economic analysis undertaken at midterm review estimated an economic internal rate of return (EIRR) of 16.9%, higher than the 14.7% EIRR at appraisal. However, analysis undertaken during project completion review resulted in an EIRR of 8.3%. The lower EIRR was mainly because of different methodology in the estimation of flood protection benefits, with significantly lower estimated flood protection benefits in the project completion review analysis. Given that flood protection benefits constitute 82.1% of total annual benefits in the project completion review analysis and 91.4% in the midterm review analysis, the impact of a lower valuation of flood protection benefits is a lower EIRR. Details of the economic analysis are in Appendix 12. The project is rated *less than efficient*.

D. Sustainability

50. O&M of project-financed infrastructure is the responsibility of JCG's Public Utility Division, which is also responsible for O&M of city-wide infrastructure, making the project sustainable from an institutional point of view. The high appreciation by project area residents of public amenity areas related to the rehabilitated river embankments and increases in land values complement the project's institutional sustainability. The Public Utility Division has the technical capacity to undertake O&M to ensure the project's technical sustainability, and PMO staff have also been reassigned to O&M activities to support project sustainability. Based on estimates, JCG's cost recovery arrangements could cover the O&M cost of project-financed infrastructure. JCG levies a flood control management fee on all enterprises in Jiaozhou. Projections prepared by the PMO indicate that revenue collected from the fee will exceed the O&M cost of the city's flood control infrastructure by 8.5% in 2020, rising to 31.2% by 2026. Similarly, an analysis of wastewater collection fee revenue indicates that 2016 fees exceeded the O&M costs, including depreciation, by 41.1%. The O&M cost has been further secured by the increased revenue from real estate prices because of the project interventions. These will help ensure the project's financial sustainability, despite the difficulties to increase the tariff in time, and indicate that JCG has the financial capacity to maintain project-financed infrastructure. JCG's finances have also been improved by the increase in real estate taxes from the increase in commercial and residential buildings in the project area. The project is rated *likely sustainable*.

E. Development Impact

51. The achievement of impact targets as defined in the DMF was mixed. An improvement in health conditions and protection from flooding for a larger-than-targeted population have been achieved because of the project interventions. Compared with pre-project levels, the water quality of the project's rivers has improved. The broader targets for improvements in the quality of water and reduced pollution in Jiaozhou Bay were unmet, but such targets were overly ambitious given the project's narrow focus. The project generally has had a significant impact on the lives of project area residents, who have benefited from much improved living conditions with protection from flooding, improved hygiene and sanitation, and development of public areas for leisure and social activities. They have also seen an increase in land and property values. Improvements in the project area have brought about an increase in residential and commercial buildings and an associated influx of people and businesses. Broad financial and economic benefits are beyond question. Environmental benefits have also accrued through the renewed flow of water through the project's rivers, the development of wetland areas, and the associated increase in biodiversity.

52. **Gender impacts and social dimensions.** Women and men participated equally in project preparation, implementation, and monitoring; and benefited equally from all project components and activities. Their awareness and knowledge on community participation, environmental protection, and flood control were enhanced, which will help ensure the sustainability of project impacts. About 480,000 people in Jiaozhou City benefited from the project directly, while 3.5 million residents in the broader Jiaozhou Bay area benefited indirectly. The project provided 3,659 unskilled jobs and 159 skilled jobs to local residents during implementation; and 110 permanent jobs for local residents, such as maintaining roads, streetlights, rivers, and greenery. More than 50% of the jobs went to women and the poor. Waterborne diseases declined significantly after project implementation, improving the health conditions of local residents, and no flooding nor property loss has been recorded in the project area since the project started. A total of 12,295 people in the project area eligible for minimum living security were exempted from the proposed increase in water tariffs, after public consultation and hearings.

53. **Involuntary resettlement.** After midterm review revisions to the project scope, the project needed to acquire more collective land. No households or individuals were affected permanently, as all acquired land was managed directly by villagers' collective organizations. All compensation relating to land, immature crops, and ground attachments was paid timely and in full to the affected villages and property owners, following the agreed resettlement plans. Delivery of restoration measures and entitlements also followed the resettlement plans. Land acquisition did not worsen any affected person's situation; and all local residents, particularly vulnerable groups, benefited significantly from the project through increased income, reduced flood-related losses, improved living environment, and diversified job and business opportunities. No complaints or appeals related to land acquisition and compensation were received and reported.

54. The project's development impact is rated *satisfactory*.

F. Performance of the Borrower and the Executing Agency

55. The government, as the borrower, provided overall project supervision through QMG. The QFB communicated with ADB on financial matters and performed this function satisfactorily. The project leading group under JCG handled overall supervision of project implementation and met on 47 occasions from 2009 to 2017. JCG demonstrated strong project ownership, met loan effectiveness conditions, and complied with all key loan covenants. The PMO in JCCB was established before the project started in 2009 and provided support to all ADB review missions,

including the project completion review mission in May 2019. The PMO managed day-to-day project implementation satisfactorily. Implementation delays, especially from 2013 to 2016, resulted from changes in (i) JCG’s development planning; and (ii) the processing and approval procedures of JCG, QMG, and the national government, which were beyond the control of the executing agency and the PMO. The performance of the borrower and executing agency is rated *satisfactory*.

G. Performance of the Asian Development Bank

56. ADB supervised the project through an inception mission, a midterm review mission, a project completion review mission, and six loan review missions during project implementation. There was a gap in loan review missions as no review mission was fielded in 2014 and 2015, reflecting project implementation delays that were beyond ADB’s control. ADB had to change the project officer and project analyst several times between appraisal and completion, despite the potential risk to continuity in project direction, because of the extended implementation period. JCG and the PMO noted the effective and timely guidance ADB provided on procurement, withdrawal procedures, monitoring and reporting requirements, and other implementation issues. Overall, ADB’s performance is rated *satisfactory*.

H. Overall Assessment

57. Based on the assessment of the project as *highly relevant, effective, less than efficient, and likely sustainable*, overall the project is rated *successful*. It is rated *highly relevant* because the project is fully aligned with the government’s priority of improving water resource management and environmental protection. The rating of *effective* is based on the achievement of the project’s intended outcome and achievement of the output targets. It is rated *less than efficient* on the basis of the EIRR and *likely sustainable* based on the assessed financial sustainability of project-supported infrastructure.

Overall Ratings

Criteria	Rating
Relevance	Highly relevant
Effectiveness	Effective
Efficiency	Less than efficient
Sustainability	Likely sustainable
Overall Assessment	Successful
Development impact	Satisfactory
Borrower and executing agency	Satisfactory
Performance of the Asian Development Bank	Satisfactory

Source: Asian Development Bank.

IV. ISSUES, LESSONS, AND RECOMMENDATIONS

A. Issues and Lessons

58. The reform of wastewater tariffs is a difficult matter that requires a concerted and ongoing program of public education. While the failure to implement tariff increases does not appear to present a risk to O&M of project-financed infrastructure since JCG has resources to finance O&M, ensuring that beneficiaries contribute adequately to O&M—if not full cost recovery—will improve financial sustainability.

59. Major lessons from the project are:

- (i) Well-planned and implemented riverbank rehabilitation can yield significant health, environmental, financial, and quality of life benefits to local residents.
- (ii) Demonstration effects that impact on a local, national, and regional scale have the potential to replicate benefits.
- (iii) To properly evaluate the project impact and/or outcome, a well-designed DMF and a well-designed and effectively implemented PPMS are critical.

B. Recommendations

60. Project-specific recommendations are:

- (i) JCG should replicate the rehabilitation of rivers in its jurisdiction using the model and lessons from the project-financed activities.
- (ii) JCG, with support of the PMO, should continue to promote the need to reform water tariffs to ensure the sustainability of project-financed infrastructure and comparable infrastructure to be constructed. The PMO should continue to disseminate information and conduct further public awareness and education programs aimed at improving local residents' understanding of the need for water resources and environment protection.
- (iii) JCG should increase the rate of collection of flood control and wastewater treatment charges.
- (iv) The PMO should continue to monitor water quality and related conditions of the project's rivers and expand coverage to include other rivers that discharge into Jiaozhou Bay to better monitor the bay's condition on a broader level and to assess the achievement of project outcomes.

61. **Covenants.** It is recommended that JCG continue to comply with loan covenants that relate to maintaining water quality and environmental standards and comply with the covenant on water tariff reform.

62. **Further action or follow-up.** The PMO should undertake an assessment of water quality in the project's rivers to update the results obtained in November 2016. To ensure the sustainability of project-financed infrastructure and comparable existing or future infrastructure in the Jiaozhou Bay area, JCG should implement the recommendations relating to wastewater tariff reform and public awareness.

63. **Timing of the project performance evaluation report.** It is recommended that a performance evaluation review be conducted in 2022 or later. This will allow proper evaluation of the project's impact on water quality in Jiaozhou Bay, and economic development and poverty reduction in Jiaozhou City.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators and Targets		Project Achievements ^c
	At Appraisal ^a	Revised ^b	
<p>Impact Improved quality of life, sustainable ecosystem, and biodiversity conservation in the Jiaozhou Bay area</p>	<ul style="list-style-type: none"> Reduced incidence of waterborne diseases by 40% in Jiaozhou City by 2015 Water quality in Jiaozhou rivers restored to class IV/V by 2015 Water quality in Jiaozhou Bay maintained in non-eutrophic conditions by 2015 Reduced episodes of harmful algae blooms in Jiaozhou Bay by 2015 	<ul style="list-style-type: none"> No change No change No change No change 	<ul style="list-style-type: none"> 23 cases of diarrhea recorded in 2008. One case recorded in 2016 Per 10,000 head of population the incidence of diarrhea fell from 0.2888 in 2008 to 0.0114 in 2016 Only one case of paratyphoid recorded between 2008 and 2016 In general, minimum class V standard not reached in project area rivers No information available No information available
<p>Outcome Improved condition of water resources and environment in Jiaozhou City and the downstream wetlands area</p>	<ul style="list-style-type: none"> Reduced COD discharges by 28% and P discharges by 43% in or around Jiaozhou Bay by 2014 Improved hygiene conditions and reduction of waterborne diseases for 370,000 people in Jiaozhou City by 2014 Enhanced flood protection for about 370,000 people in Jiaozhou City by 2014 	<ul style="list-style-type: none"> No change No change No change 	<ul style="list-style-type: none"> No information available on the reduction in COD and P discharges By 2018, around 480,000 people in project areas benefited from improved hygiene conditions and reduction of waterborne disease By 2018, around 480,000 people in project areas benefited from improved flood protection

Design Summary	Performance Indicators and Targets		Project Achievements ^c
At Appraisal ^a	At Appraisal ^a	Revised ^b	
	<ul style="list-style-type: none"> Reduced pollution loads in Jiaozhou Bay by 2014 	<ul style="list-style-type: none"> No change 	<ul style="list-style-type: none"> In 2016, 72% of the area of Jiaozhou Bay was assessed as having good quality water; an increase of 6 percentage points over 2015
<p>Outputs 1. Improved Water and Flood Resource Management</p> <ul style="list-style-type: none"> Major river courses rehabilitated/ upgraded Flood retention facilities improved Urban storm drainage network installed/upgraded 	<ul style="list-style-type: none"> A total of 19.5 km of riverbanks upgraded/ rehabilitated in four major rivers by 2011: Yunxi River - 9.4 km Hucheng River - 3.9 km Wushui River - 3.2 km Sanli River -3.0 km Existing Erli'he flood retention facilities upgraded from 0.2 million m³ to 0.8 million m³ by 2011 A total of 11.4 km of storm drainage pipelines installed by 2011 	<ul style="list-style-type: none"> A total of 18.4 km of riverbanks upgraded/ rehabilitated in four major rivers by 2011: Yunxi River – 8.3 km Hucheng River - 3.9 km Wushui River - 3.2 km Hucheng River branch – 3.0 km (1.7 km financed by ADB and 1.3 km financed from counterpart) River monitoring and administrative center built and operational by 2016 No change Transferred to counterpart funding 	<ul style="list-style-type: none"> All targeted works completed by December 2016, except: Hucheng River branch completed in March 2017 Civil works completed February 2017 Monitoring equipment contract signed March 2017 Installation completed July 2017 All targeted works completed December 2010 All targeted works completed December 2010

Design Summary	Performance Indicators and Targets		Project Achievements ^c
	At Appraisal ^a	Revised ^b	
<p>2. Strengthened Wastewater Management and Pollution Control</p> <p>Urban wastewater drainage network upgraded</p>	<ul style="list-style-type: none"> A total of 27.7 km of wastewater drainage pipelines installed by 2011 	<ul style="list-style-type: none"> No change 1.7 km interceptor sewer for Hucheng River branch 	<ul style="list-style-type: none"> All targeted works completed December 2012 All targeted works completed September 2016
<p>3. Integrated Water and Ecosystem Management</p> <ul style="list-style-type: none"> Shaohai Lake and Jiaozhou Bay ecosystem protection measures developed 	<ul style="list-style-type: none"> About three artificial wetlands established and habitats enhanced by 2011 Operations manual for Shaohai Lake ecosystem management in place by 2013 	<ul style="list-style-type: none"> No change No change 	<ul style="list-style-type: none"> Shaohai National Wetland Park constructed in 2010 Erle'hi River Southwest Wetland Park constructed in 2011 Yunxi Downstream Wetland Park constructed in 2011 Handbook for the Shaohai Lake Ecosystem Management and Operation completed in March 2017 and being used by Shaohai Lake Management Office
<ul style="list-style-type: none"> Water resources and flood management strengthened in Jiaozhou 	<ul style="list-style-type: none"> Integrated information system for flood, water, and wastewater management developed and operated by 2012 A total of 30 persons trained within JCG by 2014 	<ul style="list-style-type: none"> No change No change 	<ul style="list-style-type: none"> The information system was established in March 2017 62 people, including 54 from the PMO, trained in areas such as flood management, environmental protection, project

Design Summary	Performance Indicators and Targets		Project Achievements ^c
	At Appraisal ^a	Revised ^b	
<ul style="list-style-type: none"> Environmental management and pollution control strengthened in Jiaozhou 	<ul style="list-style-type: none"> A total of 5 communities and surrounding industries mobilized for training and awareness raising activities by 2011 Public education and awareness program implemented by 2012 Wastewater service corporatized by 2014 Wastewater tariffs reformed by 2014 	<ul style="list-style-type: none"> No change No change No change No change 	<p>management, financial management, and procurement by March 2017</p> <ul style="list-style-type: none"> Environmental management training held in November and December 2016 covering 9 villages with 217 participants, of which 88 (40.6%) were men and 129 (59.4%) were women Flood control training held in November and December 2016 covering 8 villages with 196 participants, of which 73 (37.2%) were men and 123 (62.8%) were women Public awareness and consultation held in November and December 2016 covering 8 villages with 196 participants, of which 73 (37.2%) were men and 123 (62.8%) were women Expansion of Beikong WWTP from 50,000 m³ to 100,000 m³ completed under a BOT arrangement in 2011. OT contractor subsequently acquired by Qingdao Jiaozhou Beikong Water Co. Ltd, which now operates the WWTP. Study/ recommendations for tariff reform completed by March 2017. JCG proposals for tariff reform published for

Design Summary	Performance Indicators and Targets		Project Achievements ^c
	At Appraisal ^a	Revised ^b	
<p>SEA on Jiaozhou Bay development prepared</p> <p>• 4. Strengthened Project Management Capacity</p>	<ul style="list-style-type: none"> • Environmental monitoring plan is enforced by 2011 • SEA incorporating integrated planning methodologies approved by relevant authorities by 2011 • PMOs established and operational by 2009, adequate budgetary resources allocated, office equipment and vehicles procured by 1Q 2009, 92 person-months of consulting services provided by 2014 • A total of \$0.2 million provided for logistical support (i.e., computers, equipment, etc.) 	<ul style="list-style-type: none"> • No change • No change • No change • No change 	<p>public consultation in 2018 but not implemented.</p> <ul style="list-style-type: none"> • Environmental monitoring reports were submitted for the duration of the project except for the years 2014 to 2016 when no civil works were conducted. • SEA not completed following shift in focus of TA 7219-PRC¹⁸ to develop low carbon strategy for QMG • 62 persons trained by March 2017 6 study tours conducted by March 2017 157 person-months of consulting services provided by March 2017 • CNY2.4 million provided for vehicles, equipment, etc. (\$0.36 million equivalent at rate of exchange prevailing at project completion review)

BOT = build-operate-transfer, COD = chemical oxygen demand, CNY = Chinese yuan, JCG = Jiaozhou City Government, km = kilometer, m³ = cubic meter, MTR = midterm review, P = phosphorous, PMO = project management office, PRC = People's Republic of China, Q = quarter, QMG = Qingdao Municipal Government, SEA = strategic environmental assessment, TA = technical assistance, WWTP = wastewater treatment plant.

^a As indicated in: ADB. 2008. *Report and Recommendation of the President to the Board of Directors for the Proposed Loan to People's Republic of China for Qingdao Water Resources and Wetland Protection Project*. Manila.

^b Based on revisions following the midterm review and June 2013 loan review missions and approved by ADB on 7 December 2015.

^c As of project completion review in May 2019, unless otherwise stated. Data derived from government project completion report.

¹⁸ ADB. 2008. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Qingdao Water Resources and Wetland Protection Project*. Manila (Appendix 9: Technical Assistance).

PROJECT COST AT APPRAISAL AND ACTUAL
(\$ million)

Item ^c	Appraisal Estimate ^a	Actual ^b
	Total Cost	Total Cost
A. Investment Costs^d		
1. Improving Water Resources and Flood Management		
a. Improvement of the Erli'he flood retention facilities	5.5	
b. Upgrading of stormwater drainage facilities	14.4	
c. Rehabilitation of river courses	53.3	
Subtotal (A1)	73.2	102.03
2. Strengthening Wastewater Management and Pollution Control	6.4	1.33
3. Integrated Water and Ecosystem Management		0.95
a. Capacity building for flood and water resources management	0.8	
b. Environmental management and pollution control	0.6	
c. Support for the Shaohai artificial lake ecology	0.4	
Subtotal (A3)	1.8	0.95
4. Strengthened Project Management Capacity	0.9	2.59
Subtotal (A)	82.3	106.90
B. Contingencies	17.7	
C. Financing Charges During Implementation	5.8	2.94
Total	105.8	109.84

^a No data on the breakdown of foreign exchange and local currency costs by project outputs are available in project appraisal documents.

^b Actual project costs are not broken down by foreign exchange and local currency costs. Data on actual costs financed by the Jiaozhou City Government is not available.

^c No data on total costs including contingencies by output are available in project appraisal documents.

^d Outputs are listed as indicated in the Report and Recommendation of the President, Table 1.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank.

PROJECT COST BY FINANCIER
Table A3.1: Project Cost at Appraisal by Financier

Item ^a	Asian Development Bank		Jiaozhou City Government		Total	Taxes and Duties
	Amount (\$ million)	% of Cost Category	Amount (\$ million)	% of Cost Category	\$ million	\$ million
A. Investment Costs						
1. Civil Works						
a. Flood retention	2.5	53.8	2.2	46.2	4.7	0.2
b. Urban stormwater drainage network	6.7	53.8	5.8	46.2	12.5	0.4
c. Urban wastewater drainage network	2.8	53.8	2.4	46.2	5.2	0.2
d. River course rehabilitation	24.1	53.8	20.7	46.2	44.8	1.5
e. Ecological construction	0.1	53.8	0.1	46.2	0.1	0.0
2. Survey and Design	0.0	0.0	1.9	100.0	1.9	2.3
3. Preparation, management, supervision and quality review	0.0	0.0	3.0	100.0	3.0	0.2
4. Vehicles	0.2	80.0	0.0	20.0	0.2	0.0
5. Equipment and materials	6.7	85.4	1.1	14.6	7.8	0.4
6. Consulting Services						
a. International consultants	0.7	95.0	0.0	5.0	0.7	0.0
b. National consultants	1.0	95.0	0.1	5.0	1.0	0.1
c. Consultant support	0.1	95.0	0.0	5.0	0.1	0.0
7. Capacity Building						
a. Training	0.1	45.0	0.1	55.0	0.1	0.0
8. Monitoring and Reporting	0.2	95.0	0.0	5.0	0.2	0.0
Total Base Costs	45.0	42.5	37.3	57.5	82.3	3.1
Contingencies	0.0	0.0	17.7	100.0	17.7	0.0
Interest and Commitment Charges	0.0	0.0	5.8	100.0	5.8	0.0
Total Project Costs	45.0	42.5	60.8	57.5	105.8	3.1
% Total Project Cost		43%		57%	100%	

^a Expenditure categories defined in the Report and Recommendation of the President, Table A5.2.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank.

Table A3.2: Project Cost at Completion by Financier

Item ^c	Asian Development Bank		Jiaozhou City Government		Total ^a	Taxes and Duties ^b
	Amount (\$ million)	% of Cost Category	Amount (\$ million)	% of Cost Category	\$ million	\$ million
A. Investment Costs						
1. Civil Works	40.43	40.2	60.22	59.8	100.65	
a. Flood retention	2.92					
b. Urban stormwater drainage network	9.35					
c. Urban wastewater drainage network	5.23					
d. River course rehabilitation	22.29					
e. Ecological construction	0.64					
2. Survey and Design						
3. Preparation, management, supervision and quality review						
4. Vehicles	0.35	100.0	0.00	0.0	0.35	
5. Equipment and materials	2.39	90.9	0.24	9.1	2.63	
6. Consulting Services	1.83	56.0	1.44	44.0	3.27	
a. International consultants						
b. National consultants						
c. Consultant support						
7. Capacity Building						
a. Training						
8. Monitoring and Reporting						
Total Base Costs	45.00	42.1	61.90	57.9	106.90	
Contingencies						
Interest and Commitment Charges	0.00	0.0	2.94	100.0	2.94	
Total Project Costs	45.00	41.0	64.84	59.0	109.84	
% Total Project Cost		41%		59%	100%	

^a Costs include contingencies, which are not identified separately in actual cost estimates.

^b No details of taxes and duties are available for actual project costs.

^c Expenditure categories defined in the Report and Recommendation of the President, Table A5.2. While an itemized breakdown of expenditures financed by ADB is available, a breakdown of expenditures financed by JCG is not provided in the government completion report nor is it available from the project management office.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank.

DISBURSEMENT OF ADB LOAN PROCEEDS
Table A4.1: Annual and Cumulative Disbursement of ADB Loan Proceeds
(\$ million)

Year	Annual Disbursement		Cumulative Disbursement	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2010	4.50	10.0	4.50	10.0
2011	9.15	20.3	13.65	30.3
2012	7.96	17.7	21.61	48.0
2013	2.34	5.2	23.95	53.2
2014	0.00	0.0	23.95	53.2
2015	2.29	5.1	26.24	58.3
2016	18.77	41.7	45.00	100.0
2017	0.00	0.0	45.00	100.0
Total	45.00	100.0		

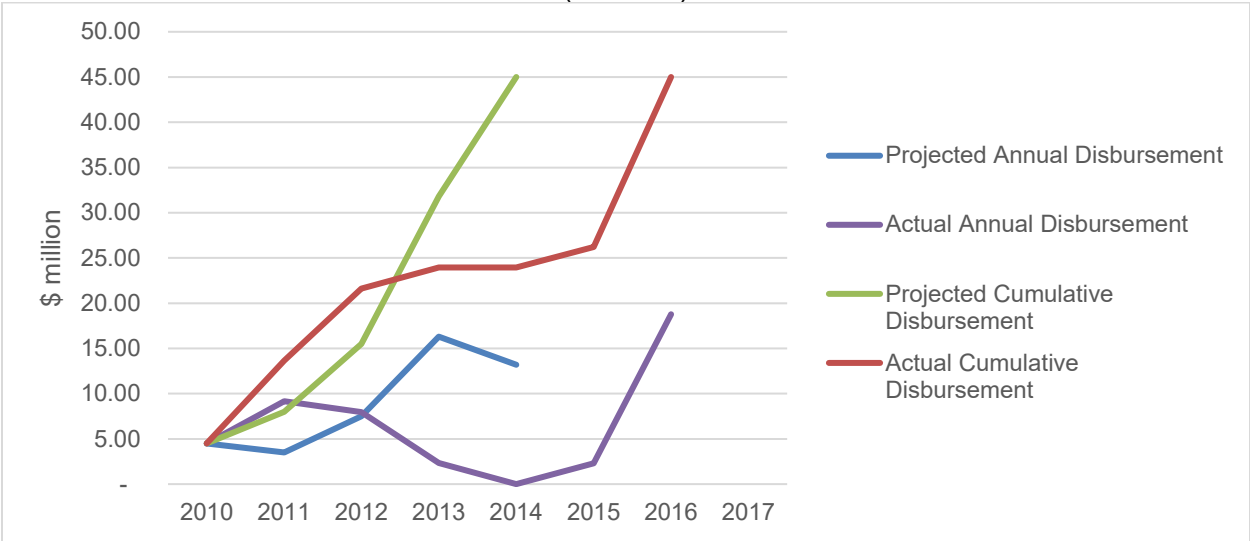
ADB = Asian Development Bank.
Source: Asian Development Bank.

Table A4.2: Projected Annual and Cumulative Disbursement of ADB Loan Proceeds
(\$ million)

Year	Annual Disbursement		Cumulative Disbursement	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2010	4.5	10.0	4.5	10.0
2011	3.5	7.8	8.0	17.8
2012	7.5	16.7	15.5	34.4
2013	16.3	36.2	31.8	70.7
2014	13.2	29.3	45.0	100.0
2015	0.0	0.0		
2016	0.0	0.0		
2017	0.0	0.0		
Total	45.0	100.0		

ADB = Asian Development Bank.
Source: Asian Development Bank.

Figure A4.1: Projection and Cumulative Disbursement of ADB Loan Proceeds
(\$ million)



ADB = Asian Development Bank.
Source: Asian Development Bank.

CONTRACT AWARDS OF ADB LOAN PROCEEDS
Table A5.1: Annual and Cumulative Contract Awards of ADB Loan Proceeds
(\$ million)

Year	Annual Contract Awards		Cumulative Contract Awards	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2010	12.07	26.8	12.07	26.8
2011	4.60	10.2	16.67	37.1
2012	13.70	30.5	30.37	67.5
2013	0.00	0.0	30.37	67.5
2014	0.00	0.0	30.37	67.5
2015	0.04	0.1	30.41	67.6
2016	14.39	31.9	44.81	99.6
2017	0.19	0.4	45.00	100.0
Total	45.00	100.0	45.00	100.0

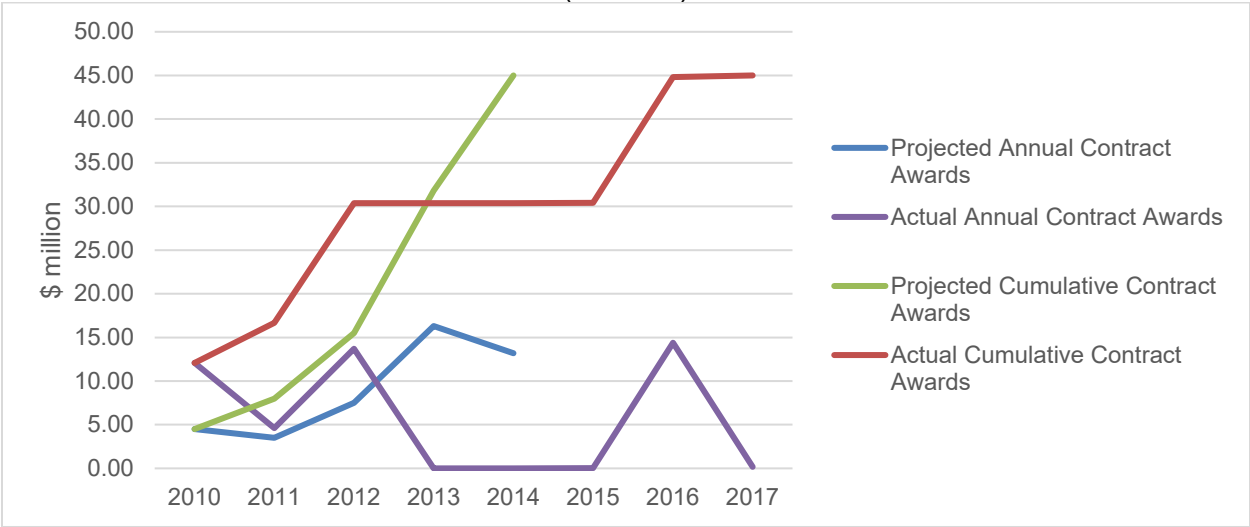
ADB = Asian Development Bank.
Source: Asian Development Bank.

Table A5.2: Projected Annual and Cumulative Contract Awards of ADB Loan Proceeds
(\$ million)

Year	Annual Contract Awards		Cumulative Contract Awards	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2010	4.5	10.0	4.5	10.0
2011	3.5	7.8	8.0	17.8
2012	7.5	16.7	15.5	34.4
2013	16.3	36.2	31.8	70.7
2014	13.2	29.3	45.0	100.0
2015	0.0	0.0		
2016	0.0	0.0		
2017	0.0	0.0		
Total	45.0	100.0	45.0	100.0

ADB = Asian Development Bank.
Source: Asian Development Bank.

Figure A5.1: Projection and Cumulative Contract Awards of ADB Loan Proceeds (\$ million)



ADB = Asian Development Bank.
Source: Asian Development Bank.

CHRONOLOGY OF MAIN EVENTS

Date	Event
2008	
17 December 2008	ADB Board approval of the loan and attached TA
2009	
27 January 2009	TA signing
25 May 2009	Loan signing
3 September 2009	Loan effectiveness date
10–15 October 2009	Project inception mission
2010	
3 March 2010	ADB approval of the model bidding documents for civil works
18–22 March 2010	Project review mission
31 March 2010	Initial disbursement
31 July 2010	Original TA closing date and TA account (financial) closing date
3 March 2010	ADB approval of the model bidding documents for goods
5 July 2010	ADB approval of the selection of the loan implementation consultant
2011	
23–27 May 2011	Project review mission
2012	
23 April 2012	ADB approval of the updated procurement plan splitting 9 contracts into 22 contracts without changing the procurement method
6–11 June 2012	Project midterm review mission
30 September 2012	Actual TA completion date
21 December 2012	Actual TA account (financial) closing date
2013	
6 June 2013	ADB approval of the TCR
13 June 2013	Circulation of the TCR to the ADB Board
23–26 July 2013	Project review mission
2014	
28 May 2014	MOF request for first extension of the loan closing date
11 June 2014	ADB approval of the first extension of the loan closing date
30 September 2014	Original loan closing date
2015	
13 July 2015	Executing agency application for changes to the project
7 August 2015	MOF request for second extension of the loan closing date and reallocation of loan proceeds
7 December 2015	ADB approval of the second extension of the loan closing date, minor changes to the project, change in consultant selection method, selection of procurement method, and reallocation of loan proceeds
2016	
16–20 May 2016	Project review mission
20 September 2016	ADB approval of the change in disbursement percentage, reallocation, and removal of imprest account ceiling
18–21 November 2016	Project review mission
2017	
23 March 2017	ADB approval of the removal of the statement of expenditure ceiling and reallocation

Date	Event
31 March 2017	Actual loan closing date
22–26 May 2017	Project review mission
2018	
25 November 2016	Final disbursement
13 February 2018	Financial closing date
2019	
6–8 May 2019	Project completion review mission

ADB = Asian Development Bank, MOF = Ministry of Finance, TA = technical assistance, TCR = technical assistance completion report.

Source: Asian Development Bank.

TECHNICAL ASSISTANCE COMPLETION REPORT

Division: EAER

TA No., Country and Name			Amount Approved: \$750,000	
TA 7219-PRC: Enabling the Protection of Jiaozhou Bay Water Quality and Wetland Ecosystem			Revised Amount: not applicable	
Executing Agency Qingdao Municipal Government	Source of Funding \$350,000 (TASF-other sources) \$400,000 (Water Financing Partnership Facility –Multi Donor Fund)		Amount Undisbursed: \$52,194.75	Amount Utilized: \$697,805.25
TA Approval Date: 17 Dec 2008	TA Signing Date: 27 Jan 2009	Fielding of First Consultant: Sep 2009	TA Completion Date Original: 31 Jul 2010 Actual: 30 Sep 2012 Account Closing Date Original: 31 Jul 2010 Actual: 21 Dec 2012	
Description				
<p>The urban population in the People's Republic of China (PRC) has tripled over the last 30 years and reached about 690 million in 2011. The increasing urban population (i) fuels further industrialization, economic development, and intensification of agriculture; (ii) strains the already overloaded infrastructure; and (iii) contributes to widespread pollution and environmental threats to PRC's rivers, lakes, and coastal waters. Pressures brought by urbanization are particularly intense in PRC's coastal cities. Development activities such as settlements, ports, and industrial facilities are increasingly competing for energy and land in the narrow coastal zones. Qingdao is a case in point. It embraces opportunities for further development, while facing serious challenges because of limited land, scarce energy, and deteriorating coastal ecosystems surrounding Jiaozhou Bay. To develop a strategic environmental assessment (SEA) for Jiaozhou Bay, a technical assistance (TA) from ADB was requested by the government.^a</p> <p>During TA inception in March 2010, the Qingdao Municipal Government (QMG), the executing agency of the TA, informed ADB that major works related to the strategic environmental assessment (SEA) were completed using local counterpart funds. As Qingdao Municipality moved towards a low carbon economy following the "Embracing Bay Development, Surrounding Bay Protection" strategy, QMG requested ADB to change the TA scope to focus on a low carbon development strategy. At QMG's request, a major change in TA scope and implementation arrangements was approved in June 2010.</p>				
Expected Impact, Outcome and Outputs				
<p>The expected impact of the TA was the strengthened capacity of the QMG in strategic environmental planning and management to support sustainable economic development in the Jiaozhou bay area. The original outcome was the increased protection of Jiaozhou Bay water quality and wetland ecosystem through the development of a SEA, while the original outputs of the TA were: (i) an effective management mechanism for strategic environmental and planning process, (ii) strategic environmental assessment, and (iii) implementation of operational guidelines and monitoring system. Under the revised scope and implementation arrangements, the expected outcome of the TA was a well-designed strategy and blueprint for low carbon development in 2020, while the expected outputs were: (i) a technical roadmap and financing framework in developing a low carbon economy in Qingdao; and (ii) a framework in managing rural nonpoint source pollution in Jiaozhou Bay and a note on integrated coastal zone management, as a continuous support to the loan project.</p>				
Delivery of Inputs and Conduct of Activities				
<p>The TA was implemented in two stages by two consulting firms. The first firm provided 2.7 person-months of international and 31 person-months of national consultants at the first stage. With the change in scope and implementation arrangement, ADB recruited another consulting firm to prepare a low carbon development strategy. The second firm provided 8.5 person-months of international and 31 person-months of national consultants.</p> <p>The consulting firms produced the required outputs and their performances were considered satisfactory. The QMG set up a TA management office under an inter-agency leading group chaired by the vice mayor. The TA management office ensured strong interdepartmental coordination and the consultants' access to reference reports and data.</p> <p>QMG's performance was satisfactory. QMG provided adequate and timely counterpart inputs to facilitate TA implementation. ADB provided guidance and fielded timely missions for the inception, interim, and final review of the TA. The performance of ADB was assessed as satisfactory. TA financing was adequate, with 93% of the total TA amount disbursed. The amount utilized for the achievement of the original and revised outcome amounted to \$174,616 and \$523,189 or 23% and 70%, respectively of the TA amount. ADB procedures on disbursements and procurement were followed.</p>				

Evaluation of Outputs and Achievement of Outcome

The consulting firms produced all the outputs required under the original and the revised TA scope. The consultants' inception report at the first stage covered the: (i) assessment of Jiaozhou Bay's water quality and ecosystems, (ii) international experiences on integrated coastal zone, and (iii) framework for the SEA on Jiaozhou Bay development.^b

The consultants' final report at the second stage covered: (i) the analytical framework for low carbon cities in the PRC; (ii) best practices and experiences in low carbon development in the PRC and in the world; (iii) Qingdao's situation analysis: economy, energy, and the environment in the low carbon city context; (iv) scenario analysis for Qingdao towards a low carbon economy; (v) sector and technological roadmap for Qingdao's low carbon development; and (vi) low carbon financing mechanism in Qingdao. The report also included a framework for agricultural nonpoint source water pollution and recommendations for coastal management to support the loan.

Overall Assessment and Rating

The TA was rated successful. All activities planned under the revised TA scope were completed with satisfactory performance of consultants and active participation of QMG. The findings of the TA were disseminated at a national capacity building workshop on climate change held in March 2011 in Qingdao, and was sponsored by the National Development Reform Commission (NDRC), ADB, and the British embassy. ADB also presented the TA results during the session on Building Up Low Carbon Cities in China: Practices and Approaches at the Durban Conference of the Parties 17 of the United Nations Framework on Climate Change in December 2011. At the NDRC meeting for climate change mitigation and adaptation in Xiamen in March 2012, QMG was invited to share the TA results to serve as a model of successful international cooperation on climate change.

Major Lessons

Three major lessons were learned from the TA: (i) to better protect the water quality of Jiaozhou Bay, QMG needs to upgrade wastewater treatment technologies to further remove nitrogen and phosphorus, and encourage wastewater recycling and reuse; (ii) low carbon city planning is more than energy conservation and emission reduction. The concept should be integrated into the urban development master plan and strategy. Qingdao may further integrate the key measures proposed in the final report into its urban master plan; and (iii) private sector resources are available and could be tapped to disseminate the findings of ADB TA projects and to scale up studies. For instance, Caterpillar Foundation agreed to finance "Sustainable and Livable Cities Initiative" following the conclusions of the TA, and Qingdao was selected to share its experiences on low carbon development with other counterparts in India and Brazil.

Recommendations and Follow-Up Action

Qingdao was selected as one of the low carbon development pilot cities by NDRC in December 2012. Compared to the inland cities which are piloting low carbon development, Qingdao as a coastal city needs mass deployment of some advanced technologies, including carbon capture and storage, solar power generation, and electric automobiles, as it has the potential to become a model of low carbon economy in the PRC. Deployment of these advanced technologies requires considerable investment and capacity. To overcome the market barriers, especially those related to financial investment, an innovative public-private financing partnership is essential, and ADB may continue to help Qingdao to access such partnership.

^a Attached to ADB. 2008. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Qingdao Water Resources and Wetland Protection Project*. Manila.

^b The outputs delivered by the first firm were still relevant to the Qingdao Municipal Government and provided important support to the implementation of Loan 2494-PRC.

Prepared by: Qingfeng Zhang

Designation: Lead Water Resources Specialist

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.

SOCIAL IMPACT AND POVERTY REDUCTION

A. Relevance to Development Strategies

1. The Qingdao Water Resources and Wetland Protection Project is aligned with the 11th and 12th five-year plans of the People's Republic of China (PRC), as well as the Millennium Development Goal 7 (target 10: access to basic sanitation). It also supports the development of a harmonious society, village beautification, and sustainable development in the PRC. The project supports the Asian Development Bank's (ADB's) strategic priorities such enhancing rural and urban living environments and inclusive and sustainable development.

B. Project Benefits and Impacts

2. **Beneficiaries.** The project directly benefited in various ways approximately 480,000 people in Jiaozhou City by 2018, which is 27.9% higher than the planned 370,000 people.¹ The project benefits the local residents by (i) creating jobs and income opportunities and reducing water pollution; (ii) protecting water resources and providing clear and safe drinking water; (iii) reducing property losses and disruption to livelihoods from frequent localized flooding; (iv) improving living environment through wetland ecosystem rehabilitation; (v) improving health condition; and (vi) improving public service delivery through corporatization and improved financial sustainability.

3. The project also indirectly benefited approximately 3,500,000 residents in the broader Jiaozhou Bay area, with an increase of 16.7% from the target in 2008. The benefits include reduced water pollution of Jiaozhou Bay, reduced health risks from consumption of shellfish, decreased algal growths in the bay and surrounding areas, and improved amenity values.

4. **Employment generation.** Project construction created a total of 3,659 direct employment for unskilled job positions and 159 for skilled job positions for local residents, an increase of 9% over the target.² The project also created over 5,000 indirect employment opportunities for local residents, such as in the selling of sand, building stones, and cement during project construction. The project purchased locally a total of 130,022 tons of sand; 135,567 tons of building stone; and 335,521 tons of cement. Project operation generated 110 jobs for local residents such as maintaining the roads, streetlamps, rivers, and greenery; tree pruning; and others. Priorities were given to women and the poor. Of the jobs generated, over 50% were provided to women, the poor, and other vulnerable groups.

5. **Waterborne diseases reduction.** Incidence of waterborne disease decreased by 96% from 0.2888 in 10,000 in 2008 down to 0.01142 in 10,000 in 2016.³

6. **Flooding control.** The project helped the city prevent floods. Through the project, at least CNY218 million (equivalent to \$320,000)⁴ of property loss was prevented in 2013 when the heaviest rain was recorded in the project area since 2008. Jiaozhou City was hit by 9 floods during 1990 and 2007. The property loss varied but showed an upward trend prior to the project. The loss in 2007 was about CNY2.18 million (\$320,000). There was a heavy rainfall in July 2013, with

¹ Due to the expansion of project scope and population growth in project area.

² 3,400 jobs as indicated in the summary poverty reduction and social strategy.

³ The figures are from the government project completion report particularly from the Jiaozhou City Center for Disease Control and Prevention.

⁴ Exchange rate: \$1 = CNY6.8.

264 millimeters of precipitation falling within 24 hours.⁵ But due to the project, rainwater quickly flowed to canals, further to rivers, then to Jiaozhou Bay. No flooding happened during the heavy rain event, and no property loss has been recorded since the commencement of the project (Table A8.1).

Table A8.1: Cost of Property Loss in Jiaozhou City, 1990–2018

Currency	1990	1993	1994	1997	1998	1999	2001	2005	2007	2008–2018
CNY million	0.44	11.84	19.01	14.87	12.24	285.00	198.00	224.90	218.18	0.00
\$ million	0.06	1.74	2.80	2.19	1.80	41.91	29.12	33.07	32.09	0.00

Source: Jiaozhou City Government project completion report.

C. Gender Equality

7. The project was identified as some gender elements. No gender action was prepared. A gender-related indicator of *at least 20% of unskilled work provided to women* was stated in the original resettlement plan.⁶ The project land acquisition did not negatively affect livelihoods and income generation of any women and men. There is no female-headed household in the project land-acquisition affected villages.

8. Of the total beneficiary of 480,000 people, 50% are women. The project promoted gender equality, although there was no specific gender action plan. Of the 3,659 local residents who worked for the project, 35% are women, which is significantly higher than the target of 20%; of the 5,000 training participants, 65% are women; of the pilot community-based monitoring teams, 73% are women; and of the newly increased 110 unskilled workers for the project maintenance and operation, 50% are women. A survey done for the project in 2016 and 2017 indicated that women's awareness and knowledge on public participation, environmental protection, and flood risk management increased.⁷

D. Poverty Reduction

9. The households eligible for rural and urban minimum living standard (MLS) participated throughout the project cycle. They participated in project preparation, project employment, skills training, awareness raising, community-based monitoring, and maintenance and operation. For example, 14.1% of the project direct workers were from low-income families, and half of the newly added workers for the project maintenance are from low-income families. The monthly salary is between CNY2,500–CNY3,000 (monthly \$368–\$441) or a yearly earning between CNY30,000–CNY36,000 (\$4,412–\$5,294), which can lift a household out of income poverty by 2018 per official MLS standards.⁸

10. **Ensured affordability for the low-income households.** The Jaozhou City Government had implemented a policy on water tariffs with subsidy measures to all low-income households

⁵ Information from the project management office.

⁶ It is stated in the original resettlement plan that during project construction, the project management office will ensure that a certain number of the affected women (at least 20% of the unskilled laborers) will be offered unskilled jobs.

⁷ Jiaozhou Three Rivers Rehabilitation Headquarters. 2017. *Community and Public Consultation Draft Final Report*. Jiaozhou.

⁸ The MLS is used for identifying poverty in the urban PRC. The minimum guarantee living standards for rural-registered and urban-registered residents in Jiaozhou City in 2018 were CNY490 (\$72) and CNY600 (\$88) per month, or CNY5,800 (\$865) and CNY7,200 (\$1,059) yearly. A survey done in 2017 showed that on the average, each low-income household has 3.16 persons in Jiaozhou City. That is, if a household earned a yearly income of (CNY7,200/person*3.16 persons/household) CNY22,752 (\$3,346) and above, the household will not be in poverty.

since 2005. Water tariff is CNY3.2 per cubic meter (m^3) ($\$0.47/\text{m}^3$) for normal households and CNY1.8 for low-income households following the water tariff policy.⁹ As stated in the project summary poverty reduction and social strategy, water cost accounted for 2.48% of low-income households' disposable income, which is below the 3% benchmark. After public hearings in which low-income households were consulted, the Jiaozhou City Government proposed a new water rate policy on 1 January 2018 but did not implement it due to some reason. It is an ascending block rates policy. Even if the new tiered water rates are being enforced, the poor's affordability will still be ensured. The policy defines water rates into three tiers: CNY3.2/ m^3 ($\$0.47/\text{m}^3$) for water usage up to 144 m^3 over 1 calendar year; CNY4.23/ m^3 ($\$0.62/\text{m}^3$) for use of 144–204 m^3 , and CNY7.31 ($\$1.08/\text{m}^3$) for over 204 m^3 .¹⁰ The MLS households still enjoy the subsidy policy and just need to pay CNY1.8/ m^3 ($\$0.27/\text{m}^3$) for up 144 m^3 of water used. The water tariff for the MLS households did not increase since 2005 while their income increased. A total of 12,295 people benefited from the guaranteed MLS policy in Jiaozhou City in 2018, accounting for 1.4% of its total population.

E. Consultation and Public Participation

11. The Jiaozhou residents especially the communities surrounding the project site participated in various ways at different levels throughout the project cycle (preparation, implementation, monitoring, and preliminary evaluation). During project preparation, the surrounding community members, women and men, and poor and non-poor were timely informed about the project's objectives and outcomes; women and men residents were consulted on the project design, outputs and activities, and change in scope. All relevant farmers were consulted on land occupation and acquisition, land compensation, and resettlement plan preparation. The resettlement plan and resettlement information booklets were distributed to all affected communities and affected households and disclosed on the ADB website. During project preparation, about 2,465 residents participated in the project design, of which, 35% are women. During project implementation, over 3,659 local residents, women and men, poor and non-poor, worked directly for the project construction. It was estimated that the project also created 5,500 of indirect employment opportunities for the local residents, such as producing and or selling sands, building stones, and cements for the project; over 5,000 people received awareness raising and trainings on environmental protection, public participation, road safety, river safety, flood prevention and preparedness, offered by the project and relevant government agencies. Grievance redress mechanisms on resettlement, environment, and project construction activities were established and made accessible to the concerned communities. There are 110 local residents employed for the project maintenance and operation related to sanitation, river safety, road safety, and landscape greenery. As a pilot, five community-based monitoring teams with 15 members (including 11 women) were set up in late 2016. The teams carried out monitoring activities on environment situation of the rivers, surrounding restaurants and communities and resident's environment related behavior, etc.

F. Conclusions and Lessons Learned

12. The project improved local residents' living environment, promoted gender equality, strengthened the affordability of the water services, facilitated public participation, and contributed to beautification of villages and sustainable development. Emphasis on women's involvement and participation in the project made a significant contribution to the promotion of gender equality.

⁹ Includes water resources fee and sewage treatment fee. In the PRC, both are always collected together although they are paid to different agencies.

¹⁰ Of the water rates, CNY1/ m^3 is for sewer service and the others are for water resources and water service.

13. Given the comprehensive project design and large number of beneficiaries, the social benefits monitoring and evaluation should have been conducted on a more regular basis during implementation to provide timely feedback for better project administration and subsequent evaluation.

ENVIRONMENTAL SAFEGUARDS

1. **Categorization and due diligence.** The project was prepared under the Asian Development Bank's (ADB) Environment Policy (2002; succeeded in 2009 by ADB's current Safeguard Policy Statement) and was classified as Category B for environment. An initial environmental examination (IEE), including an environmental management plan (EMP), was prepared in July 2008. The IEE was largely based on a domestic environment impact assessment prepared by the Ocean University of China, for which first and second drafts were prepared in February and May 2008, respectively. The EMP included institutional arrangements for EMP implementation, mitigation measures for the identified risks, and monitoring requirements to ensure compliance with ADB and domestic safeguard requirements. Between August and November 2015, the IEE, including the EMP, were updated, to reflect the withdrawal of some subprojects and addition of others. The updated IEE was disclosed on ADB's website on 14 December 2015.

2. **Institutional setup and capacity building.** The key organizations and personnel responsible for EMP implementation were: (i) the executing agency, Jiaozhou City Government, on behalf of the Qingdao Development and Reform Commission (general oversight and coordination for the EMP; submission of progress reports to ADB; management of any compliance issues or grievances); (ii) the Jiaozhou project management office (JPMO) (coordination and supervision for daily EMP implementation; liaison with ADB). The JPMO was supported when necessary by a second PMO (Qingdao PMO), which focused on the project financial management. The JPMO team included one full-time environment officer, who was responsible for leading the coordination of the EMP; (iii) the implementing agency, Jiaozhou Construction Bureau (JCB) (daily EMP implementation); (iv) the Jiaozhou environment monitoring station (JEMS) (external monitoring of compliance with the EMP); and (v) a loan implementation environment consultant (LIEC; from Easen International Co. Ltd.), engaged by the JPMO. The LIEC worked with the project agencies between August 2010 and March 2017 and provided technical support for EMP implementation.

3. **Environment safeguard measures.** Mitigation measures in the EMP focused on soil erosion control, water and air quality protection, noise control, safe disposal of dredged sediments, public safety, and the protection of historical sites near the construction sites. The IEE concluded that environment impacts during the construction phase would be localized and temporary, and this was confirmed during project implementation. Based on the external monitoring reports, adverse environmental impacts were minor and mitigated to the levels stated in the EMP and for domestic standards. Contractors complied with domestic regulatory standards for occupational health and safety (workers were equipped with appropriate personal protective equipment) and construction sites were fenced to ensure public safety. No major construction accidents were reported from construction sites during project implementation. For the operations phase, the project was concluded to present few risks, as civil works mainly involved river course rehabilitation and the upgrading of stormwater and sewage systems.

4. **Environmental monitoring.** Monitoring related to environment safeguards comprised: (i) internal monitoring and inspection i.e. non-quantitative visual inspection of construction activities to confirm the compliance with EMP. Internal monitoring was implemented regularly by the construction supervision companies and reported to JPMO via monthly project progress reports, with the help of the LIEC; and (ii) external monitoring and inspection i.e., quantitative monitoring of water, air and soil quality and noise levels, by JEMS. External monitoring was conducted in December 2010, January 2012, August 2012, August 2013 and September 2016. These

monitoring periods were timed to coincide with civil works. No monitoring was conducted in 2014 and 2015 as no civil works occurred in these years.¹

5. **Timing and quality of environment monitoring reports.** Under the EMP, the JPMO was required to submit environment monitoring reports (EMR) to ADB on an annual basis. The project was implemented over 9 years (2008–2017). Civil works were conducted over 8 years (2009 to 2016) and project completion occurred in the first quarter of 2017. Based on this information, a minimum of eight EMRs, covering the period of civil works from 2008 to 2016, would be expected. In total, four EMRs were submitted to ADB, covering 6 years: 2008–2010, 2011, 2012 and 2013. No reports were received for the years 2014 to 2016. The four EMRs submitted to ADB included progress with implementation of the mitigation measures, monitoring plan, and training plan i.e., the key aspects of the EMP. All were publicly disclosed on ADB’s website.² The lack of EMRs for 2014 to 2016 was due to: (i) no civil works conducted in 2014 and 2015 (footnote 1). For these 2 years, it was agreed by the JPMO and ADB that no EMRs were required, and that any safeguard activities would be included in the JPMO project progress reports. No safeguard issues were reported for 2014 and 2015; (ii) long project delays, which affected the status of works and reporting in general; and (iii) challenges for the loan implementation consultants to maintain the agreed reporting frequencies, due to these various factors.

6. **Grievances.** A project-specific grievance redress mechanism was not implemented for the project as such mechanism was not required by ADB’s Environmental Assessment Guidelines (2003) under which the EMP was prepared. Despite this: (i) public consultations were held during implementation to inform residents of construction works and new subprojects. Consultations included meetings with residents and information disclosure of works on public notice boards and government websites. These methods are described in the IEE; and (ii) the project resettlement plan included grievance redress procedures to provide affected persons with the opportunity to raise and discuss issues. No public complaints were received by both JPMO and the government during the loan implementation.

7. **Lessons learned.** For environment safeguards the key lessons are: (i) ensure that adequate person-months and budget are accounted for within the loan for the provision of loan implementation consultants, including a LIEC. This will help ensure that reporting requirements for the EMRs are met and will reduce the risk of gaps in the submission of EMRs for future projects; and (ii) as long as possible (pending budget availability and other possible factors), promote semi-annual, not annual, reporting for environment safeguards. This will help ensure the government and ADB is updated more frequently with progress for EMP compliance, and will provide confidence that the EMP is being complied with.

8. **Added value of ADB support for safeguard implementation.** For much of the period the project was under preparation and implementation, PRC environmental safeguard requirements were lower than ADB standards. The application of ADB’s safeguard requirements helped raise the quality of the environmental mitigation and monitoring measures. Rapid and significant improvements in the PRC’s framework of safeguard policies, laws and regulations have been made, and many of these differences have since been removed. Some domestic standards are now comparable to (or exceed) the World Bank’s Environmental, Health and Safety Regulations.

¹ No civil works were conducted in 2014 and 2015 as: (i) works for subprojects in the original project scope had been completed by 2013; and (ii) baseline assessments were undertaken, for new subprojects that were subsequently included in the project scope. Civil works resumed in 2016.

² <https://www.adb.org/projects/40017-013/main#project-documents>.

9. **Conclusions.** Implementation of the EMP is rated as moderately satisfactory. Most EMP requirements were complied with. This resulted in the construction works meeting the required standards for soil and water protection and occupational and community health and safety. A key exception was that EMRs were not submitted for some years of project implementation (para. 5). Overall, the project has significantly reduced the flood risk and total pollution loads in Jiaozhou City.

LAND ACQUISITION AND RESETTLEMENT

A. Preparation of the Resettlement Plans and Due Diligence Reports

1. The Qingdao Water Resources and Wetland Protection Project (the project) was classified as Category B for involuntary resettlement. A resettlement plan was prepared during the project preparation stage. The resettlement plan was prepared in accordance with the relevant policies of the People's Republic of China (PRC) and the ADB's Involuntary Resettlement Policy (1995).¹ The resettlement plan and the resettlement information booklets were distributed to the affected villages and affected households in July 2008. Summary of the plan was included in the report and recommendation of the president to the Board of Directors which was disclosed on the ADB website in November 2008.

2. The resettlement plan was updated based on the detailed measurement survey and in accordance with domestic regulations and the ADB Safeguard Policy Statement (2009). The updated resettlement plan was approved by Jiaozhou City Government (JCG) and ADB and disclosed on ADB website in March 2010.

3. The project conducted its midterm review (MTR) in 2012. ADB and the JCG agreed on the following changes: part of Yunxi River and whole section of Sanli River were removed from the project because both sections were financed using government funds; revised and expanded Erli River, Yunxi River, Hucheng River, and Wushui River; and added rehabilitation of the tributary of Hucheng River and construction of a monitoring center.

4. Before the MTR, part of the land acquisition related to the changes was done.² An addendum resettlement plan was prepared for the rest of the land acquisition. The addendum resettlement plan was made based on the detailed socioeconomic survey and approved by JCG and ADB and disclosed on ADB website in May 2016.

5. Due diligence was done for the construction of the East Lake (Shaohai Lake), to which the project provided technical support. The due diligence report shows that land acquisition and compensation were in line with national and local policies on resettlement, and affected persons were satisfied with the resettlement. There was no remaining issue on resettlement.

B. Impacts of Permanent Land Acquisition

6. The project occupies a total of 1,783.5 *mu* (119 hectares [ha]) of land according to the government project completion report. Of this, 27.3% (32.5 ha) were collectively-owned land belonging to 10 villages and the others are state-owned land. Actual land acquisition increased by 253% due to the project's change in scope. Detailed information is presented in Table A10. Land acquisition was completed by the end of 2016.

¹ During the project preparation phase, the Safeguard Policy Statement (2009) has not yet been issued.

² Including land acquisition for Erli'he River and Hucheng River, and 635.6 *mu* (42.3 ha) for Yunxi River.

Table A10.1: Land Acquisition Area (*mu*)

Project Component	Original Addendum		Revised	DDR	Actual/Planned		Remarks
	RP	RP	RP		Actual	(%)	
Flood Retention in Erli'he River	30.8	0.0	30.8	296.4	327.2	1,062	Scope expanded
River Rehabilitation							
Yunxi River	0.0	80.8	80.8	653.6	716.4	887.0	Scope expanded
Hucheng River	0.0	0.0	0.0	353.9	353.9		Scope expanded
Sanli River	11.3	0.0	0.0	0.0	0.0	0.0	Cancelled
Wushui River/ Shidong Canal	0.0	192.2	192.2	0.0	192.2	100.0	
Tributary of Hucheng River	0.0	138.8	138.8	0.0	138.7	100.0	Added
Monitoring Center	0.0	50.7	50.7	0.0	50.7	100.0	Added
Urban sewer and drainage							
Urban Sewerage	0.0	0.0	0.0	0.0	0.0		
Urban Drainage	0.0	0.0	0.0	0.0	0.0		
Total	42.1	462.5	493.3	1,303.9	1,779.1	353.0	

DDR = due diligence report, RP = resettlement plan.

Source: Government project completion report, original resettlement plan, addendum resettlement plan, report and recommendation of the President, resettlement monitoring reports, other project documents and communication with the project management office and the consulting firm.

7. All the land was riverside land for public greenery before the project. The project land acquisition did not result to any house demolition nor to any negative impact on livelihoods and income generation of the affected villages. On the contrary, the project improved the livelihoods of the affected villages. Before the project, the collectively-owned land was only for public greenery and did not generate any income. During construction, the land was acquired by the JCG and became state-owned land. The land is still used for public greenery but the villages received compensation for the ownership change. The compensation was used for village public affairs or allocated to individual households, who can use the money for their livelihoods. The villagers in affected villages not only received compensation and improved their livelihoods, but they can now enjoy much better river conditions, better greenery, and better living environment.

C. Impact of Temporary Land Occupation

8. The project temporarily occupied a total of 278 *mu* (18.5 ha) of land, with an increase of 223% than the planned of 86 *mu* (5.7 ha). The temporarily occupied land areas were all riverside greenery areas and not farmland. By relevant regulations, any crop or vegetable is not allowed to be planted on these areas. However, some residents planted some vegetables or temporary crops. Affected young crops and ground attachments had been compensated by local government and/or contractors of civil works following the stipulated compensation rates in the agreed resettlement plan. All the temporarily occupied land areas were restored timely as planned.

D. Villages and People Affected by Land Acquisition

9. The number of people affected by the project's permanent land acquisition was reduced to zero from the planned 51 people due to the project's change in scope. Originally, the project planned to acquire 11.3 *mu* (equivalent to 0.75 ha) of farmland for rehabilitation of the Sanli River, affecting 51 people from 15 rural households in one village. This section was removed from the project following the midterm revisions.

10. The project land acquisition affected 10 villages, which was also the same number as planned.³ Before land acquisition, all the land was collectively-owned and the use rights was not contracted to any individual households. The land acquisition did not negatively affect the livelihood of any individual household. The land compensation was paid to the village committees prior to the land acquisition, which helped facilitate the land acquisition process. The villages used the compensation for village public affairs, helping people in need, and others. The use of the compensation funds were decided and agreed by the villagers.

E. Resettlement Policies and Compensation

11. Compensation rates of land acquisition followed the agreed resettlement plans. The compensation rates were classified into four levels in 2013.⁴ All the rates increased to CNY66,000 per *mu* (\$145,888/ha) in 2016. The rates increased by 13.8% to 57% (Table A10.2). All villages were satisfied with the compensation.

Table A10.2: Compensation Rates for Land Acquisition

Area Code	Planned and Actual Rates before 2015			Actual Rates since 2015 ^a
	CNY/hectare	CNY/mu	Description of area scope	CNY/mu
I	870,000	58,000	Administrative villages within the scope of Beilin railway, NanlinHongkong road, Donglin railway, XilinHangzhou road.	66,000
II	825,000	55,000	All administrative villages under Sanlihe street office, Yunxi street office, Beiguan street office, Zhongyun street office and all administrative villages in the Fu'an street office except Area I and some administrative villages under Yinhai street office, Jiaodong street office and Jiulong town.	
III	720,000	48,000	Other scopes in the Jiaozhou administrative area except area I and II.	

^a Applicable to area codes I, II, and III.

Source: Government project completion report.

F. Disbursement, Allocation, and Utilization of Compensation Funds

12. A total of CNY27.53 million (\$4.05 million) was paid timely to the affected villages. The actual compensation payment is 218% of the planned.⁵ One reason is increased land acquisition

³ Although the work on Sanli River was removed from the project, the number of villages affected by changes to the project scope remained the same.

⁴ In 2013, the land compensation rates in the city area were classified into four levels, varying from CNY42,000/*mu* (\$92,647/ha), to CNY48,000/*mu* (\$105,882/ha), CNY55,000/*mu* (\$121,323/ha) and CNY58,000/*mu* (\$127,941/ha).

⁵ For the addendum resettlement plan made in 2015, the total land compensation is 153% of the planned while the quantity of land acquisition is same as the planned due to increase in compensation rate.

area and increased compensation rate. Land acquisition funds were paid to the affected village committees. The funds were used for the villages' public affairs such as improvement of village roads and construction of village kindergartens and allocated as pension to women older than 45 years and men older than 50 years. The procedure for using the funds is that the village committees propose the schemes first, then the villagers discussed, and finally the schemes are submitted to township governments for approval. The use of the funds was audited by relevant audit departments.

G. Restoration Measures and Entitlements

13. After midterm adjustment, the project needed to acquire more collective land. However, no household or individual was to be affected permanently, as the lands were uncontracted to households and managed directly by villagers' collective organizations. In addition to cash compensation for collective land, young crops and ground attachments, restoration measures and entitlements were also delivered in accordance with the resettlement plans. No one was worse off due to land acquisition instead, all the local residents, particularly the vulnerable groups, significantly benefited from the project, including increased income, reduced flood-related losses, improved living environment, and diversified employment and business opportunities.

H. Institutional Arrangements and Capacity Building

14. The institutional setup for implementation of the land acquisition followed the resettlement plan. The JCG, as the executing agency, assumed the overall responsibility for resettlement. The Jiaozhou project management office (PMO) was in charge of resettlement compensation payment and supervision. The PMO also coordinated the planning, implementation, financing, and reporting of the land acquisition progress to ADB. A resettlement specialist in the project management consulting team was recruited to assist the executing agency, PMO, and implementing agencies to implement the resettlement plan and prepare internal resettlement monitoring reports. An external firm was engaged in 2016 by the PMO to monitor and report the implementation of the resettlement plans. To strengthen the capacity of the executing agency, PMO, and implementing agencies, several training on resettlement implementation and monitoring had been provided by resettlement specialists during the implementation of the resettlement plan.

I. Information Disclosure, Consultation, Public Participation and Grievance Redress

15. The resettlement plan had been uploaded on ADB's website and disclosed to public in the project area. Throughout the project cycle, from preparation to implementation and monitoring and evaluation, a large number of consultations with and participation of the affected people, affected communities, and other project stakeholders were conducted by the project executing agency, implementing agency, consulting firm, individual consultants, external resettlement agency, and external environmental monitoring agencies.

16. The affected people of the affected villages and other stakeholders were consulted during the socioeconomic surveys and have widely participated in the land acquisition discussions, compensation schemes and development of mitigation measures. Every affected household and village committee participated in the detailed measurement survey of the land acquisitions. Their concerns and suggestions were adequately integrated into the resettlement plan. The resettlement plan and the resettlement information booklets were distributed to all the project affected villages and made accessible to all individual households expected to be affected by the land acquisition and temporary land use.

17. A grievance redress mechanism was set up for the affected people with complaint channels that included: village committees, township governments, Jiaozhou PMO, and JCG. The external monitoring agency also could receive and report complaints and appeals during its field visits. The concerned villagers were informed of the grievance redress mechanism and the mechanism was kept functional throughout the implementation of the resettlement plan. No complaints or appeals related to land acquisition and compensation were received and reported.

J. Monitoring and Evaluation

18. The project set up internal and external monitoring and evaluation of implementation of the resettlement plan as follows: (i) the PMO reported the implementation progress of the resettlement plan regularly to the executing agency, which summarized the land acquisition and compensation progress in the quarterly progress reports to ADB; and (ii) a consulting firm was recruited by PMO in April 2016 for conducting external resettlement monitoring and evaluation. The external resettlement monitoring reports were submitted simultaneously to ADB and to the executing agency every 6 months during the resettlement plan implementation. The first semi-annual monitoring report was submitted to ADB in August 2016 and the second was submitted in December 2016. Two external resettlement monitoring reports were disclosed on the ADB website. The delayed recruitment of external resettlement monitor caused inadequate frequencies of monitoring and evaluation on the implementation of the resettlement plan.

K. Conclusions and Lessons Learned

19. The project only acquired uncontracted collective land and did not result in house demolition and negative impacts on the villagers' livelihoods. Land acquisition and compensation were implemented in accordance with the agreed resettlement plan. The affected villages are satisfied with the compensation and entitlements delivered to them.

20. The executing agency and the PMO paid great attention to land acquisition and compensation. Public participation was emphasized throughout the whole process of land acquisition and compensation. Grievance redress mechanism was set up and kept functional during the implementation of the resettlement plan.

21. Best efforts to avoid and/or minimize the land acquisition and resettlement impacts throughout the project can significantly reduce the negative impacts and facilitate the implementation of the project. Timely recruitment of qualified external resettlement monitor is critical to ensure regular monitoring, evaluation, and reporting on the implementation of the resettlement plan.

STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference in Loan/Project Agreement	Status of Compliance
The Loan		
ADB agrees to lend to the Borrower from ADB's ordinary capital resources an amount of forty-five million Dollars (\$45,000,000), as such amount may be converted from time to time through a Currency Conversion in accordance with the provisions of Section 2.06 of this Loan Agreement.	LA, Article II, Section II, para. 2.01 (a)	Complied with. The original loan amount of \$45 million was fully utilized and disbursed.
Executing Agency		
<p>(a) The Borrower, through QMG, shall cause JCG to carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental and public utility practices.</p> <p>(b) In the carrying out of the Project and operation of the Project facilities, the Borrower shall perform, or cause to be performed, all obligations set forth in Schedule 5 to this Loan Agreement and the Schedule to the Project Agreement.</p>	<p>LA, Article IV, Section 4.01</p> <p>PA, Article II, Section 2.01</p>	<p>Complied with.</p> <p>(a) JCG implemented the project with due diligence and efficiency (except with regard to the midterm changes where domestic approval of the changes was significantly delayed) and in conformity with sound practices.</p> <p>(b) Key obligations in LA, Schedule 5 and PA, Schedule were met by JCG.</p>
The Borrower shall ensure that the activities of its departments and agencies with respect to the carrying out of the Project and operation of the Project facilities are conducted and coordinated in accordance with sound administrative policies and procedures.	LA, Article IV, Section 4.03	Complied with. Departments and agencies involved in the implementation of the project performed as required.
The Borrower shall take all action which shall be necessary on its part to enable QMG and JCG to perform their obligations under the Project Agreement, and shall not take or permit any action which would interfere with the performance of such obligations.	LA, Article IV, Section 4.04	Complied with. Obligations of QMG and JCG were performed with the support of the Ministry of Finance.
<p>(a) The Borrower shall cause QMG and, through QMG cause JCG, to exercise their rights under the Onlending Agreements in such a manner as to protect the interests of the Borrower and ADB and to accomplish the purposes of the Loan.</p> <p>(b) No rights or obligations under the Onlending Agreements shall be assigned, amended, abrogated or waived without the prior concurrence of ADB.</p>	<p>LA, Article IV, Section 4.05</p> <p>PA, Article II, Section 2.14</p>	Complied with. The terms of the onlending agreement were adhered to and were not amended.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
<p>(a) JCG shall, promptly as required, take all action within its powers to maintain its corporate existence, to carry on its operations, and to acquire, maintain and renew all rights, properties, powers, privileges and franchises which are necessary in the carrying out of the Project or in the conduct of its business.</p> <p>(b) JCG shall at all times conduct its business in accordance with sound administrative, financial, environmental and public utility practices, and under the supervision of competent and experienced management and personnel.</p> <p>(c) JCG shall at all times operate and maintain its plants, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, public utility, and maintenance and operational practices.</p>	PA, Article II, Section 2.11	Complied with.
<p>Except as ADB may otherwise agree, JCG shall not sell, lease or otherwise dispose of any of its assets which shall be required for the efficient carrying on of its operations or the disposal of which may prejudice its ability to perform satisfactorily any of its obligations under this Project Agreement.</p>	PA, Article II, Section 2.12	Complied with.
<p>Except as ADB may otherwise agree, JCG shall apply the proceeds of the Loan to the financing of expenditures on the Project in accordance with the provisions of the Loan Agreement and this Project Agreement, and shall ensure that all Goods, Works and consulting services financed out of such proceeds are used exclusively in the carrying out of the Project.</p>	PA, Article II, Section 2.13	Complied with. Loan proceeds were used entirely to finance project-related expenditures in accordance with the loan and project agreements.
<p>As the Project Executing Agency, JCG shall be responsible for the overall technical supervision and execution of the Project.</p>	LA, Schedule 5, para. 1	Complied with. JCG assumed all responsibilities of the executing agency during project implementation.
<p><u>Policy Guidance</u> The Borrower shall ensure that the Project Leading Group, which has been established by JCG, headed by the Vice-Mayor and comprising representatives from Jiaozhou City Construction Bureau, Development and Reform Bureau, Finance Bureau, Environmental Protection Bureau, Planning Bureau, Shaohai Artificial Lake Management Bureau, Land Resources Bureau, and Water Resources Bureau, provides overall policy guidance, facilitate interagency coordination, and resolve any institutional problems that may have adverse impact on Project implementation. The Project Leading Group shall meet as often as necessary to ensure that the objectives of the Project are met.</p>	LA, Schedule 5, para. 2	Complied with. A project leading group chaired by the Vice-Mayor and comprised of representatives from various agencies was established by JCG and met as needed to provide guidance and discuss issues affecting project implementation. The PLG met at least 47 times during the course of implementation.
<p>Project Management Office and the Project Manager The PMO, which has been established by JCG, shall have the overall responsibility for implementation of</p>	LA, Schedule 5, para. 3	Complied with. An adequately staffed PMO was established by JCG and was operational during

Covenant	Reference in Loan/Project Agreement	Status of Compliance
the Project and provide administrative and technical support, counterpart staff, documentation and other services that may be required. During Project implementation, the PMO shall also be responsible for coordinating with the design institutes and specialists engaged under the Project. The Borrower shall, through QMG, cause JCG to ensure that the PMO is headed by a Project manager acceptable to ADB, and is appropriately staffed for day-to-day coordination throughout the Project implementation period.		the entire project implementation period.
QMG and JCG shall make available, promptly as needed, the funds, facilities, services, equipment, land and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project.	LA, Article IV, Section 4.02 PA, Article II, Section 2.02	Complied with. QMG made available the funds and all resources necessary to carry out the project.
(a) In the carrying out of the Project, JCG shall employ competent and qualified consultants and contractors, acceptable to ADB, to an extent and upon terms and conditions satisfactory to ADB. (b) Except as ADB may otherwise agree, all Goods, Works and consulting services to be financed out of the proceeds of the Loan shall be procured in accordance with the provisions of Schedule 4 to the Loan Agreement. ADB may refuse to finance a contract where Goods, Works or consulting services have not been procured under procedures substantially in accordance with those agreed between the Borrower and ADB or where the terms and conditions of the contract are not satisfactory to ADB.	PA, Article II, Section 2.03	Complied with. All consulting services packages were subjected to prior review, and all goods and works were subjected to either prior or post review in accordance with procurement plan provisions, to ensure that winning firms, contractors, and suppliers satisfy the qualification requirements set out in the requests for proposal and bidding documents.
JCG shall maintain, or cause to be maintained, records and accounts adequate to identify the Goods, Works and consulting services and other items of expenditure financed out of the proceeds of the Loan, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof) and to reflect, in accordance with consistently maintained sound accounting principles, its operations and financial condition.	PA, Article II, Section 2.06	Complied with. JCG maintained records and accounts of contracts and expenditures financed by the loan, prepared annual project financial statements, and had these project financial statements audited by the Qingdao Audit Office.
Safeguards Covenants (Environmental)		
<u>Environmental Issues</u> The Borrower shall, through QMG, cause JCG to ensure that (a) the regulations for industrial pollution control and water conservation are enforced strictly; (b) a comprehensive plan for reusing the storm water and treated wastewater is developed, adopted and implemented in a timely manner; (c) the Water Savings Master Plan adopted under the 11th 5-year plan for Jiaozhou is carried out effectively; (d) a community-based monitoring team, acceptable to ADB, is set up to assist with independent monitoring of the environmental impact of the project activities	LA, Schedule 5, para. 5 PA, Schedule, para. 5	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
and, carrying out of the environmental protection awareness education.		
<p>The Borrower shall, through QMG, also cause JCG to ensure that Project facilities are constructed, operated, maintained, and monitored in strict conformity with (a) all applicable laws, regulations, and standards of the Borrower for environmental protection and ADB's Environment Policy (2002); (b) the environmental mitigation and monitoring measures detailed in the approved EIA, summary IEE, and EMP for the Project are undertaken in strict conformity; and (c) adequate numbers of personnel are engaged to monitor implementation of the EMP, under the guidance of the Jiaozhou Environment Protection Bureau and/or the Jiaozhou City environmental monitoring center.</p> <p>The Borrower shall cooperate closely with ADB in the preparation of the strategic environmental assessment for Jiaozhou Bay under the Technical Assistance, to ensure that appropriate integrated planning methodologies are identified and incorporated in the applicable environmental regulations following approval of the relevant authorities by 2011.</p>	<p>LA, Schedule 5, para. 6</p> <p>PA, Schedule, para. 6</p>	<p>Partially complied with. Internal monitoring to confirm compliance with the EMP and applicable laws was conducted by the construction supervision companies and reported to the project management office through monthly progress reports. External monitoring was conducted by the Jiaozhou environment monitoring station.</p> <p>The strategic environmental assessment was to be undertaken under TA 7219-PRC. The scope of the TA was changed at MTR following a request from QMG to focus on preparing a strategy and blueprint for low carbon development in Qingdao and considering that the many activities related to the development of the strategic environmental assessment were completed using government counterpart funds.</p>
Safeguards Covenants (Resettlement)		
<p><u>Resettlement</u></p> <p>JCG shall ensure that (a) the Resettlement Plan is updated upon completion of the final technical design based on the detailed measurement survey, disclosed to the Affected Persons and submitted to ADB for review and approval prior to award of Works contracts; (b) the Resettlement Plan is implemented promptly and efficiently in accordance with its terms; (c) all land and rights-of-way required by the Project are made available in a timely manner; (d) provisions of the Resettlement Plan, including compensation and entitlements for the Affected Persons are undertaken in accordance with all applicable laws and regulations of the Borrower and ADB's Policy on Involuntary Resettlement (1995); (e) all Affected Persons are given adequate opportunity to participate in resettlement planning and implementation; (f) compensation and resettlement assistance are given to the Affected Persons prior to dispossession and displacement; (g) the Affected Persons are at least as well off as they would have been in the absence of the Project; (h) counterpart funds for land acquisition and resettlement activities are provided in a timely manner;</p>	<p>PA, Schedule, para. 9</p>	<p>Complied with. The resettlement plan was updated and reviewed and approved by ADB and disclosed in the ADB website in March 2010. When a minor change in scope was processed in 2015, the resettlement plan was again updated and was also reviewed and approved by ADB prior to the commencement of the civil works under the scope change. This updated resettlement plan was disclosed in the ADB website in May 2016.</p> <p>There is no permanent land acquisition under the project. Temporary land acquisition was implemented in accordance with the resettlement plan. Affected persons were satisfied with the compensation rates, and</p>

Covenant	Reference in Loan/Project Agreement	Status of Compliance
(h) any financial obligations in excess of the Resettlement Plan budget estimates are promptly met; and (i) any material change in Project scope during Project implementation is reflected in the Resettlement Plan, the Resettlement Plan is duly updated to reflect such a change and submitted to ADB for review and approval.		compensation were paid to the affected persons in a timely manner.
JCG shall ensure that (a) adequate staff and resources are committed to supervising and monitoring the implementation of the Resettlement Plan, and providing quarterly reports on such implementation to ADB; (b) an independent agency acceptable to ADB is engaged to carry out monitoring and evaluation, and submit to ADB and JCG (i) semi-annual monitoring reports during implementation of the Resettlement Plan, and (ii) a post evaluation report prior to Project completion.	PA, Schedule, para. 10	(a) Partially complied with Resettlement reports were integrated into project progress reports. Consultants submitted a total of 12 quarterly project progress reports to ADB, covering project progress from 2009 to March 2017. (b) An independent agency was recruited in April 2016. The first semi-annual monitoring report was submitted to ADB in August 2016 and the second in December 2016. A resettlement completion report was submitted In March 2017.
JCG shall also (a) ensure that Works contracts clearly specify the requirement to comply with the Resettlement Plan and indicate the respective entitlements for the permanent and temporary impacts to the Affected Persons; (b) supervise contractors to ensure compliance with the requirements of the Resettlement Plan, applicable laws and regulations of the Borrower, and ADB's Policy on Involuntary Resettlement; and (c) ensure that contractors accord priority to the Affected Persons for employment opportunities generated through the Works contracts.	PA, Schedule, para. 11	Complied with. The relevant safeguards provisions were incorporated in all civil works contracts and contractors were supervised by the project management office and supervision companies to ensure adherence to these provisions.
The Borrower shall not award any works contract financed under the Loan prior to approval of the updated resettlement plan by ADB.	LA, Schedule 4, para. 6	Complied with. The resettlement plan was updated in 2010 and in 2016 prior to the award of civil works contracts.
Social Covenants		
<u>Labor and Other Social Issues</u> JCG shall ensure that (a) all applicable labor, health and occupational safety laws of the Borrower are complied with; (b) child labor is prohibited; (c) men and women are paid equally for work of equal value; (d) women are given priority in the employment and training opportunities generated in the Project's construction and operation phases; (e) seventy five (75) percent of the jobs generated by the Project are given to vulnerable groups, with priority being given to women, all other conditions being equal; (f) the community-based monitoring team mentioned in paragraph 8 above is enlisted to monitor selection and	PA, Schedule, para. 7	Complied with. Relevant social safeguards provisions were incorporated in all works contracts. 3,659 unskilled job positions and 159 skilled job positions for local residents were created during project construction. Of the 3,659 local residents who worked for the project, 35% were women, which is significantly higher than the target of 20%; of the 5,000

Covenant	Reference in Loan/Project Agreement	Status of Compliance
recruitment of the construction workers; and (g) compliance with these provisions are closely observed and monitored during Project implementation.		training participants, 65% were women; of the pilot community-based monitoring teams, 73% were women; and of the 110 unskilled workers for project maintenance and operation, 50% are women.
JCG, through the PMO, shall undertake ongoing consultations during the Project implementation period to (a) meet the evolving needs and expectations of the users; (b) increase the awareness of the public about the benefits of the Project; (c) encourage the active involvement of local communities to maximize their support for the Project; (d) promote environmental protection; and (e) raise the social acceptance of tariff increases.	PA, Schedule, para. 8	Complied with. Consultations were conducted during project implementation. One consulting services package was implemented to strengthen community awareness and public consultation among local residents.
<u>Pro-poor Subsidy</u> JCG shall ensure that prior to the implementation of any tariff increases, the City Price Bureau of JCG (a) conducts a comprehensive review to determine the number of poor people, including those living at or below the poverty line, who would be affected by such tariff increase, and the impact of such wastewater adjustments on the poor; (b) prepares a scheme acceptable to ADB, which may include price subsidies or other appropriate measures such as lifeline tariffs, to ensure that the livelihood or standard of living of the affected poor is at least just as good after the tariff increase as it was in the period preceding such increase; (c) holds public hearings to consult with the affected poor; (d) issues a decree before the tariff increase takes effect to ensure that all those affected are provided with subsidy or benefit from other measures taken; and (e) monitors the effectiveness of the subsidy provided or other measures taken.	PA, Schedule, para. 4	Complied with. The water tariff increase, however, was not implemented due to results of the public consultations.
Financial		
The Borrower shall cause QMG to establish, immediately after the effective date, an imprest account at a commercial bank selected by the Borrower and acceptable to ADB. The imprest account shall be established, managed, replenished, and liquidated in accordance with ADB's Loan Disbursement Handbook, and detailed arrangements agreed upon between the Borrower and ADB. The currency of the imprest account shall be Dollar.	LA, Schedule 3, para. 5(a)	Complied with. An imprest account was established at the Bank of Communications Qingdao branch in March 2010. The initial advance and subsequent deposits to the imprest account were made in accordance with ADB's Loan Disbursement Handbook.
The statement of expenditures (SOE) procedure may be used for reimbursement of eligible expenditures for any individual payment not exceeding \$100,000 and to liquidate advances provided into the imprest account, in accordance with ADB's Loan	LA, Schedule 3, para. 5(b)	Complied with. Removal of SOE ceiling was approved by ADB in March 2017 following positive results of the SOE review conducted by PRCM-DU. Such removal was aimed to facilitate

Covenant	Reference in Loan/Project Agreement	Status of Compliance
Disbursement Handbook and detailed arrangements agreed upon between the Borrower and ADB.		liquidation of outstanding advances to the imprest account.
<u>Condition of Withdrawals from Loan Account</u> Notwithstanding any other provision of this Loan Agreement, no withdrawal shall be made from the Loan Account for any part or subcomponent in Schedule 1 to this Loan Agreement until the Borrower submits to ADB the certification that (i) the Onlending Agreements have been duly executed and delivered on behalf of QMG and JCG, and have become fully effective and binding upon the parties thereto in accordance with their terms; and (ii) such Onlending Agreements contain the same financial terms and conditions and other relevant requirements as provided in this Loan Agreement and the Project Agreement.	LA, Schedule 3, para. 7	Complied with. Onlending agreements between JMG and JCG signed on 25 May 2009.
<u>Counterpart Funding</u> Without limiting the generality of Section 4.02 of this Loan Agreement, the Borrower shall, through QMG, cause JCG to ensure that (a) all local and foreign currency counterpart financing necessary for the Project, including cash advances, are provided as and when due to enable completion of the Project activities in the scheduled implementation period; (b) additional counterpart funding is promptly provided for any shortfall of funds or cost overruns; (c) the wastewater entity to be established by JCG adopts and maintains an appropriate financial management system acceptable to ADB.	LA, Schedule 5, para. 4	(a) and (b) Complied with. (c) Not known. An assessment of the financial management system of the entity operating the Beikong wastewater treatment facility was due to be conducted under consulting services contract JCON20.1. It is not clear if this assessment was undertaken or whether the financial management system in operation meets ADB requirements.
JCG shall ensure that (a) all local and foreign currency counterpart financing necessary for the Project, including cash advances, are provided as and when due to enable completion of the Project activities in the scheduled implementation period; (b) additional counterpart funding is promptly provided for any shortfall of funds or cost overruns; and (c) the wastewater entity to be established by JCG adopts and maintains an appropriate financial management system acceptable to ADB.	PA, Schedule, para. 1	ADB loan proceeds and government counterpart funds were provided as and when necessary.
<u>Accounting, Auditing and Reporting</u> The Borrower shall cause QMG to ensure that JCG, through the PMO, (a) establishes and maintains records and accounts that identify Goods and services from the Loan proceeds, financing resources received, expenditures incurred, and use of local funds, in accordance with sound accounting principles and internationally-accepted accounting standards; (b) reviews and consolidates these accounts and has them audited annually in accordance with sound accounting practices by the sovereign audit agency of the Borrower or other auditors acceptable to ADB; (c)	LA, Schedule 5, para. 10	Complied with. Eight audited project financial statements were submitted during project implementation, covering financial years 2010 to 2017. All audit reports had unqualified opinions, and except for one, were submitted on or before 30 June of the relevant year. Quarterly and annual reports were prepared and submitted to

Covenant	Reference in Loan/Project Agreement	Status of Compliance
furnishes to ADB, promptly after their preparation but in any event not later than 6 months after the close of the fiscal year to which they relate, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto (including the auditors' opinion on the use of the Loan proceeds and compliance with the covenants of the Loan Agreement as well as on the use of the procedures for imprest account/statement of expenditures), (d) prepares consolidated quarterly reports indicating progress made, problems encountered during the period, steps taken or proposed to remedy the problems, proposed program of activities and progress expected for the next quarter, and (e) within 3 months of physical completion of the Project, submits to ADB a completion report that describes the achievements in relation to the Project's expected impact, outcomes and outputs.		ADB; a government completion report was prepared but was not submitted in a timely manner and had incomplete information.
(a) JCG shall (i) maintain separate accounts for the Project and for its overall operations; (ii) have such accounts and related financial statements (balance sheet, statement of income and expenses, and related statements) audited annually, in accordance with appropriate auditing standards consistently applied, by the sovereign audit agency of the Borrower or other auditors acceptable to ADB; and (iii) furnish to ADB, promptly after their preparation but in any event not later than 6 months after the close of the fiscal year to which they relate, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto (including the auditors' opinion on the use of the Loan proceeds and compliance with the covenants of the Loan Agreement as well as on the use of the procedures for imprest account/statement of expenditures), all in the English language. JCG shall furnish to ADB such further information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request.	PA, Article II, Section 2.09	Complied with. Eight audited project financial statements were submitted during project implementation, covering financial years 2010 to 2017. All audit reports had unqualified opinions, and except for one, were submitted on or before 30 June of the relevant year.
Economic		
<u>Wastewater Tariff Reform</u> JCG shall ensure that the wastewater fees charged to households, institutions and industries in Jiaozhou are gradually brought, by 2014, to a level that ensures full cost recovery of operation and maintenance, depreciation and financial costs including debt service obligations, and a reasonable profit margin for wastewater treatment.	PA, Schedule, para. 3	Not complied with. A recommendation for increase in wastewater tariffs was made under consulting services contract JCON20.1. In 2018, JCG proposed an increase in tariffs but following public consultation it was not implemented. No increase in tariffs has occurred since project preparation.
<u>Operation and Maintenance</u> JCG shall ensure that, upon completion of the Project, (a) the public utility division of the Jiaozhou	PA, Schedule, para. 12	Complied with. The Jiaozhou Construction Bureau continues to be responsible for the operation

Covenant	Reference in Loan/Project Agreement	Status of Compliance
Construction Bureau is responsible for the operation and maintenance of the Project facilities, including wastewater networks, drainage, river courses management, and also supervision and management of the WWTP; and (b) necessary budget allocations are provided to meet the operation and maintenance costs of the Project facilities during both the Project implementation period and thereafter.		and maintenance of project facilities.
<u>Capacity Extension of Wastewater Treatment Plant</u> JCG shall ensure the capacity of the WWTP is extended by 50,000 m ³ /day nominally, in a phased manner, and the discharge content is raised from Class II to Class IB in accordance with the Amended Urban Wastewater Treatment Discharge Standards, the 21st Notice (2006) of the State Environmental Protection Administration, Beijing, in parallel with the wastewater network extensions to be undertaken under the Project but in any event no later than 2014.	PA, Schedule, para. 2	Complied with.
Anticorruption		
The Borrower shall, and shall cause QMG and JCG to, (a) undertake necessary measures to create and sustain a corruption-free environment for activities under the Project; (b) comply with ADB's Anticorruption Policy (1998, as amended to date); and (c) where appropriate, ensure that relevant provisions of ADB's Anticorruption Policy are included in all bidding documents for the Project. The Borrower (i) acknowledges ADB's right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive and coercive practices relating to the Project, and (ii) agrees to cooperate fully with, and cause QMG and JCG 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. All external costs related to such investigations shall be met by the Project resources.	LA, Schedule 5, para. 7	Complied with. Anticorruption provisions based on ADB's Anticorruption Policy were included in all bidding documents. No incidence of corruption nor complaints from bidders alleging corruption or fraud were reported during project implementation.
Without limiting the generality of the preceding paragraph, the Borrower shall, through QMG, (a) ensure that JCG conducts periodic inspections on the suppliers', contractors', consultants' and other service providers' activities related to the Loan proceeds, fund withdrawals and settlements; and (b) ensure, and cause JCG to ensure, that all contracts financed by ADB in connection with the Project include provisions specifying the right of ADB to audit and examine the records and accounts of JCG, the PMO, and all suppliers, contractors, consultants and other service providers as they relate to the Project.	LA, Schedule 5, para. 8 PA, Schedule, para. 14	Complied with. (a) JCG through the project management office and construction supervision companies fielded regular inspections of project activities. (b) Such provisions included in all contracts financed by ADB.
QMG and JCG shall, (a) undertake necessary measures to create and sustain a corruption-free environment for activities under the Project; (b) comply	PA, Schedule, para. 13	Complied with. Please refer to status of compliance to LA, Schedule 5, para. 7 above.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
with ADB's Anticorruption Policy (1998, as amended to date); and (c) where appropriate, ensure that relevant provisions of ADB's Anticorruption Policy are included in all bidding documents for the Project. The Borrower (i) acknowledges ADB's right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive and coercive practices relating to the Project, and (ii) agrees to cooperate fully with, and cause QMG and JCG 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. All external costs related to such investigations shall be met by the Project resources.		
In addition to the above requirements, JCG shall also (a) introduce a dual signing system in which the Works contractor awarded a contract also signs an anticorruption contract with the employer; and (b) cause the PMO to set up a Project website that describes the Project and provides the public with information on the Project, including (i) a summary of the audited financial statements of the Project, and (ii) contract awards.	PA, Schedule, para. 15	Complied with. A dual signing system was established and a project website was set up.
Others		
<p><u>Project Performance Monitoring and Evaluation</u></p> <p>The Borrower shall cause QMG to ensure that JCG, through the PMO, establishes and maintains a PPMS, which shall be designed to permit adequate flexibility to adopt remedial action regarding Project design, schedules, activities, and development impacts. The PPMS shall adopt the following agreed indicators: (a) physical progress of the implementation of the parts and subcomponents of the Project, as indicated in Schedule 1 to this Loan Agreement; (b) results of the capacity building program; (c) water quality and quantity improvements in the rivers and Shaohai Lake, Dagu River and Jiaozhou Bay; (d) improvement in biodiversity conservation in Shaohai Lake and Jiaozhou Bay; and (e) social development. At Project inception, the Borrower shall ensure that JCG, through the PMO, develops comprehensive PPMS procedures to systematically generate data on inputs and outputs of the Project activities, as well as the socioeconomic, health and environmental indicators to measure Project impacts.</p>	LA, Schedule 5, para. 11 PA, Schedule, para. 16	Complied with. A PPMS was developed and training given to PMO staff under the loan implementation consulting service contract.
The Borrower shall also cause QMG to ensure that JCG, through the PMO, (a) refines the PPMS framework, confirms achievable targets, monitoring and recording arrangements, and establishes systems and procedures no later than 6 months after Project implementation begins, (b) reports to ADB and QMG, at the requisite time intervals, the baseline and	LA, Schedule 5, para. 12 PA, Schedule, para. 17	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
progress data, and (c) annually reports to ADB and QMG the compliance status of the EMP. The PMO shall be responsible for analyzing and consolidating reported data through its management information system, and for reporting outcomes to ADB and QMG through quarterly progress reports.		
<p><u>Project Review and Progress Reporting</u> In addition to regular monitoring, the Borrower shall, jointly with ADB, review the Project at least once a year. The review shall assess implementation performance and achievement of progress towards Project outcomes and outputs, financial progress, and issues and constraints affecting implementation, and work out a time-bound action plan for their resolution. The Borrower shall also, jointly with ADB, undertake a midterm review to assess implementation status and take appropriate measures, including modification of scope and implementation arrangements, and reallocations of Loan proceeds, as appropriate, to achieve the Project's outcomes and impact.</p>	LA, Schedule 5, para. 13	Partially complied with. During the project implementation period from 2009 to 2017, an inception mission, a midterm review mission, and six review mission were fielded by ADB. No review missions were fielded in 2014 and 2015 when PMO was processing domestic approval of the scope change, but ADB kept in close contact by phone and by email.
JCG shall enable ADB's representatives to inspect the Project, the Goods and Works financed out of the proceeds of the Loan, all other plants, sites, properties and equipment of JCG, to the extent applicable to the Project, and any relevant records and documents.	PA, Article II, Section 2.10	Complied with. ADB review missions were positively received and inspection visits to project sites were easily arranged.
(a) JCG shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the Loan and the expenditure of the proceeds thereof, (ii) the Goods, Works and consulting services and other items of expenditure financed out of such proceeds, (iii) the Project, (iv) the administration, operations and financial condition of JCG, and (v) any other matters relating to the purposes of the Loan.	PA, Article II, Section 2.08	Complied with. Progress reports and audited project financial statements were submitted to ADB.
(b) Without limiting the generality of the foregoing, JCG shall furnish to ADB quarterly reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the quarter under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following quarter.	PA, Article II, Section 2.08	Partially complied with. Progress reports were submitted but not always on a quarterly basis.
(c) Promptly after physical completion of the Project, but in any event not later than 3 months thereafter or such later date as ADB may agree for this purpose, JCG shall prepare and furnish to ADB a report, in such form and in such detail as ADB shall reasonably request, on the execution and initial operation of the Project, including its cost,	PA, Article II, Section 2.08	Partially complied with. The government PCR was not submitted in a timely manner. It was submitted in January 2018 and was incomplete.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
the performance by JCG of its obligations under this Project Agreement and the accomplishment of the purposes of the Loan.		

ADB = Asian Development Bank, EIA = environmental impact assessment, EMP = environmental management plan, FY = financial year, IEE = initial environmental examination, JCG = Jiaozghou City Government, LA = loan agreement, m³ = cubic meter, PA = project agreement, PCR = project completion report, PMO = project management office, PPMS = project performance management system, PRCM-DU = People's Republic of China Resident Mission - Disbursement Unit, QMG = Qingdao Municipal Government, RP = resettlement plan, SOE = statement of expenditure, WWTP = wastewater treatment plant.

Source: Asian Development Bank.

ECONOMIC ANALYSIS

A. Introduction

1. The economic analysis of the project completion review (PCR) utilizes the economic model prepared at the midterm review (MTR) of the project in 2012.¹ The MTR model was based on the world price numeraire. Benefit and cost data and assumptions, and economic parameters have been reviewed and updated as appropriate for the PCR analysis.

2. All benefit estimates and actual annual costs of the project have been updated to end-2018 values based on the implicit gross domestic product (GDP) deflator from which escalation factors have been estimated and applied for individual years.² For benefits, these factors have been applied to the MTR benefit estimates which were valued in 2012 prices. For costs, they have been applied to the actual yearly costs incurred for each year from the commencement of the project in 2009. For the PCR analysis, a standard conversion factor (SCF) of 0.9319 has been estimated (Table A12.1).

Table A12.1 Derivation of the Standard Conversion Factor

Item	Value 2018 (\$)	Rate
Total Imports of Goods and Services /a	1,843,792,938,795	
Total Exports of Goods and Services /a	2,263,370,504,301	
Import Duty at 3.8% /b	70,064,131,674	3.80%
Sales Tax on Imports at 12.5% /c	229,920,979,468	12.47%
Subsidy on Imports at 0%	-	0.00%
Net Value of Taxes on Imports (NVTM)	299,985,111,142	
Export Duty /d	-	0.00%
Export Rebates	-	
Net Value of Taxes on Exports (NVTX)	-	
Exports + Imports	4,107,163,443,096	
Imports + NVTM	2,143,778,049,937	
Exports - NVTX	2,263,370,504,301	
Standard Conversion Factor (SCF)	0.9319	
Shadow Exchange Rate Factor (SERF)	1.0731	

a. United Nations Comtrade <https://comtrade.un.org/data/>

b. World Bank. Weighted average 2017. <https://data.worldbank.org/indicator/TM.TAX.MRCH.WM.AR.ZS>

c. <https://customsdutyfree.com/china-customs-and-import-duty-tax-calculation-method/>

d. KPMG. <https://home.kpmg/cn/en/home/insights/2019/03/china-tax-alert-08.html>

Standard Conversion Factor (SCF) = $[M+X / (M+Tm)+(X-Tx)]$

Shadow Exchange Rate Factor = $1/SCF$

3. The PCR analysis is based on a 25-year cash flow 2009–2033, from which the economic internal rate of return (EIRR) has been calculated.

¹ The PCR analysis utilizes the same excel model used for the MTR analysis. The excel file is available on request.

² The implicit gross domestic product deflator is derived from World Bank. 2019. World Development Indicators. Washington.

B. Benefits

4. Three sources of benefits have been assumed: reduced flood damage, reduced health related losses and costs, and reduced wetland degradation.

5. **Reduced flood damage.** Benefits of reduced flood damage are based on the recorded cost of damage resulting from the flood in 2001, which was estimated to have been a 1-in-30-year flood. The cost of flood damage was estimated at CNY158.0 million in 2001. This was escalated based on: (i) annual changes in the consumer price index (CPI), and (ii) the annual rates of growth in Jiaozhou City industrialization and urbanization reported for the period of 2005 to 2007 in project preparation reports, which ranged from 25.3% to 29.4%. Annual nominal rates of growth were reduced over time: 27% (2005–2007), 20% (2008–2011), 14% (2012), 10% (2013), and 7% (2014). These nominal rates of growth were converted to real annual rates of growth by application of the CPI rates of inflation for 2001 to 2012 and ADB estimates of PRC inflation for 2013 and 2014. From 2014 onwards, a real annual rate of growth of 3.4% was applied to determine the estimated cost of flood damage for 2014 to 2033.

6. Annualized values of flood damage were calculated from the estimated damage for three flood return periods: a 1-in-3-year flood with a return probability of 33.3%, a 1-in-30-year flood with a return probability of 3.3%, and a 1-in-50-year flood with a return probability of 2.0% (Table A12.2). The 1-in-3-year flood was assumed to cause no damage and the annual value of damage was set to zero. The annual value of damage resulting from a 1-in-30 flood was estimated from the actual, updated 2001 flood damage values. In the absence of recorded costs of damage for a 1-in-50 flood, the annual value of damage from the 1-in-50-year flood was estimated on the basis of the actual damage from the 2001 1-in-30-year flood. Based on hydrological calculations of potential flood area and depth for a 1-in-50 year flood compared with a 1-in-30 year flood, a ratio of 1.9887 was used to increase the damage costs of the 1-in-30-year flood to obtain the damage cost of a 1-in-50-year flood.³ Using the estimated value of damage per flood and the flood return probability, an annualized value of damage has been estimated. Table A12.2 illustrates the calculation for 2009 taken from the data used in the MTR model. The estimated annualized value has been updated to 2018 values using the implicit GDP deflator (para. 2).

**Table A12.2: Calculation of Estimated Flood Damage and Probability of Return
(2009 Values)**

Item	Return Probability (%)	Value of Damage (CNY million)
1-in-3-year flood	33.33	0.0
1-in-30-year flood	3.33	503.0
1-in-50-year flood (equal to CNY503.0 million x 1.9887)	2.00	1,000.3
Annualized value of damage		36.76

CNY = Chinese yuan.

Source: Asian Development Bank.

7. According to information provided by the project management office (PMO), flood retention works were completed by the end of 2010. While river training/rehabilitation works were not completed until the end of 2016, the PCR analysis assumes that flood protection benefits

³ The basis of the calculation of the ratio is provided in the excel model.

accrued from 2011 onwards. This is borne out by the fact that, according to the PMO, there has been no incidence of flooding since the commencement of the project.

8. **Reduced health related losses and costs.** The assessment of the benefit of reduced losses of income and health care costs associated with ill health is based on projected with-project annual health care costs following project implementation minus estimated without-project annual health care costs. Without-project health care costs are estimated from data of the Jiaozhou Health Bureau and from a socioeconomic survey undertaken during project preparation. Estimates for 2009 are as follows:⁴

- (i) An estimate of annual project area population in the period 2003–2007, equal to 230,000 persons in 2007.
- (ii) Projected project area population from 2008 to 2033 based on the average annual growth rate estimated from 2003–2007 project area population estimates, equal to 234,691 in 2009.
- (iii) Calculation of the average annual incidence of water-related illness based on actual incidences reported for Jiaozhou for five illnesses (hepatitis, dysentery, typhoid, diarrhea, and other stomach illnesses) over the period 2003–2010.⁵ Equal to 4.94%.
- (iv) Application of the average annual change in incidence for Jiaozhou as a whole (4.94%) to the projected project area population to estimate the number of people in the project area suffering illness during 2008–2033. In 2007 the incidence of illness was 4.382% and the project area population 230,000, resulting in the number of affected persons of 10,079. For 2008 onwards the number of affected persons is increased by the average annual increase in incidence of 4.94%. In 2009, the number of affected persons was estimated at 11,099.
- (v) An estimate of the average number of working days per year lost to illness (20 days) for each of three elements of the working population: a working adult, a child working part time, and retired person working part time. The total income foregone per working day lost comprises three elements: (a) the income per day of a working adult (according to MTR model data, CNY90 per day in 2012 prices), (b) the income per day of a child working part time, valued at 50% of the adult income per day, and (c) the income per day of a retired adult working part-time, valued at 50% of the adult income per day.
- (vi) An estimate of the average cost of medical treatment for each occurrence of illness, assumed to be the same for an adult, working child and working retired person, at CNY660 per treatment in 2012 prices, according to MTR model data.
- (vii) The total cost per year of illness for an adult, a working child and a working retired person calculated as the sum of income foregone and the average cost of treatment. Equal to CNY2,460 per adult (20 working days at CNY90 per day plus CNY660 medical treatment), and CNY1,560 per child and retired person (20 working days at CNY45 per day plus CNY660 medical treatment).
- (viii) An estimate of the number of adults, working children and working retired people in the total number of affected people ([iii] above) by applying the reported distribution of population in Jiaozhou: adults 54%, children 32%, and retired 14%. In 2009, equal to 5,993 adults, 3,552 children, and 1,554 retired people.

⁴ Calculations for all years in the cash flow are in the excel model.

⁵ Investigations during project preparation indicate that poorer household do not necessarily access formal medical facilities or report incidence of illness. The estimate therefore underestimates the actual incidence of illness.

- (ix) An estimate of the total cost per year for each category of working people. In 2009, adults CNY14,742,780, children CNY5,542,120, and retired people CNY2,424,240.
- (x) Conversion of financial cost to economic values by applying conversion factors. The SCF (0.9139) has been applied to the cost of medical treatment and the conversion factor for surplus labor (0.8387) has been applied to income foregone for each category of working population. This results in an economic cost of medical treatment of CNY615.05 and income foregone per day of CNY75.48 for adults and CNY37.74 for children and retired people. The corresponding annual cost is CNY2,124.65 per adult (20 working days at CNY75.48 per day plus CNY615.05 medical treatment), and CNY1,369.85 per child and retired person (20 working days at CNY37.78 per day plus CNY615.05 medical treatment).
- (xi) An estimate of the total cost per year in economic terms for each category of working people. In 2009 for the estimated number affected people, adults CNY12,733,027, children CNY4,865,707, and retired people CNY2,128,745, resulting in a total cost for the year of CNY19,727,482.

9. The same methodology is applied for the estimation of with-project losses of income and health care costs but they are applied to a smaller number of affected people. It is assumed that in 2009 and 2010, the number of people affected by illness remained unchanged. In 2011, the number was reduced by 10%, in 2012 by 20%, and in 2013 until 2033 by 40%. These percentage reductions are applied to the projected without-project number of affected people. The difference between without- and with-project costs of income losses and health care costs represents the incremental benefit attributable to the project. This annual incremental benefit was updated to end 2018 values by application of the implicit GDP deflator escalation factors.

10. **Reduced wetland degradation.** The estimation of benefits from the reduction in wetland degradation following project implementation is based on the estimated area of wetlands in the project area (2,500 hectare [ha]), the value attributable to wetland areas per ha, and a slowing of the rate of wetland degradation that would occur without the project.

11. The value attributable to wetland areas derives from multiple sources. Direct use/value comprises raw material extraction, recreational use and cultural use. Indirect value comprises disturbance regulation, nutrient cycling, biological control and habitat/refuge. The estimated annual value of each was derived from estimates of their value in United States (US) dollars per ha per year made for 1994. The total annual financial value in 2012 prices amounted to CNY35,190 per ha. This was converted to an annual economic value of CNY32,794 per ha by application of the SCF, and escalated to 2018 values by application of the implicit GDP deflator. In the without-project scenario, it was assumed that the rate of wetland degradation was 0.9% per year based on observations over the period 1952–2000. Over the period 2009–2033, it was estimated that at this rate the area of wetland would decline from 2,500 ha to 1,994 ha, and the corresponding economic value of the wetland from CNY81.25 million per year to CNY65.40 million per year.

12. The assumed benefit of the works undertaken under the project was to reduce the rate of wetland degradation by 50%, to 0.45% per year. It was estimated that this would be achieved on a phased basis, beginning with a 5% reduction in the annual rate of degradation in 2014, reaching the 50% reduction in the rate of degradation by 2018. It was assumed that no further reduction in the rate would occur after 2018. On this basis, the area of wetland would fall to 2,161 ha with an annual economic value of CNY70.86 million. This represents a saving of 167 ha of wetland by 2033 and an incremental economic value of CNY5.46 million in 2033.

C. Costs

13. Total project costs have been estimated at \$106.9 million, excluding financial charges during implementation. No information is available from the PMO upon the phasing of costs financed by counterpart funds. To obtain the annual phasing of total project costs, annual disbursements by ADB for each expenditure category reported in the Loan Financial Information System have been gathered to determine the annual phasing in percentage terms. These annual percentages have been applied to total project costs to obtain annual project costs by expenditure category. These have been updated to 2018 values and converted to annual CNY values by applying the average annual exchange rate between the US dollar and Chinese yuan derived from ADB's Key Indicators.

14. Estimates of actual project operation and maintenance (O&M) costs, following completion of the project, are not available from the PMO. For the purposes of the PCR analysis, the estimates of economic O&M costs in the MTR model have been used in the PCR analysis. These have been updated to 2018 values.

D. Economic Analysis

15. The EIRR estimated in the PCR analysis is 8.3%. A summary economic cash flow is in Table A12.3. This compares with an EIRR at appraisal of 14.7%. The PCR EIRR indicates that the project was *less than efficient*. The project has significant unquantified benefits in terms of increases in real estate values, increased commercial activity, improved living standards of project area residents, and reduced income foregone and health costs of poorer families that would not normally access official health care services and are not recorded in health statistics. Such unquantified benefits would likely raise the EIRR under the PCR analysis to a rating of *efficient*.

Table A12.3: Summary Economic Cash Flow
(CNY million)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2033
Benefits											
Reduced flood damage	0.00	0.00	47.90	51.44	53.39	54.82	56.63	58.00	58.03	59.99	66.28
Reduced income losses and health care costs	0.00	0.00	2.37	4.88	10.06	10.48	10.99	11.43	11.61	12.18	25.09
Reduced wetland degradation	0.00	0.00	0.00	0.00	0.00	0.04	0.15	0.32	0.58	0.92	5.46
Total benefits	0.00	0.00	50.28	56.32	63.45	65.34	67.77	69.75	70.22	73.09	96.84
Costs											
Investment											
Civil Works	702.18	0.00	82.09	141.72	130.81	28.98	0.00	35.27	283.32		
Vehicles	2.16	0.00	0.00	0.00	0.00	2.16	0.00	0.00	0.00		
Equipment	17.68	0.00	2.39	5.96	0.87	1.40	0.00	0.75	6.31		
Consulting services - Implementation support	22.15	0.00	1.18	3.74	0.95	0.00	0.00	16.28			
Total Investment Cost	744.16	0.00	85.66	151.42	132.63	32.54	0.00	36.01	305.91	0.00	0.00
Total Operation and Maintenance Cost	0.00	2.44	13.60	13.32	15.15	17.11	17.09	16.93	16.39	16.39	16.39
Total Costs	0.00	88.09	165.01	145.95	47.69	17.11	53.11	322.84	16.39	16.39	16.39
Net Economic Benefit	0.00	(88.09)	(114.74)	(89.62)	15.77	48.23	14.66	(253.09)	53.83	56.70	80.45
Economic Internal Rate of Return	8.3										