



## Extended Annual Review Report

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Project Numbers: 42936-014 and 46921-014  
Investment Number: 7375  
Loan Numbers: 2627 and 2933  
December 2019

Longjiang Environmental Protection Group Co., Ltd.  
Songhua River Basin Water Pollution Control and  
Management Project Private Sector Facility,  
Phases 1 and 2  
(People's Republic of China)

This is an abbreviated version of the document, which excludes information that is subject to exceptions to disclosure set forth in ADB's Access to Information Policy.

Asian Development Bank



## CURRENCY EQUIVALENTS

Currency Unit – Yuan (CNY)

	At Appraisal		At Project Completion
	16 April 2010 Phase 1	8 November 2012 Phase 2	3 November 2016
CNY1.00	= \$0.15	= \$0.16	\$0.15
\$1.00	= CNY6.8268	CNY6.29	CNY6.6006

## ABBREVIATIONS

ADB	– Asian Development Bank
EARD	– East Asia Department
EIRR	– economic internal rate of return
EPB	– Environmental Protection Bureau
ESMS	– environmental and social management system
FIRR	– financial internal rate of return
GHG	– greenhouse gas
IPO	– initial public offering
LJEP	– Longjiang Environmental Protection Group Company Limited
PPP	– public–private partnership
PRC	– People’s Republic of China
PSOD	– Private Sector Operations Department
RRP	– report and recommendation of the President
SIHL	– Shanghai Industrial Holdings Ltd.
SRB	– Songhua River Basin
TA	– technical assistance
THHC	– Tsinghua Holdings Company
WACC	– weighted average cost of capital
WWTP	– wastewater treatment plant

## WEIGHTS AND MEASURES

t/d	– tons per day
MT	– metric ton
Kt/day	– kilo tons per day

## NOTES

- (i) The fiscal year (FY) of Longjiang Environmental Protection Group Company (LJEP) ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2015 ends on 31 December 2015.
- (ii) In this report, "\$" refers to US dollars.

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**BASIC DATA**  
**Songhua River Basin Water Pollution Control and Management Project**  
**Private Sector Facility, Phase 1**  
**(LN2627/EI7310-PRC)**

Investee: Longjiang Environmental Protection Group Company Ltd. (LJEP)<sup>1</sup>

<b>Key Dates</b>	<b>Expected</b>	<b>Actual</b>
Screening		1 February 2010
Appraisal		5 February 2010
Preliminary Investment Negotiations		
Board Approval		16 April 2010
Final Negotiations and Investment Agreements		6 December 2010
Disbursement Date		14 December 2010
Final Repayment Date	8 December 2019	3 November 2016
XARR	2017	2019
<b>Project Administration and Monitoring</b>	<b>No. of Missions</b>	<b>No. of Person-Days</b>
Fact-Finding	1	2
Appraisal and Negotiations	3	40
Project Administration	2	7
XARR Mission	1	12

ADB = Asian Development Bank, XARR = extended annual review report.

<sup>1</sup> The phase 1 borrower, Tongfang (Harbin) Water Engineering Co., Ltd. (TWE) was renamed LJEP in 2010.

**BASIC DATA**  
**Songhua River Basin Water Pollution Control and Management Project**  
**Private Sector Facility, Phase 2**  
**(LN2933/EI7375-PRC)**

Investee: Longjiang Environmental Protection Group Company Ltd. (LJEP)

<b>Key Dates</b>	<b>Expected</b>	<b>Actual</b>
Screening		21 June 2012
Appraisal		8 October 2012
Preliminary Investment Negotiations		
Board Approval		8 November 2012
Final Negotiations and Investment Agreements		28 December 2012
XARR	2017	2019
<b>Project Administration and Monitoring</b>	<b>No. of Missions</b>	<b>No. of Person-Days</b>
Fact-Finding	1	2
Appraisal and Negotiations	3	32
Project Administration	1	7
XARR Mission	1	12

ADB = Asian Development Bank, XARR = extended annual review report.

## EXECUTIVE SUMMARY

This extended annual review report covers two projects: Songhua River Basin Water Pollution Control and Management Project Private Sector Facility, Phases 1 and 2. For both projects, the Asian Development Bank (ADB) made a loan to Longjiang Environment Protection Group Company Limited (LJEP) and the sponsor was Tsinghua Holdings Company (THHC). The projects shared common development goals and were undertaken to support LJEP in addressing severe environmental degradation in Songhua River Basin. The loans for both phase 1 and phase 2 were fully prepaid at the same time on 3 November 2016.

Phase 1 involved an equity investment and a loan to LJEP to finance its portfolio of water supply and wastewater treatment plant (WWTP) subprojects in Heilongjiang province. Phase 2 involved a risk-participated loan, which expanded LJEP's operations into sludge treatment and improved the technical parameters of its existing WWTP projects.

The projects were evaluated on the following dimensions: development impacts and outcomes; ADB's additionality; ADB's investment profitability; and ADB work quality. Overall, the development impact is rated *satisfactory* based on the following:

- (i) The contribution to private sector development and ADB strategic development objectives is *satisfactory*.
- (ii) LJEP's economic performance is *satisfactory*.
- (iii) The project's environment, social, health, and safety performance is rated *partly satisfactory*.
- (iv) The project's business success is rated *partly satisfactory*. Commercial operations were slower than projected because LJEP faced difficulties in financing its capital expenditure requirements, which was the result of slower than anticipated increases in demand and tariff levels. But due to the scalable nature of the projects, the company was able to grow in line with the availability of funding.

ADB's additionality is rated *satisfactory*, as its participation played a crucial role in helping the project secure appropriate financing, which is a necessary condition for private-sector operators to secure concession contracts with local governments and ensure that projects are financially viable. ADB's contribution includes matching local currency loans with project revenues at the appropriate tenor and pricing, and adopting a risk participation structure that had a catalytic effect on mobilizing third-party equity and debt. The success of the project showed the feasibility of the financing structure and demonstrated the viability of urban wastewater public-private partnerships (PPPs) in the Songhua River Basin, an area with minimal private sector concession activity at the time.

ADB's investment profitability is rated *excellent*, as interest and principal payments were made on time until both phase 1 and 2 loans were prepaid by LJEP in 2016.

ADB's work quality is rated *satisfactory* based on a satisfactory rating for screening, appraisal, and structuring of the project; monitoring and supervision; and role and contribution.

Key lessons and recommendations are:

- (i) **“One ADB” approach to sovereign–nonsovereign cooperation.** Project identification, selection, and design was heavily influenced by the previous interventions of the East Asia Department (EARD) in the Songhua River Basin.

EARD sovereign assistance was important in preparing the market conditions for LJEP's emergence, especially TA that fostered commitment to a PPP regime and identified specific water and wastewater projects for commercial bidding. The project demonstrates that "One ADB" solutions are possible when upstream conditions are well established and sovereign–nonsovereign synergies are anticipated.<sup>1</sup>

- (ii) **Management of local government counterparty risk.** Municipal oftakers were consistently slow to raise tariffs (despite obligations under LJEP's concessions to do so) and frequently late in fee payments, which resulted in liquidity pressure for the company. LJEP managed these challenges through proactive discussions, flexibility in the timing of its capital expenditures, and ongoing strategic support from the provincial government.
- (iii) **Advantage of having a strong sponsor.** ADB's loan structure, which covered LJEP's entire portfolio and was guaranteed by a creditworthy sponsor, THHC, provided ADB with partial mitigation of credit risk. THHC also provided the needed liquidity to LJEP through guarantees on short-term debt, which gave LJEP the necessary resources to continue with its expansion at a time when long-term financing was difficult to secure for an industry that was new to private sector participation in PRC.
- (iv) **Exit strategy for the equity investment.** Having a good exit strategy and flexibility to exit is essential for optimizing returns on equity investments. ADB's equity investment included a put option that, although not used, strengthened ADB's position to negotiate the sale to a strategic investor.

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<sup>1</sup> Ongoing sovereign operation projects in northeast PRC are strengthening the parallel actions of the private and public sectors to improve the current pollution management and control within the SRB. These are Jilin Urban Development Project, Heilongjiang Green Urban and Economic Revitalization Project, and Jilin Yanji Low-Carbon Climate-Resilient Urban Development Project.

## I. THE PROJECT

### A. Background

1. The Board of Directors of the Asian Development Bank (ADB) approved phase 1 of the project on 16 April 2010. This involved (i) an equity investment, (ii) a corporate A-loan, and (iii) a B-loan, to Longjiang Environment Protection Group Company Limited (LJEP)—formerly Tongfang (Harbin) Water Engineering Co. Ltd. Phase 1 was designed to support LJEP's expansion and capital expenditure plan for water supply and wastewater treatment subprojects in the Songhua River Basin in the People's Republic of China (PRC). The A-loan was signed on 6 December 2010 with disbursement on 14 December 2010, while the equity investment was disbursed on 22 April 2010. The B-loan was not syndicated and was cancelled on 11 October 2018.

2. On 8 November 2012, the Board approved a second corporate A-loan to LJEP (phase 2). Phase 2 built on the success of phase 1 by supporting LJEP in broadening its investment plan. Phase 2 was intended as parallel assistance that avoided overlap with phase 1. It focused on (i) sludge treatment and disposal subprojects, and (ii) upgrades to existing wastewater treatment plants (WWTPs) to meet higher effluent standards. Phase 2 drawdown occurred on 16 May 2013.

3. A guarantee agreement was also signed on 28 December 2012 between ADB and the sponsor, Tsinghua Holdings Company (THHC), covering outstanding amounts under phases 1 and 2.

### B. Project Features

4. **Integrated river basin management.** The projects were an integral part of the basin-wide Songhua water resources management initiative and complemented ADB's sovereign operations to address pollution control in the Songhua River Basin (SRB).<sup>1</sup> Phase 1 supported LJEP's plans to build, rehabilitate, expand, upgrade, privatize, and/or operate water supply and wastewater treatment facilities in the SRB. Phase 2 complemented phase 1 by funding subprojects that address the need for proper and safe disposal or reuse of sludge, which is a by-product of the wastewater treatment facilities.<sup>2</sup> In particular, by supporting the first commercially-operated sludge treatment facility in northeast PRC, phase 2 was designed to serve as a model for future sludge project investments in the SRB. Phase 2 also funded WWTP upgrades that involved improved anaerobic–anoxic–oxic treatment, an activated sludge process commonly used in the PRC to enhance the removal of biological nutrients.

5. **Public–private partnership.** ADB and the Heilongjiang Provincial Government adopted a public–private partnership (PPP) approach to address the significant wastewater treatment funding needs for the SRB. The responsibility for developing water infrastructure in PRC falls on local municipalities, but funding in most locations had been limited. The PPP approach incentivized the private sector to invest in wastewater and sludge treatment. The projects expanded the PPP modality, reforming the delivery of these services through the private sector

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<sup>1</sup> ADB. 2002. *Technical Assistance to the People's Republic of China for Songhua River Water Quality and Pollution Control Management*. Manila (TA 4061-PRC, approved on 19 December). The TA assisted the government in developing its long-term SRB pollution clean-up program. This program has been supported by a series of urban projects under ADB's East Asia Department and by phase 1 of this project.

<sup>2</sup> The sludge subprojects involve dewatering, using stabilizer solutions, and further composting to decompose organic matter present in the sludge, reduce its volume, and condition it for safe disposal or reuse as a fertilizer in urban landscaping in compliance with GB/T 23486-2009 Disposal of Sludge from Municipal Wastewater Treatment– Quality of Sludge Used for Landscaping.

rather than through municipalities. By the end of the two phases, ADB had supported LJEP in implementing 24 concession contracts in water supply and wastewater treatment. The use of PPPs for water supply and wastewater treatment has now become a mature industry in PRC.

6. **Extensive risk participation.** The phase 1 B-loan was in the process of syndication in 2010 but was put on hold because of an unsuccessful syndication, as international banks became selective in choosing credits against the backdrop of tightening liquidity in 2009–2011. Considering the difficulty in syndicating the B-loan for phase 1, phase 2 pursued the possibility of having at least 50% of ADB's principal exposure risk-participated by commercial banks to broaden the project's development impact by catalyzing commercial bank financing. This was successfully completed as risk participation agreements were signed. The resulting total risk participation under phase 2 was for two-thirds of ADB's total A-loan exposure.

7. **Strong sponsor support.** The project loans had a strong sponsor, which was the main driver of the loan structure. ADB imposed cross-default provisions in the loan agreements with other indebtedness of the sponsor, as well as restrictions on change of control and sponsor financial covenants.

8. **Scalability of operations.** LJEP's growth strategy involved capital expenditure for the construction and/or acquisition of franchises. However, funding of capital expenditures has been a major limitation for LJEP. LJEP earlier aimed to optimize its capital structure by listing its shares on the Shanghai Stock Exchange and increasing senior and local debt in step with investment opportunities. LJEP expected to raise at least CNY500 million from an initial public offering (IPO) in 2013 but this did not push through. Instead, the company focused its expansion on Heilongjiang province and adjusted its investment plan in step with its capacity to finance a new construction or acquisition.

### C. Progress Highlights

9. **Phase 1 (Loan).** ADB's funds helped LJEP scale up by 130% during six years of engagement. By the time of phase 1 and phase 2 repayment, the company was operating 55% of Heilongjiang's wastewater treatment capacity. Nonetheless, LJEP underperformed compared to projections, primarily due to slower capital expenditure and lower tariffs than originally anticipated. The delay in phase 1 B-loan syndication because of limited interest from commercial banks had a significant impact on the capital expenditures of the company and continued growth.

10. **Phase 1 (Equity).** ADB's equity investment in LJEP achieved its developmental goals and objectives, which included improving the company's governance structure, as well as its environmental and social management system. Although the IPO was delayed from the original target of 3-5 years, the company has been able to implement an advanced corporate governance structure and has generally adopted listing rules in its decision-making process in anticipation of its planned IPO. Annual reports, company information, and disclosures are prepared to local and international auditing standards. LJEP was also in compliance with ADB's safeguard policies.

11. ADB exited from its equity investment in LJEP in 2014 through a private sale of its 12.1875% total equity stake to an existing shareholder.

12. **Phase 2 (Loan).** ADB's phase 2 loan funded a new sludge project in Harbin (650 tons per day (t/d) total capacity), which started commercial operations in October 2014 and another sludge project (40 t/d total capacity), which started operations in January 2016.

13. Both phase 1 and 2 A-loans were fully prepaid on 3 November 2016.
14. ADB no longer has any exposure in LJEP.

## II. EVALUATION

### A. Project Rationale and Objectives

15. Rapid urbanization accompanied high levels of economic growth in PRC, which in turn took a severe toll on the environment. The expansion and upgrading of public services did not keep pace with the rapid growth. In the past, infrastructure investments focused on major cities in the east and south of the country, while cities in the north and west and in key inland regions such as the SRB experienced widespread pollution caused by the discharge of untreated wastewater. Consequently, water conservation and water sector development were identified as critical priorities in the 12th Five-Year Plan (2011–2015) announced in March 2011. The following aspects of water development were the focus of the Plan: (i) conservation, (ii) reduction of water pollution, (iii) expansion of wastewater treatment capacity, (iv) pipeline network development, (v) waste-to-energy, and (vi) use of alternative water sources (e.g., desalination).

16. While local municipalities are responsible for developing water infrastructure, funding has been limited and the government has continued to aggressively promote PPPs and privatization in water projects. Annually since 2005, the State Council has issued policies encouraging investment in, and the construction and operation of, water treatment plants and water supply networks by private entities, and mandating municipalities to allow such participation.

17. The projects were part of ADB's program for the SRB since its successful technical assistance (TA) project in 2002. The subprojects covered by the projects were linked to the Songhua River Basin Water Pollution Prevention and Control Master Plan, to which the TA provided substantial inputs. The projects were the result of the partnership between ADB's sovereign and nonsovereign operations to address the enormous funding requirements for the sector.

### B. Development Results

#### 1. Contribution to Private Sector Development and ADB Strategic Development Objectives

18. **Improved water quality of the Songhua River Basin.** The original target of the projects was to improve the percentage of the Songhua River that meets at least class III water quality standard from 41% in 2009 to 100% in 2020. Based on information provided by the Ministry of Ecology and Environment, among all 108 water sections along the Songhua River under its national monitoring program, no section met class I standard; 14.8% met class II standard; 53.7% met class III standard; 25.0% met class IV standard; 0.9% met class V standard; and 5.6% failed to meet class V standard.<sup>3</sup>

19. This report does not present quantitative water quality data for the whole SRB or data on waterborne diseases to substantiate achievement of this project objective. Improvements or declines in the water quality and waterborne diseases may not be indicative of the projects' contribution, given that the SRB basin covers more than 500,000 km<sup>2</sup> and flows more than

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<sup>3</sup> Ministry of Ecology and Environment. 2018. *The 2017 Report on the State of the Ecology and Environment in China is hereby announced in accordance with the Environmental Protection Law of the People's Republic of China*. PRC

1,400 km across two provinces. Nonetheless, the two ADB loans supported the construction and operation of WWTPs, which treated an additional 2 million m<sup>3</sup>/day of wastewater, and therefore contributed to reducing water pollution and threats to public health. Although ADB exited from the project in 2016, the projects have demonstrated the viability of WWTPs and sludge treatment facilities.

20. The private sector development impact of the projects is considered *satisfactory*. At the time of entry, LJEP was a private sector firm with majority ownership held by a state-owned enterprise sponsor (and the remainder held by private investment firms). During the years of ADB's assistance, LJEP scaled up to become the dominant wastewater services company in Heilongjiang, operating a large majority of the province's wastewater treatment capacity. ADB's support of a privately-run client that pioneered urban wastewater PPPs in a less-developed province, with visible standards of corporate governance and environmental and social protection, had a demonstration impact.

## **2. Environmental, Social, Health, and Safety Performance**

21. ADB's equity and loan under phase 1 and loan under phase 2 were both categorized as B for environment, B for involuntary resettlement, and C for indigenous peoples under ADB's Safeguard Policy Statement (2009).<sup>4</sup> LJEP established an environmental and social management system (ESMS) and an environmental and social unit at the corporate level, which was responsible for guiding, overseeing, and monitoring social, environmental, occupational, health, and safety management plans under ADB's first loan. Due diligence during the second loan processing confirmed that LJEP's operations and performance were compliant with the requirements of the ESMS and applicable national and local laws and regulations. However, improvements in the implementation of the ESMS were recommended, particularly on the screening and categorization procedures for environmental risks and impacts, the environmental management plan, consultation and information disclosure activities during subproject environmental assessment, and the grievance redress mechanism. Due diligence on sample subprojects also recommended improvements in occupational, health, and safety management onsite.

22. Environmental impacts and risks from construction activities were site-specific and temporary, and mitigated through the implementation of time-bound environmental measures in compliance with the requirements of the ESMS, the approved domestic feasibility study reports, and the environmental impact assessment reports. Monitoring results from the local monitoring stations confirmed that construction activities did not cause air and water pollution. During construction, no exceedances in air quality, water quality, and noise standards or incidents of noncompliance were reported in the annual environmental and social monitoring reports, which were regularly submitted to ADB. Similarly, no fatal incidents or accidents or any occupational, community health or safety issues were reported.

23. LJEP's sludge treatment facilities and WWTPs are located in suburban areas designated as industrial areas and operate under a quality and environmental management system that has been certified to ISO9001 and ISO14001 since 2009. No subproject activities or components were in ADB's prohibited investment activities list. No sample screening inspection tables or environmental assessment checklists were provided for review to confirm categorization of the subprojects. However, none of the six subprojects reviewed caused or is expected to cause significant, adverse, irreversible, diverse or unprecedented environmental impacts beyond the

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<sup>4</sup> ADB. [Safeguard Categories](#).

subproject sites. No environmental management plan was provided for review; hence, the improvements recommended during the due diligence for the second loan cannot be confirmed.

24. LJEP established safety and health management teams at all levels and provides annual training on environmental and social management, health, and safety. In addition, LJEP has implemented two systems to monitor compliance with national and local regulations and standards. First, LJEP subprojects have in-plant laboratories with a continuous emissions monitoring system.<sup>5</sup> This system provides 24-hour real-time effluent monitoring data to the local Environmental Protection Bureau (EPB). Second, LJEP monitors water and soil pollution, noise levels, air emissions, and energy use through its quality and environmental management system, which includes an environmental impact and compliance register, mitigation measures, timelines, and responsible personnel or departments.

25. Public consultations and information disclosures in relation to civil works were conducted following the requirements of PRC's Environmental Impact Assessment Law. During operations, complaints are usually lodged through hotlines in the Mayor's Office and the local EPB. The environmental and social unit is responsible for receiving complaints and coordinating necessary action to ensure timely resolution. Monthly reports on the environmental performance of the WWTPs and sludge treatment facilities are disclosed on the corporate website following the requirements of the concession agreement. Except for the two administrative penalty notices received by LJEP from the local EPB, no complaints related to the operation of the WWTPs and sludge treatment facilities were received from the public.

26. LJEP's ESMS contained procedures for screening and conducting land acquisition and resettlement audits. However, LJEP's due diligence only ascertained whether the local government had possession of the land in accordance with national requirements. To improve its ESMS, corrective actions were recommended during the due diligence for the second loan processing, including, (i) systematically screening future subprojects and liaising with the municipal government to determine if resettlement plans are required, and (ii) conducting meaningful consultations on environmental and social issues related to plant operations with villages where the facilities are located. However, LJEP has not adequately established that it has adopted the required actions and effectively implemented them. Despite having new subprojects, LJEP has not presented how each new subproject was screened and what requirements, if any, were needed. Furthermore, LJEP has posted information about the project in a few public places but has not clearly demonstrated any attempt at conducting meaningful consultations with the community.

27. LJEP did not acquire any additional land and was not engaged in any resettlement activity. Current LJEP-occupied land was obtained from the local governments via certificates of state-owned land use rights. LJEP relies on the local government to undertake land acquisition and resettlement. LJEP confirmed that all compensation was paid for such land and no issues remain. The project did not involve any impact on indigenous peoples and hence did not trigger ADB's safeguard policy requirements.

28. LJEP encouraged civil works contractors to hire workers from the local community. A total of 2,400 workers were hired during construction, 95% of which were locals. During operations, 274 jobs were generated, 15% of which have been given to locals. LJEP confirmed its compliance with the national labor law and the international core labor standards. A workers' association

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<sup>5</sup> The continuous emissions monitoring system (CEMS) monitors the chemical oxygen demand, ammonia number (NH<sub>3</sub>-N), total phosphorus (TN), among others, of the effluent, confirming compliance with the national standards. In January 2018, LJEP included total nitrogen in the CEMS in compliance with the revised monitoring regulations.

organizes sports events and cultural shows for its members and helps those in need (e.g., due to illness).

29. Grievance redress for plant workers is handled by LJEP's human resource management. For community grievances, LJEP established an environmental and social unit to receive and process complaints. No complaints from either the community or workers were recorded.

30. While much has been achieved in relation to environmental and social monitoring and the adoption of ADB safeguard policies, the environmental, social, health and safety performance of LJEP is rated as *partly satisfactory*.

### **3. Business Success**

31. The projects are rated *partly satisfactory* for business success. LJEP has complied with the financial covenants, keeping its historic debt-service coverage ratio, debt to equity ratio, and current ratio within the requirements of the loan agreements.<sup>6</sup> However, its financial performance at the operating and net profit levels has been generally lower than the projections in the report and recommendation of the President (RRP).

#### **C. ADB's Additionality**

32. ADB's assistance played a crucial role in helping the LJEP expand its operations by providing long-term local currency loans. ADB's innovative risk participation structure allowed it to minimize its exposure in LJEP, and enabled international commercial banks and an insurance firm, which have limited experience in financing wastewater plants in the PRC, to participate in long-term financing.

33. When LJEP was established in 2004 to facilitate private sector participation in a predominantly public sector service, wastewater treatment was deemed to have excellent potential for private sector partnership. When ADB provided financing, it was on the basis of LJEP's balance sheet.

34. LJEP chose ADB as a strategic partner to address the call for efficient large-scale wastewater treatment plants because of ADB's strong mandate, reputation, and commitment to the rehabilitation of the Songhua River. ADB's loans were well structured, which minimized the risk of dilution as LJEP expanded its renewable energy portfolio. To address the need of the client for local currency financing at competitive rates, ADB funded its loans through local bonds, which was an innovation for ADB at the time.

35. ADB's additionality is considered *satisfactory*.

#### **D. ADB Work Quality**

36. ADB's overall work quality is rated *satisfactory*. This is based on (i) a satisfactory rating for screening, appraisal, and structuring of the project; (ii) a satisfactory rating for monitoring and supervision; and (iii) a satisfactory rating for role and contribution.

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<sup>6</sup> The debt service coverage ratio is Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) during a 12-month test period over the principal and interest payable during the same period. The debt to equity ratio is debt (the aggregate outstanding principal amount of interest bearing debts of the borrower) over equity (the paid-up capital, share premium, valuation surplus, retained earnings (or retained losses), statutory reserves, and subordinated loans, capital from preference shares, warrants or any other securities or instruments of a similar nature pursuant to the notification of the Securities Exchange Commission). Current ratio is current assets over current liabilities, as reflected in the borrower's audited financial statements.

37. ADB's work quality during appraisal and structuring is considered satisfactory as the Bank took the lead in structuring and negotiating the terms of the legal documentation. The financial structure was innovative in covering certain critical project commercial risks. Phase 2 was one of the first ADB projects that maximized risk transfer, which covered two-thirds of ADB's exposure in the company. ADB's adoption of a risk participation structure enabled the participation of an international bank in financing the project.

38. Monitoring was satisfactory. ADB kept itself informed about the project's implementation through site visits, annual credit monitoring reviews, and various reports submitted periodically by LJEP. These enabled ADB to monitor compliance with its environmental and safeguard policies and loan covenants. Environmental and social monitoring reports are disclosed on the ADB website.<sup>7</sup>

39. ADB's role and contribution is considered satisfactory, having been in line with ADB's country and private sector development strategies. ADB's participation helped showcase the financial viability of wastewater treatment, which helped LJEP expand its franchise area. ADB's role on LJEP's board provided valuable inputs to the company in developing solid corporate governance.

## E. Overall Evaluation

**Table 1: Evaluation of the Songhua River Basin Water Pollution Control and Management System Private Sector Facility, Phase 1 and 2**

Indicator/Rating	Unsatisfactory	Less Than Satisfactory	Satisfactory	Excellent
<b>A. Development Impact</b>				
(i) Contribution to Private Sector Development			✓	
(ii) Economic Performance			✓	
(iii) Environment, Social, Health, and Safety Performance		✓		
(iv) Business Success		✓		
<b>B. ADB Additionality</b>			✓	
<b>C. ADB Investment Profitability</b>				✓
<b>D. ADB Work Quality</b>				
(i) Screening, Appraisal, and Structuring			✓	
(ii) Monitoring and Supervision			✓	
(iii) Role and Contribution			✓	
	<b>Unsuccessful</b>	<b>Less Than Successful</b>	<b>Successful</b>	<b>Highly Successful</b>
<b>Overall Rating</b>			✓	

ADB = Asian Development Bank.

Source: ADB.

<sup>7</sup> However, it should be noted that the Borrower did not submit its E&S monitoring report for 2015 given that prepayment of ADB's loans was forthcoming in early 2016.

### III. ISSUES, LESSONS, AND RECOMMENDED FOLLOW-UP ACTIONS

#### A. Issues and Lessons

40. **“One ADB” approach to sovereign–nonsovereign cooperation.** Project identification, selection, and design were heavily influenced by the previous interventions of the East Asia Department (EARD) in the Songhua River Basin. EARD sovereign assistance was important in preparing the market conditions for LJEP’s emergence, especially TA that fostered commitment to a PPP regime and identified specific water and wastewater projects for commercial bidding. EARD also introduced the company to PSOD for the phase 1 processing and helped ensure that PSOD’s intervention would contribute to important development objectives. The project demonstrates that “One ADB” solutions are possible when upstream conditions are well established and sovereign–nonsovereign synergies are anticipated.

41. **Local government counterparty risk.** Consistent with due diligence findings and RRP risk disclosures, a perennial challenge for LJEP was the performance of Heilongjiang’s city governments as concession partners. Municipal offtakers were consistently slow to raise tariffs (as required under the contracts) and frequently late in payments, which resulted in liquidity pressure for LJEP. The company managed these challenges through proactive discussions, flexibility in the timing of capital expenditures, and strategic support from the provincial government. The company also cited its association with ADB as a help in negotiating for improved contract performance. ADB’s loan structure, which covered LJEP’s entire portfolio and was guaranteed by a creditworthy sponsor, provided ADB with partial mitigation of this risk.

42. **Value of a strong sponsor.** THHC was among PRC’s most prominent investment holding companies. It managed the corporate investments and other financial assets of Tsinghua University, PRC’s leading university for science and engineering. THHC injected significant levels of capital (equity and subordinated debt). THHC also provided the needed liquidity to LJEP through guarantees on short-term debt, which gave LJEP the necessary resources to continue with its expansion at a time when long-term financing was difficult to secure for an industry that was new to private sector participation in PRC.

43. **Effects of international financial markets on catalytic financing.** While the direct loans from local banks and equity from strategic investors were mobilized according to the financing plan, the \$100 million B-loan from international commercial banks was initially attempted for syndication, but this fell through due to adverse conditions in the international financial markets. Many banks pulled out of the deal because of the unfamiliar nature of wastewater treatment projects and unfamiliarity with LJEP. This led to a slowdown in LJEP’s expansion plans and underachievement against projections.

44. **The importance of flexibility in the exit process to realize the capital gain from the equity investment.** [Redacted] ADB’s flexibility in considering the offer and its timely action allowed for a profitable exit from LJEP.

#### B. Recommended Follow-Up Actions

45. Given that ADB no longer has any exposure with LJEP, no further follow-up actions are necessary.

**PROJECT-RELATED DATA****A. Investment Identification**

1. Country	PRC	
2. Loan number	LN2627 and LN2933	
3. Type of Business	Waste management, water supply and sanitation	
4. Project Title	Songhua River Basin Water Pollution Control and Management Project Private Sector Facility, Phase 1 and 2	
5. Investee Company and/or Borrower	Longjiang Environment Protection Group Company Limited (LJEP)	
6. Amount of Approved ADB Assistance	Phase 1 A-loan = CNY250 million Equity = CNY10 million	Phase 2 CNY600 million

**B. Investment Data**

		<b>Phase 1</b>	<b>Phase 2</b>
1. Concept Clearance Approval		1 February 2010	21 June 2012
2. Date of Board Approval		16 April 2010	8 November 2012
3. Signing Date of Legal Documents		6 December 2010	28 December 2012
4. Date of Loan Effectiveness		6 December 2010	28 December 2012
5. Loan Closing Date (end of availability period)			
In Loan Agreement		6 December 2010	2 April 2015
Actual		6 December 2010	27 May 2015
Number of Extensions		-	1
6. Disbursements			
	Initial Disbursement	Final Disbursement	Time Interval
Phase 1	14 December 2010	14 December 2010	-
Phase 2	16 May 2013	27 May 2015	2 years
7. Loan Repayment			
A-Loan	Initial Repayment Date	Final Repayment Date	
Phase 1		3 Nov 2016	
Phase 2	14 July 2015	3 Nov 2016	

**C. Data on ADB Missions**

	<b>No. of Missions</b>	<b>No. of Person-Days</b>
Fact-Finding	2	4
Appraisal and Negotiations	6	72
Project Administration	4	14
XARR Mission	2	24

SHIBOR = Shanghai Interbank Offered Rate, PBOC = People's Bank of China, bps = basis points, RRP = Report and Recommendation of the President

## RESULTS AND RATINGS FOR PROJECT CONTRIBUTIONS TO PRIVATE SECTOR DEVELOPMENT AND ADB STRATEGIC DEVELOPMENT OBJECTIVES—INFRASTRUCTURE

Results Area	Actual Achievements <sup>a</sup>	Rating <sup>b</sup>	Justification	Potential Future Achievements <sup>c</sup>	Risk <sup>1</sup>
<b>1. Within company PSD effects</b>					
1.1 Improved skills: New or strengthened strategic, managerial, operational, technical, or financial skills		Satisfactory	LJEP had first-mover advantage. Company improved market share in Heilongjiang province to ~70%, making it the largest WWTP company in the province.	Expansion within and beyond Heilongjiang province	Low
1.2 Improved business operations: Improved ways to operate the business and compete, as seen in investee operational performance against relevant best industry benchmarks or standards		Satisfactory	LJEP showcased best in class operations and set the industry benchmark		N/A
1.3 Improved governance: As evident in set standards related to corporate governance, stakeholder relations, ESHS fields and/or energy conservation, and their implementation	Governance and Safeguards monitoring	Satisfactory	ADB's equity stake in the company granted ADB a seat on LJEP's Board. ADB was able to influence the adoption of acceptable governance and ESHS standards.		N/A
1.4 Innovation: New or improved infrastructure design; technology; service delivery; ways to cover or contain cost, manage demand, or optimize utilization; improved risk allocation between private company and government; financial structure, etc.	Scalable multi-project loan facility  Local currency financing	Satisfactory	The projects combined several features that were innovative in PRC infrastructure finance and were structured as a multiproject loan facility, in effect bundling small- and medium-sized subprojects to avoid the high transaction costs associated with stand-alone project financing and to diversify risk.  ADB's B-loan was provided in local currency, using renminbi sourced from ADB's renminbi-denominated bond proceeds.		N/A
1.5 Catalytic element: Mobilizing or inducing more local or foreign market financing or foreign direct investment in the company	Unfunded Risk participation	Satisfactory	Phase 1 B-loan syndication started but fell through because of the poor financial market situation in PRC in 2011.		N/A

<sup>1</sup> Given that ADB is no longer involved in the project following full prepayment in 2016, the risk of future achievement for most items is rated N/A.

Results Area	Actual Achievements <sup>a</sup>	Rating <sup>b</sup>	Justification	Potential Future Achievements <sup>c</sup>	Risk <sup>1</sup>
			However, unfunded risk participation for phase 2 allowed private entities to participate in the sector at acceptable terms. Risk participation covered 2/3rds of the ADB A-loan exposure vs the original objective of risk participation of at least 50%.		
<b>2. Beyond company PSD effects</b>					
2.1 Private sector expansion: Contribution by a pioneering or high-profile project that facilitates in its own right, or paves the way, for more private participation in the sector and economy at large	Resource mobilization	Satisfactory	The projects, together with other related ADB sovereign operations, provided good examples of how the government and ADB can mobilize enough resources—from sovereign, quasi-sovereign, multilateral, bilateral, domestic private sector, foreign government, and foreign investors—to address a common development concern and jointly work on a sustainable solution.		N/A
2.2 Competition: Contribution of new competition pressure on public and/ or other sector players to raise efficiency and improve access and service levels in the industry	Improved service delivery	Satisfactory	Industry-setting standards: With LJEP showcasing efficiency and high standards in operating WWTPs, the government was able to impose higher requirements for the operation of new WWTPs	Continued high-level of operations	Medium
2.3 Demonstration effects: Adoption of new skills, improved infrastructure assets and services, more efficient processes, maintenance regimes, improved standards, risk allocation and mitigation beyond the project company	High production efficiencies	Satisfactory	<p>Many wastewater treatment operations before the projects only dried or thickened the sludge before disposing of it in landfills. The projects demonstrated how WWTPs, sludge and WWTP upgrade investments can be commercially and technically viable.</p> <p>ADB's requirements ensured that LJEP operated according to best international practices and adhered to high standards of corporate governance and environmental and social protection, serving as a model for the industry.</p> <p>ADB's experience with the project meaningfully contributed to the dialogue on wastewater sector management and regulation in the PRC and the region.</p>		N/A
2.4 Linkages: Relative to investments, the Project contributes notable upstream or downstream linkage effects to business clients, consumers,	Improvement of suppliers' expertise	Satisfactory	Wastewater treatment was traditionally a government service. LJEP managed to showcase the viability of outsourcing this to the private sector. LJEP is a service provider to the government.	Privatization of more wastewater treatment facilities in the province and other parts of the PRC	Medium

<b>Results Area</b>	<b>Actual Achievements<sup>a</sup></b>	<b>Rating<sup>b</sup></b>	<b>Justification</b>	<b>Potential Future Achievements<sup>c</sup></b>	<b>Risk<sup>1</sup></b>
suppliers, key industries etc. in support of growth					
2.5 Catalytic element: Mobilizing or inducing more local or foreign market financing or foreign direct investment in the sector (beyond the company) through pioneering or catalytic finance	International banks participated in the financing of the LJEP plants.	Satisfactory	<p>The projects provided a pioneering private sector wastewater operator with access to needed finance. This is difficult to obtain from (i) local banks, because of their relative inexperience in the sector and the perception that private sector borrowers are riskier, and (ii) international banks, because of volatility in financial markets.</p> <p>Phase 2 included an unfunded risk participation component, which mobilized cofinancing in an area with little international bank participation to date.</p> <p>ADB's loans were structured to provide a tenor sufficient to allow LJEP to amortize high upfront capital costs over the long life of the assets and ensure its investments were viable.</p>		N/A
2.6. Affected laws, frameworks, regulation: Contributes to improved laws and sector regulation for public-private partnerships, concessions, joint ventures, and build-operate-transfer projects, and liberalizing markets as applicable for improved sector efficiency	Improved government regulations	Satisfactory	The government regulator could impose stricter EPC/safety requirements		N/A
<b>3. Contribution to other ADB strategic objectives</b>					
3.1 Sector development (outputs): Contribution to other sector development outputs and outcomes not captured under point 2., such as capacity or network expansion, etc.	Improved water quality and public health	Satisfactory	Upgrading WWTPs directly supported the government's policy of tightening environmental standards for urban wastewater, improving water quality, and reducing public health risks.		N/A
3.2 Sector development (outcomes): Contribution to other sector development outputs and outcomes not captured under point 2., such as increased infrastructure utilization or consumption, improved in-country connectivity, improved energy security, etc.		Satisfactory			N/A

<b>Results Area</b>	<b>Actual Achievements<sup>a</sup></b>	<b>Rating<sup>b</sup></b>	<b>Justification</b>	<b>Potential Future Achievements<sup>c</sup></b>	<b>Risk<sup>1</sup></b>
3.3 Inclusion: Improved access to, availability, or affordability of infrastructure services for the poor and other disadvantaged groups	Improved access to water for agricultural and industrial use	Satisfactory	SRB usage caters largely for agriculture and industrial use. Improvement of the water quality of the river affects livelihoods and the quality of life in Heilongjiang and Jilin.		N/A
3.4 Job creation: Creation of additional sustainable jobs or self-employment. Distinguish between jobs created within and beyond the company.	Job creation and purchase of local goods and services	Satisfactory	The projects promoted job creation at WWTPs and sludge facilities and spending on local goods and services.		N/A
3.5 Environmental sustainability: Project net impact on GHG emissions. Any other contributions to environmental improvements.	Consistency with CPS	Satisfactory	The projects were consistent with (i) the government's priority of addressing environmental issues including water and air pollution, and (ii) the ADB's water policy and CPS for the PRC. Markets would work more efficiently through urban infrastructure development, promoting environmental sustainability, and pro-poor equitable and inclusive growth.		N/A
3.6 Regional integration: Project contributions to regional cooperation and integration by facilitating trade, cross-border mobility, cross-border power supplies, etc.	Cross-border impact	Satisfactory	Improvements and interventions in the SRB impacted not only PRC, but also neighboring countries.		N/A
4. Overall Rating <sup>e</sup>		Satisfactory			

ADB = Asian Development Bank, CPS = Country Program Strategy, EPC = Engineering Procurement and Construction, ESHS = environmental, social, health, and safety; GHG = greenhouse gas; PPA = power purchase agreement, PRC = People's Republic of China, SRB = Songhua River basin, WWTP = Wastewater Treatment Plant

Source: Asian Development Bank.

## SECTOR REVIEW

1. The projects were developed in line with the 11<sup>th</sup> (2005–2010) and 12<sup>th</sup> (2011–2015) Five-Year plans of the Heilongjiang provincial government. In 2010, the province's population of over 30 million lived in 30 cities, 47 towns, and numerous villages. These required sewage improvement works to increase sewage treatment capacity and improve the quality of the final effluent discharge and the drainage infrastructure. At that time, around 1.2 billion m<sup>3</sup>/year of sewage was being discharged, with just under 40% entering the sewage treatment network.

2. The wastewater treatment industry in the People's Republic of China (PRC) broadly covers influent treatment, sewage treatment, and water recycling (mainly non-potable for irrigation or industrial water reuse). In 2015, around 74 billion tons of wastewater was discharged by PRC's population, industrial users, and other commercial users. Of this, around 67% came from the municipal (mainly household) sector, 25% from industrial sectors, and 8% from other centralized pollution control facilities.<sup>1</sup>

3. After used water is discharged by households or industries, Chinese law requires that the wastewater be collected and treated before being released into the waterways. Municipal wastewater treatment is generally undertaken by local governments, especially in urban areas. Industrial wastewater treatment is often done in-factory or in centralized treatment facilities located within industrial parks.

### A. Wastewater and Sludge Treatment in Heilongjiang

4. The 11th Five-Year Plan aimed to increase wastewater treatment by 70%. With the growing population, forecasted sewage discharge was 4,038,400 m<sup>3</sup>/d by 2015, of which roughly 50% was domestic discharge. This was followed by the 12th Five-Year Plan, which added sludge treatment as a priority for development.

5. According to National Development and Reform Commission (NDRC) reports, PRC's urban municipal wastewater collection network as of end-2015 comprised 540,000 km of drainage pipelines, with sewage, rainwater, and combined pipes accounting for 42%, 38%, and 20% respectively. There were 1,944 municipal wastewater treatment plants (WWTPs) across PRC's urban regions and 1,599 WWTPs across the counties, with daily processing capacities of 140 million and 29 million cubic meters, respectively. The installed base of industrial wastewater treatment facilities in PRC is 83,227, with a daily treatment capacity of 247 million tons.

6. Sludge treatment facilities were required to be constructed for any new WWTP project. Subject to local environmental and technical support, the sludge treatment methodology had to be proposed and agreed to ensure safe and harmless disposal. The Government of the PRC also committed substantial budget to improve WWTPs and extend the sewerage treatment network.

7. Before the project was implemented in 2010, the province had 67 wastewater treatment projects under construction in Heilongjiang province, including the construction of 31 new WWTPs in the Songhua River region. There were also 43 sewage treatment works in Heilongjiang, releasing final effluent to class 2 standard, but no sludge treatment plant. In 2009, Harbin, the capital city of Heilongjiang province, with a population of nearly 4.0 million, had 7 WWTPs with a capacity of 740,000 m<sup>3</sup>/day. The government planned to build 24 WWTPs in the Harbin region

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<sup>1</sup> PRC's Statistical Yearbook on the Environment 2016

under the 12th Five-Year Plan to increase the wastewater treatment capacity by 176,500 m<sup>3</sup>/day, serving a total population of over 9.4 million including the city outskirts.

8. Capacity for sludge treatment, disposal, and reuse remained severely underdeveloped in the PRC. With the rapid expansion of wastewater treatment since the mid-2000s, cities in the PRC faced the challenge of properly managing increasing amounts of sewage sludge. Based on an estimated overall wastewater treatment rate of 70%, WWTPs in the PRC produced about 30 million tons of sludge.

9. More than 80% of the sludge produced in the PRC undergoes only basic treatment. At best, WWTPs minimally thicken, dewater, and dispose of sludge in landfills. Less than 25% of the country's WWTPs are equipped to condition, stabilize, and dewater sludge adequately to remove pathogens, eliminate offensive odors, and effectively reduce its volume. Fewer still transform sludge into a resource for application in agriculture or construction or as fuel. The resulting waste is high in water content and occupies scarce landfill space, contaminating groundwater and land and emitting uncontrolled volumes of greenhouse gases.

## **B. Technology**

10. All technologies employed in Heilongjiang WWTPs follow global industry standards, comply with current national guidelines, and suit local conditions and environments. Equipment and processes include coarse screens, fine screens, grit traps, cyclic activated sludge systems, settlement tanks, and ultra-violet disinfection. For WWTPs already operating at class 1 or 2 effluent standards, stricter standards do not require high technology solutions but, rather, extended processing (i.e., additional coagulation, sedimentation, filtration, and disinfection) in expanded or renovated facilities. Longjiang Environmental Protection Group (LJEP) plans to implement the WWTP upgrades by adopting an improved anaerobic–anoxic–oxic treatment process, which is an activated sludge process commonly used in the PRC and an established technology to enhance biological nutrient removal.

11. For sludge treatment, the PRC's vast territory and the differences between cities make it difficult for the central government to establish rules or policies applicable nationwide. Sludge treatment is often influenced by the options for disposal or reuse in addition to regulatory requirements, available technologies, and operating and transport costs. The most common modes of sludge disposal in the PRC have been landfill and incineration. However, the growing quantity of sludge generated, the scarcity of landfill sites, and the heightened stringency of environmental regulations have made landfill a less suitable disposal option. Incineration was a reasonable alternative, but its high energy costs and related environmental hazards in the form of air pollution and ground contamination are making this option less viable.

## **C. Major Market Players**

12. LJEP started its wastewater treatment business in Harbin in May 2004. LJEP had developed the experience and personnel to operate WWTPs and had approximately 40% market share in the province. By end-2011, LJEP became the leading wastewater treatment company in the province, having around 60% of market share. There was no major competition in the province as most of the other plants were run by local government units.

#### **D. Tariffs**

13. The projects' subprojects were structured as build-operate-transfer concessions with municipal governments, for which concession rights were awarded through public tendering or bilateral negotiation with underlying competitive selection. Subprojects were implemented in accordance with granted approvals and, during construction and operation, subject to government inspections of operational and environmental performance.

14. The concessions included provisions for metered inflow and outflow volumes, contracted minimum offtake quantities, and regulated tariffs. In accordance with national tariff guidelines, tariffs were set on a cost-plus basis, including the costs of treatment, taxes, and specified rates of return. Costs of treatment included capital expenditure and direct expenses from wastewater or sludge treatment (including electricity, chemicals and other materials, and maintenance).

15. The timeliness and amount of mandated tariff increases are subject to some local variation, but the track record of wastewater treatment tariff increases in the PRC is clear, with average tariffs increasing from CNY0.30/ton in 2001 to CNY0.78/ton in 2010 in the 36 largest cities. Tariff risk is mitigated by the high visibility of WWTPs and policy pressure to encourage private sector investments in the sector.

## ENVIRONMENTAL IMPACT

### A. Project Overview

1. ADB's two loans and equity to Longjiang Environmental Protection Group (LJEP)<sup>1</sup> financed the construction, upgrade, and operation of wastewater treatment plants (WWTPs) and sludge treatment facilities. The projects were categorized as B on environment under ADB's Safeguards Policy Statement (2009). They supported the government's objective of alleviating water pollution and water quality deterioration in the Heilongjiang and Songhua river basins through private participation in the provision of public services. LJEP's sludge treatment facilities and WWTPs are in suburban areas designated as industrial areas and are operating with a quality and environmental management system (QEMS) that has been certified to ISO9001 and ISO14001 since 2009. LJEP subprojects have in-plant laboratories in their WWTPs, which conduct environmental quality monitoring and emissions monitoring (through the continuous emissions monitoring system [CEMS]). These provide 24-hour real-time effluent monitoring data to the local Environmental Protection Bureau (EPB) in compliance with applicable national and local regulations.

2. LJEP established an environmental and social management system (ESMS) and a dedicated environmental and social unit (ESU) at the corporate level. The ESU was responsible for guiding, overseeing, and monitoring social, environmental, occupational, health, and safety management plans under phase 1. As part of its due diligence, ADB reviewed the ESMS performance report; documents on plant operations, including internal environmental quality monitoring, consisting of data on air quality, noise, effluent quality, and sludge quality; training records; environmental impact assessment reports (EIRs) and environmental impact assessment tables (EITs); government permits; and approval documents and acceptance inspection reports. During phase 2 processing, LJEP's operations and performance was confirmed to be compliant with the requirements of the ESMS and applicable national and local laws and regulations. However, improvements in the implementation of the ESMS were recommended. These included the screening and categorization procedures for environmental risks and impacts relating to new facilities and/or facilities for upgrade; clearer guidance on environmental assessment report requirements and review procedures, the inclusion of mitigation measures covering the design, construction, commissioning, and operation phases of the environmental management plan; elaboration of consultation and information disclosure activities during subproject environmental assessment; and a grievance redress mechanism that is commensurate with the risks and impacts of the subprojects. Due diligence on sample subprojects also recommended improvements in occupational, health, and safety management onsite.

### B. Review Findings

#### 1. Environmental and Social Management System

3. **Screening, categorization, and review of subprojects.** No subproject activities or components were in ADB's prohibited investment activities list. The ESMS included environmental screening and categorization procedures, but no sample screening inspection tables or environmental assessment checklists were provided for review to substantiate compliance with these procedures and to confirm the categorization of subprojects. However, none of the seven subprojects reviewed has caused or is expected to cause significant, adverse, irreversible, diverse or unprecedented environmental impacts beyond the subproject sites

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<sup>1</sup> Tongfang (Harbin) Water Engineering Co., Ltd. was renamed LJEP in 2010.

(Table A4.1). The subprojects complied with the requirements of PRC's Environmental Impact Assessment (EIA) Law based on industry thresholds.<sup>2</sup> All the subprojects commissioned a third-party EIA institute for the preparation of the EIRs and EITs, and secured the necessary approval documents related to environmental completion and acceptance.

**Table A4.1: Information on WWTP Sludge Treatment and Components Reviewed in 2018**

Name of Project	Wastewater treatment projects						Sludge treatment projects
	Capacity	Receiving water body	Treatment process	Secondary pollution control -NH <sub>3</sub> / H <sub>2</sub> S / odor emission,	Sludge disposal	CEMS <sup>3</sup>	Capacity / Process / Final Product / Residual disposal
Harbin Taiping WTP Project	325,000 m <sup>3</sup> /day	A'shi River into the Songhua River mouth	A/O	Under commissioning, deodorant of the entire process + biological deodorant	Piped to the neighboring Harbin sludge treatment plant (see below)	Yes	
Harbin Wenchang WTP Project	325,000 m <sup>3</sup> /day	A'shi River into the Songhua River mouth	A/O			Yes	
Wenchang Harbin Taiping WTP upgrade project	325,000 m <sup>3</sup> /day from Taiping and 325,000 m <sup>3</sup> /day from Wenchang	A'shi River into the Songhua River mouth	A/O + biofilters + mechanical filtration + UV disinfection			Yes	
A'cheng District WTP Project	50,000 m <sup>3</sup> /day	A'shi River	A <sup>2</sup> /O	Pre-treatment and biological deodorization	Piped to the sludge dewatering facility	Yes	
A'cheng District WTP Phase II	50,000 m <sup>3</sup> /day	A'shi River	A <sup>2</sup> /O			Yes	
Harbin City WWTP Sludge Treatment Project	650 tons/day	-	-	Biological deodorant, liquid agents spray		Yes	High temperature aerobic fermentation to produce compost for landscaping
Mudanjiang Municipal Wastewater Treatment Plant Phase II	100,000 m <sup>3</sup> /day	Mudanjiang River	A <sup>2</sup> /O	Biological deodorization	Dewatering pyrolysis + Anaerobic Digestion	Yes	150 tons/day; Thermal hydrolysis + anaerobic digestion; Producing compost for landscaping; Residue is disposed in landfill

Source: Longjiang Environmental Protection Group Co., Ltd.

<sup>2</sup> Preparation of full EIRs for WWTP subprojects with the treatment capacity of 100,00 m<sup>3</sup> per day or more and preparation of EITs for subprojects with treatment capacity of less than 100,00 m<sup>3</sup> per day.

<sup>3</sup> Continuous emission monitoring system (CEMS) monitors the COD, ammonia number (NH<sub>3</sub>-N), total phosphorus (TN), among others, in the effluent and those parameters complied with the national standards.

4. **Monitoring and Reporting.** Mitigation measures for potential environmental impacts, including monitoring points during construction of the WWTPs and sludge treatment facility were specified in the feasibility study reports (FSRs) and EIRs or EITs. The local monitoring stations and the EPB check on compliance with the requirements specified in the FSRs and EIRs/EITs and conduct air and water quality monitoring at selected monitoring points around the construction sites to ensure that construction activities are not causing poor environmental quality. During operation, LJEP monitors water and soil pollution, air emissions, energy use, and compliance with applicable national and local regulatory standards through its QEMS, which includes an environmental impact and compliance register with mitigation measures, timelines, and responsible personnel or departments. WWTPs and the sludge treatment subprojects have in-house laboratories that conduct daily, monthly, and quarterly monitoring of effluent quality, odor and air emissions, and noise levels at facility boundaries. LJEP allocates CNY7.65 million annually for third-party testing of water, air, and sludge quality and noise monitoring in its WWTP and sludge treatment facilities. The WWTP facilities have a CEMS that provides the local EPB with real-time data on chemical oxygen demand (COD), ammonia (NH<sub>3</sub>-N), and total phosphorus (TN) levels. In January 2018, LJEP included total nitrogen in the CEMS in compliance with the revised monitoring regulations. Monitoring results and the environmental performance of subproject facilities were included in the annual environmental and social monitoring reports submitted by LJEP to ADB.

5. **Organizational Structure and Staffing.** The ESU oversees the environmental and social aspects of each department and subproject, including monitoring construction and operation activities; reporting and disclosing environmental data; coordinating between subproject staff, corporate departments, and the LJEP board on environmental and social aspects; and ensuring the compliance of LJEP's sludge treatment facilities and WWTPs with regulatory requirements. The ESU consisted of senior engineers and staff with an industry-relevant academic and professional background such as environmental science, water and wastewater treatment, and chemical analysis. The ESU has a dedicated staff in charge of environmental and social affairs and health and safety.

6. **Capacity Strengthening.** LJEP established a safety and health management team at all levels. The relevant departments, together with the Human Resources Management Department, conduct training courses on environmental and social management, safe production, hazardous chemical specifications, sludge disposal technology, environmental inspection, safety management, and sewage treatment technology, among others. LJEP conducts induction training and safety education for new staff.

7. **Public Consultation, Information Disclosure, and Grievance Redress.** Public consultation and information disclosure in relation to civil works were carried out following the requirements of PRC's EIA Law. The public usually lodge their complaints through the hotlines maintained by the Mayor's Office and the local EPB. The ESU is responsible for receiving complaints and coordinating the necessary action to ensure timely resolution. Monthly reports on the environmental performance of the WWTPs and sludge treatment facility are disclosed on the corporate website following the requirements of the concession agreement.

## 2. Environmental Impacts from Construction and Operation of Subproject Facilities

8. **Construction phase.** Environmental impacts during construction include dust generation; soil erosion, spoil generation, and disturbed vegetation from stripping and excavation works; noise

and vibration; generation of domestic and construction waste and wastewater; and air emissions and traffic disturbances from the operation and movement of heavy equipment and construction vehicles. The construction of subproject facilities also posed risks to workers' and the surrounding community's health and safety. These typical impacts and risks from construction activities were site-specific and temporary and were mitigated through the measures in the approved FSRs and EIRs. LJEP, through its ESU and subproject staff, supervised construction activities and ensured that contractors implemented the time-bound environmental protection measures in the approved EIRs. Results of air and water quality monitoring conducted by the local monitoring stations confirmed that construction activities for the subprojects did not cause air and water pollution. During the construction, no exceedance or noncompliance was reported in the annual environmental and social monitoring report submitted to ADB.

9. **WWTP Operations.** The WWTPs use the following biological nutrient removal processes that are common in PRC: cyclical activated sludge system, anaerobic-anoxic-oxic process (A2/O), and anaerobic-anoxic-oxic process disinfected by ultra-violet radiation prior to discharge to A'Shi and Mudanjiang rivers, which are tributaries of the Songhua river. These WWTPs are designed to meet the class 1B or class 1A effluent standard under the PRC's Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant (GB 18918-2002) and its amendment. WWTP facility expansion and/or upgrade raises the effluent quality standard of each WWTP by installing the A2/O treatment process, denitrification biofilters, rotary disc filers, and UV disinfections.<sup>4</sup> Table A4.2 presents the effluent standards under GB 18918-2002 Effluent Discharge Standard from Municipal Wastewater Treatment, which were met by the WWTPs.

**Table A4.2: GB 18918-2002 Effluent Discharge Standard from Municipal Wastewater**

Parameter	GGBB 18918-2002		
	Class 2 Standard	Class 1B Standard	Class 1A Standard
COD (mg/l)	≤ 100	≤ 60	≤ 50
BOD <sub>5</sub> (mg/l)	≤ 30	≤ 20	≤ 10
SS (mg/l)	≤ 30	≤ 20	≤ 10
Oil & grease (mg/l)	≤ 5	≤ 3	≤ 1
Petroleum hydrocarbon (mg/l)	≤ 5	≤ 3	≤ 1
Anionic surfactants (mg/l)	≤ 2	≤ 1	≤ 0.5
TN (mg/l)	---	≤ 20	≤ 15
NH <sub>3</sub> -N (mg/l)	≤ 25 (30 when water T ≤ 12oC)	≤ 8 (15)	≤ 5 (8)
TP (mg/l)	≤ 3	≤ 1	≤ 0.5
Color (dilution factor)	≤ 40	≤ 30	
pH	6 – 9		
Fecal coliform bacteria (count/l)	≤ 10 <sup>4</sup>	≤ 10 <sup>4</sup>	≤ 10 <sup>3</sup>

Source: Longjiang Environmental Protection Group Co., Ltd.

<sup>4</sup> Typical facility upgrades improved effluent standard from Class 2 to Class 1B and from Class 1B to Class 1A.

10. Table A4.3 presents the ambient air emissions and noise monitoring results monitored by the EPB.

**Table A4.3: Emissions and Noise Monitoring Data Provided to ADB in 2018**

Project name	Odor	H <sub>2</sub> S mg / m <sup>3</sup>	Ammonia mg / m <sup>3</sup>	Methane %	Continuous daytime equivalent sound level (dBA)	Night continuous equivalent sound level dBA)
<i>Standard limits</i>	20*	0.06*	1.5*	1**	60***	50***
Harbin Taiping	14 to 16	0.003 to 0.004	0.21 ~ 0.38	0.10-0.48	54.3 - 53.5	42.4 ~ 43.7
Harbin Wenchang	12 to 17	0.002 to 0.004	0.21 ~ 0.41	0.12-0.68	53.8 - 54.4	41.5 - 43.9
A'cheng phase 1	13 to 16	0.002 to 0.004	0.21 ~ 0.39	0.20-0.32	51.7 - 54.1	42.8 - 43.7
A'cheng phase 2				0.18-0.31		
Harbin sludge treatment plant	12 to 17	0.002 to 0.004	0.21 ~ 0.41	0.45-0.87	54.2 - 56.4	42.5 - 43.8
Mudanjiang Municipal Wastewater Treatment Plant Phase II	12 to 16	0.002 to 0.003	0.21 to 0.40	0.06-0.43	51.2 - 52.4	41.4 - 43.9

Note: \* GB 18918-2002 Effluent Discharge Standard from Municipal Wastewater

\*\* GB145549-93 Emission Standards for Odor Pollutants

\*\*\* GB12348-2008 Emission Standard for Industrial Enterprises Noise at Boundary

Source: Longjiang Environmental Protection Group Co., Ltd.

11. **Sludge treatment facility operations.** In 2012, Harbin Wenchang Wastewater Treatment Plant and Taiping Wastewater Treatment plant were ordered to treat the sludge produced from their operation. LJEP was publicly denounced in 2013 by the Ministry of Environmental Protection, now called the Ministry of Ecology and Environment, for the slow progress of its sludge treatment plant construction in Harbin. After delays caused by preliminary design issues, construction adjustments, and a long government review and approval process, the Harbin City WWTP Sludge Treatment Project was constructed and passed the environmental protection acceptance check and started operations in October 2014. The facility treats 650 tons of sludge per day using thermophilic aerobic fermentation composting technology with water content of 24% in compliance with the standards under GB/T 24600-2009 Disposal of Sludge from Municipal Wastewater Treatment – Quality of Sludge Used in Land Improvement. The sludge treatment plant conducted regular monitoring of physical and chemical indicators (water content, pH, and odor) and pollutant concentration limits. No exceedances against the applicable regulatory standards and complaints on its operation were reported. The compost is now being used in the remediation of saline-alkali soil in Heilongjiang province, which was previously unsuitable for animal husbandry and forest production.

12. LJEP's sludge treatment facilities in other WWTPs such as in A'Cheng, use either (i) plate-and-frame filter press technology, with sludge water content of 55% for treatment of sludge for mixed filling in compliance with GB/T 23485-2009, or (ii) a hydrothermal anaerobic digestion

process with sludge water content of 60% for treatment of sludge for landscaping in compliance with GB/T 23486-2009.

13. **Environmental, health and safety management.** LJEP has a Safety Management Institution (SMI) that ensures procedures, processes, and activities comply with mandatory safety requirements. The SMI specifically focuses on overflows, accidental release of pollutants, fire floods, equipment breakdown, pipeline cracks, power outages, and vehicular accidents. It defines the organizational roles and responsibilities on safety management, safety education and the training program, safety inspection, emergency preparedness, and response mechanisms.

### **C. Conclusion**

14. Based on the review and evaluation of available safeguard documents, discussions, and a site visit, the ESMS was not fully implemented and issues were raised on compliance with national environmental requirements. No screening and categorization of potential environmental impacts based on the ESMS were provided and no EMP was provided for review; hence, improvements based on the recommendations during the processing of the second loan cannot be confirmed.

## SOCIAL IMPACT

### A. Project Overview

1. The project was the second phase of the Songhua River Basin (SRB) Water Pollution Control and Management Project Private Sector Facility.<sup>1</sup> It was part of a broader Asian Development Bank (ADB) multiproject initiative to address acute water stress in the Songhua River basin (SRB) of northeastern People's Republic of China (PRC).<sup>2</sup> The project falls under the category of General Corporate Finance in Safeguards Requirements 4 (Special Requirements for Different Finance Modalities) of ADB's 2009 Safeguard Policy Statement (SPS). It is in category B for involuntary resettlement and category C for indigenous peoples.

### B. Review Findings

2. **Involuntary resettlement and indigenous peoples.** Longjiang Environmental Protection Group Share Company Limited (LJEP), the borrower, implemented seven subprojects.<sup>3</sup> LJEP confirmed that no new or additional land was acquired and that all LJEP-occupied land was obtained from the local governments through certificates of state-owned land use right. LJEP also confirmed that it has not been involved in any resettlement activity. The local government is responsible for land acquisition and resettlement and these are completed before any concession for bidding is brought up.

3. **LJEP's Environment and Social Management System (ESMS).** Due diligence for the second phase recommended the following corrective actions to improve LJEP's ESMS:

- (i) systematically screen future subprojects and liaise with the municipal government if resettlement plans are required;
- (ii) conduct social safeguard audits of existing facilities and of prior land acquisition to ensure that these comply with the SPS;
- (iii) conduct meaningful consultations on environmental and social issues related to plant operations with villages where the facilities are located; and
- (iv) establish plant level grievance mechanisms to address issues that arise during operations.

4. An audit of the existing facilities was done and a plant-level grievance redress mechanism (GRM) was established. However, LJEP failed to adequately demonstrate either the implementation of a systematic screening of subprojects under the second phase or the conduct of meaningful consultations on plant operations with relevant villages.

5. The project did not trigger ADB's safeguard policy requirements on indigenous peoples. Subprojects are located in suburban areas designated for industrial use and the population in the project areas is mainly composed of the Han Chinese, an ethnic majority group.

<sup>1</sup> ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Equity Investment and Loan for the Songhua River Basin Water Pollution Control and Management Project Private Sector Facility in the People's Republic of China*. Manila.

<sup>2</sup> ADB. 2002. *Technical Assistance to the People's Republic of China for Songhua River Water Quality and Pollution Control Management*. Manila (TA 4061-PRC, approved on 19 December). The TA assisted the government in developing its long-term SRB pollution clean-up program. This program has been supported by a series of urban projects under ADB's East Asia Department and by phase 1 of the proposed project.

<sup>3</sup> Under phase 2, LJEP implemented the following subprojects: Taiping WWTP, Wenchang WWTP, Taiping WTPP upgrade, Harbin City WTPP sludge treatment, Acheng WWTP I, Acheng WWT II, and Mudanjiang WWTP II.

6. **Other social dimensions.** During construction, LJEP employed 2,400 workers, of which 95% were locals, for the WWTP and sludge treatment subprojects. During the operations phase, 274 jobs were generated under the seven subprojects, of which 15% were awarded to locals. LJEP confirmed its compliance with the national labor law and the international core labor standards. A workers' association organizes sports events and cultural shows for its members and helps co-workers in need (e.g., due to illness).

7. **Community and worker grievances.** LJEP reported that no complaints have been received from the community regarding the subprojects. Subproject information was posted in the local language at township offices and other public places. LJEP established telephone hotlines that the public may access in case of issues or grievances regarding the subprojects. LJEP established an Environmental and Social Unit (ESU) that manages environmental and social affairs and is affiliated with top management. The ESU is responsible for receiving and processing complaints. During the last supervision mission undertaken in May 2018, ADB recommended further improvements to LJEP's GRM bookkeeping.

8. Grievance redress for the workers is handled at the plant level by human resource management. LJEP reports no conflicts with the workers.

9. **Corporate Social Responsibility activities.** Between 2015 and 2017, LJEP engaged in additional corporate social responsibility programs, spending CNY600,000. Programs included sponsorship of conferences and forums on water and the environment, provision of sanitation facilities, financial support for science education and internship training, and disaster relief activities.