Technical Assistance Report

Project Number: 51353-001
Knowledge and Support Technical Assistance (KSTA)
May 2018

Republic of Kazakhstan: Astana Integrated Water Master Plan
(Financed by the Japan Fund for Poverty Reduction)

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 18 April 2018)

Currency unit	–	tenge (T)
T1.00	=	$0.0030
$1.00	=	T328.60

ABBREVIATIONS

ACA	–	Astana City Akimat (Astana City Government)
ADB	–	Asian Development Bank
TA	–	technical assistance

NOTE
In this report, "$" refers to United States dollars.

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CONTENTS

KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data — **Project Number:** 51353-001

Project Name	Astana Integrated Water Master Plan	**Department/Division**	CWRD/CWER
Nature of Activity	Policy Advice	**Executing Agency**	Astana City Akimat
Modality	Regular		
Country	Kazakhstan		

2. Sector — **Subsector(s)** — **ADB Financing ($ million)**

Total **0.00**

3. Strategic Agenda — **Subcomponents** — **Climate Change Information**

Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Climate Change impact on the Project	Low
Environmentally sustainable growth (ESG)	Disaster risk management Natural resources conservation Urban environmental improvement		

4. Drivers of Change — **Components** — **Gender Equity and Mainstreaming**

Governance and capacity development (GCD)	Public financial governance	No gender elements (NGE)	✓
Partnerships (PAR)	Bilateral institutions (not client government) Official cofinancing		

5. Poverty and SDG Targeting — **Location Impact**

Geographic Targeting	No	Not Applicable	
Household Targeting	No		
SDG Targeting	Yes		
SDG Goals	SDG6		

6. Risk Categorization Low

7. Safeguard Categorization Safeguard Policy Statement does not apply

8. Financing

Modality and Sources	Amount ($ million)
ADB	**0.00**
None	0.00
Cofinancing	**1.20**
Japan Fund for Poverty Reduction (Full ADB Administration)	1.20
Counterpart	**0.00**
None	0.00
Total	**1.20**

I. INTRODUCTION

1. The knowledge and support technical assistance (TA) will support the preparation of an Integrated Water Master Plan in Astana, Republic of Kazakhstan, to ensure water security for Astana's sustainable economic development and increasing demand for water as a result of rapid urbanization and population growth.

2. Astana City Akimat (ACA), with the endorsement of the Government of Kazakhstan, has requested assistance from the Asian Development Bank (ADB) to prepare an Integrated Water Master Plan for Astana City based on advanced international knowledge to improve the planning and management of its water resources.[1] The plan is to include the upgrade of the water supply and sanitation infrastructure, improvement of the city drainage systems, mitigation of flood risks, use of storm and snow-melted water, and reuse of treated wastewater.[2]

II. ISSUES

3. Astana, the capital city of Kazakhstan, covers more than 722 square kilometers and its population in 2017 was about 1.1 million. The ACA forecasts that the city will expand to 2 million people by the year 2050.[3] Astana lies in low floodplain terraces in arid steppes, and its climate is sharply continental—cold and long winters, hot and moderately dry summers. The Ishim River flows across the city and is its major source of water. Part of Astana city also falls in the catchment of the Nura River. The Ishim River originates in the Niaz Mountains in Karaganda Province of Kazakhstan. It is 2,450 kilometers (km) long passing through Kazakhstan and Russia, including 1,717 km in the Akmola and North Kazakhstan oblasts of Kazakhstan.

4. Astana's economy and population are growing fast, increasing pressure on ensuring water security. The ACA has been investing in water infrastructure since 2009, including constructing flood dikes, wastewater treatment plants, and water supply networks. However, flood risks remain serious due to a bottleneck for flood flows in the lower section of the Ishim River and a rapid expansion of the urban center. The ACA has realized the importance of the development and adoption of a master plan to strategically guide its water management and water-related investments. It is necessary to improve the city's water resources management and expand the water supply and sewage networks through an integrated approach to providing quality services to the city's expected growing population and urbanization.

5. **Flood risks**. A major flood in 1949 washed away the left bank of the Ishim River. With the move of the capital of Kazakhstan from Almaty to Astana in 1997, Astana has become home to ministries, national companies, and major residential hubs. To enhance the protection of Astana by cutting off-peak discharges of flood flows from the Astana Reservoir upstream of the city, a flood control dam near the Astana airport was constructed in 2009, with a height of 10 meters (m) and length of over 30 m. During the 2017 flood period, about 600 million cubic meters (m^3) passed through the Astana reservoir, while the reservoir has only an effective storage capacity of 135 million m^3. The peak discharge released from the Astana reservoir was 1,910 m^3/second, while the total flood outlet capacity of the dam is no more than 450 m^3/second and some lower sections of the Ishim River within the city have a discharge capacity of less than 65 m^3/second. There is

[1] Astana City Akimat is the name locally known for Astana City Government.
[2] The TA first appeared in the business opportunities section of ADB's website on 14 December 2017.
[3] Official Site of the President of the Republic of Kazakhstan. Meeting on the Capital City's Development. http://www.akorda.kz/en/events/astana_kazakhstan/astana_other_events/meeting-on-the-capital-citys-development.

also a lack of flood forecasting and no warning system or emergency plan for flood risk management.

6. **Increasing demand for water supply and sanitation**. In 2017, piped water supply systems cover 98% of Astana's population, with 3% of them getting water from street standpipes. The remaining 2% rely on individual wells or pits. About 92% of Astana's population is connected to sewage networks while the remaining 8% discharge directly to septic tanks and cesspools. In some smaller villages, nearly half of households are not connected to sewage networks. Astana is facing challenges to meet the increased demand for water as a result of the city's rapid economic and population growth from 1.1 million in 2017 to potentially 2.0 million in 2050. The networks and facilities are aging and have high water losses. About one-third of households have no meter installed. The ACA estimates that water losses are over 20%. A lack of comprehensive water data, understanding of alternative water sources and integrated technical approaches, and institutional coordination also limit access to safe and secure water. There is a need to introduce universal metering and reduce non-revenue water.

7. **Low water tariff.** Tariffs for water supply and sewerage for retail consumers in Astana are relatively low compared to the other regions of Kazakhstan and provide no incentive for households to save water.[4] For example, the domestic water supply tariff in 2016 was about T45 or $0.13 per cubic meter. There is a need to ensure financial sustainability and to change consumption patterns.

8. **Weak institutional coordination and data coverage**. There is no unified agency for integrated water management at national or Astana city levels. The Ishim River Basin Inspection Agency and the Committee for Water Resources of the Ministry of Agriculture are responsible for surface and groundwater resources management at the river basin and country levels, while water supply is mainly the city's responsibility. Coverage and reliability of hydrological data are poor, preventing strategic planning and management of water resources. This fragmented management and lack of water data support need to be improved, including coordination and information sharing between agencies. In addition, Kazakhstan is experiencing a shortage of qualified personnel, and there is room to improve management practices and strengthen staff's capacity.

9. **Resilience and adaptation to climate change**. Climate change is projected to have a significant impact on Kazakhstan's water resources, exacerbating water shortages. Flood risks may also increase. Global climate scenarios indicate that the projected increase in air temperature will result in changes in the amount, seasonality, intensity, and distribution of precipitation and increase in evaporation. Temperatures are expected to increase by 1.4°C by 2030 and 2.7°C by 2050 from the 2017 levels.[5] Flow discharges in the Ishim River, the water source for Astana, may decrease and peak discharges during the flood season may increase. Astana's current resilience to predicted climate change is low, and adaptation planning is necessary to minimize negative impacts on the population, environment, and the economy.

10. **Lessons.** The TA design has incorporated lessons from water-related projects in Kazakhstan and other developing member countries financed by ADB, Japan International Cooperation Agency, United Nations Development Programme, and other international agencies. The lessons include (i) inclusion of public participation and public awareness campaigns on improving water management, (ii) provision of incentives for residents to use advanced

[4] Utility Department of Astana City Akimat. 2017. *Water Supply Report* (unpublished). Astana.
[5] World Bank. 2013. *Kazakhstan Overview of Climate Change Activities*. Washington, DC.

technology for water saving and demand management, (iii) collection and treatment of wastewater should keep pace with increased water supply, and (iv) project design should take into consideration the rapid urbanization and population growth in emerging economies.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

11. The TA is aligned with the following impacts: Astana citizens' quality of life improved and Astana's water infrastructure modernized.[6] The TA will have the following outcome: improved strategic planning for the management of water resources and related services by ACA.[7]

B. Outputs, Methods, and Activities

12. **Output 1: Geographic information system-based data and information system for water management established**. This output will support (i) the review and assessment of water resources availability, flood risks, water supply, wastewater treatment capacity and coverage, and land use types for Astana; (ii) the review of current water use by various sectors; (iii) stocktaking of Astana's water infrastructures and assessment of their performance; and (iv) the development of a geographic information system-based data and information system for Astana's water management, with initial data set inputted.[8]

13. **Output 2: Astana's integrated water master plan developed**. This output will support (i) the identification of issues, gaps, and challenges in water management in Astana; (ii) the review and documentation of international best practices in water management in major cities and assessment of their applicability in Astana; (iii) the review of Astana's urban master plan, land use plan, and other available plans; (iv) the projection of future water availability, use, and wastewater generated, taking into consideration Astana's current urban master plan and climate change impacts; (v) the assessment of alternative water sources, including the reuse of treated wastewater, beneficial use of floodwater, and joint use of groundwater and storm water; (vi) recommendations for reducing nonrevenue water and energy use, water-saving technology, and policy incentives; (vii) the review of tariff levels and structures, and recommendations for tariff regimes and cost recovery, including incentives for women in water saving, as women are big users of water for the domestic chores in the home; (viii) the review of current institutional settings and recommendations for institutional reforms to apply integrated water resources management, including capacity building, in particular for women's participation and empowerment, and potential for establishing partnerships with the private sector to improve water resources management; (ix) the development of a set of indicators and targets for integrated water management; (x) recommendations on the development of storm drainage, and mechanisms for a unified system of water disposal including rain and snowmelt water, and tariff setting for using various water sources; and (xi) the development of an integrated water master plan.

14. **Output 3: Investment programs and projects assessed and prioritized**. This output will include (i) the assessment of investment needs to implement the water master plan developed under the TA; (ii) the review of the city's proposed or planned water-related infrastructure investment projects at concept level and recommendation for improvement; (iii) the rationalization,

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[6] Government of Kazakhstan (Government Decree). 2014. *The Capital City's Joining the World's Best 10 Cities by 2050 (Smart Astana)*. Astana.

[7] The design and monitoring framework is in Appendix 1.

[8] The Utility and Emergency Department of ACA, through its water supply and wastewater treatment company, will maintain the geographic information system and update data.

streamlining, and prioritization of the water-related infrastructure investment projects for cost saving and improved synergies; and (iv) the assessment of financial sources from public and private sector equity and/or loans, including the development of proposals for possible ADB financing.

C. Cost and Financing

15. The TA is estimated to cost $1,335,000, of which $1,200,000 will be financed on a grant basis by the Japan Fund for Poverty Reduction and administered by ADB. The government will finance the balance in kind. The key expenditure items are listed in Appendix 2.

16. Eligible expenditures include (i) consultant services, (ii) non-consultant costs for local training and workshops, minimal equipment such as computers, and operating costs essential to carry out the TA, including rent of vehicles, if justified;[9] and (iii) knowledge partnership. The following are ineligible expenditures: (i) purchase of vehicles, (ii) salaries for civil servants, (iii) any foreign travel, (iv) scholarships or long internships, (v) detailed engineering design, (vi) civil works and other related expenses, and (vii) those under ADB's List of Ineligible Items (or Negative List) and Prohibited Investment Activities List.[10]

17. The government will provide counterpart support in the form of counterpart staff, office space and access to the internet, necessary data, and other in-kind contributions. The ACA has recruited an agency to conduct a hydrological and geological survey. The survey, serving as the government's contribution to the TA, will provide background data such as surface and groundwater, and topography and geodetic information and maps.

D. Implementation Arrangements

18. ADB will administer the TA and select, supervise, and evaluate consultants. The ACA will be the executing agency for the TA. Its utilities and emergency department will lead the implementation of the TA, with support from the departments of natural resources and use regulation, and finance. A TA steering committee will be established, comprising ACA, Ishim River Water Inspection Agency, and the Committee for Water Resources, for better coordination between government agencies of national policies, strategies, and programs or plans, and for improved data and information sharing. The TA steering committee will be chaired by a vice mayor of ACA and meet at least quarterly or as needed to direct and provide overall guidance to the TA implementation. The implementation arrangements are summarized in the table.

Implementation Arrangements

Aspects	**Arrangements**		
Indicative implementation period	July 2018–September 2019		
Executing agency	ACA		
Consultants	To be selected and engaged by ADB		
	Firm: Quality and cost-based selection (quality to cost ratio 90:10)	Astana Integrated Water Master Plan	$1,093,000
Procurement[a]	To be procured by consultants		

[9] Travel cost of resource persons is included in these items.
[10] ADB. 2011. *Cost Sharing and Expenditure Eligibility: Policy Implementation Review.* Manila.

Aspects	Arrangements		
	Shopping	1 contract (computers, printers, projector, and copier)	$15,000
	Shopping	1 contract (GIS-related software)	$92,000
Disbursement	The TA resources will be disbursed following ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time).		
Asset turnover or disposal arrangement upon TA completion	All the equipment and software will be transferred to the executing agency upon completion of TA activities.		

ADB = Asian Development Bank, ACA = Astana City Akimat (Astana City Government), GIS = geographic information system, TA = technical assistance.

[a] Procurement plan (accessible from the list of linked documents in Appendix 3).

Source: Asian Development Bank.

19. **Consulting services.** ADB will engage a firm or entity for the consulting services following the ADB Procurement Policy (2017, as amended from time to time) and its associated project administration instructions and/or staff instructions.[11] Quality- and cost-based selection method, with a quality–cost ratio of 90:10, and full technical proposal, will be used. The consultants will procure goods following the ADB Procurement Policy (2017, as amended from time to time) and Procurement Regulations for ADB Borrowers (2017, as amended from time to time).

20. The TA will be implemented in 14 months from July 2018 to September 2019. ADB will conduct inception, interim, and final review missions, and hold tripartite meetings during the missions to review the consultants' performance and TA implementation progress and deliverables, based on the design and monitoring framework and the consultants' work plan. The missions will also monitor the national and local governments' inputs and contributions as documented in the TA report. The final review mission will evaluate the performance of the TA, including its outputs and outcomes, based on the design and monitoring framework.

21. During TA implementation, workshops and seminars will be conducted to discuss and share the TA findings and results, including a training workshop on integrated water resources management. The TA will also provide on-the-job training for the ACA staff by the TA consultants. The TA consultant, together with the ACA, will conduct public consultation with key stakeholders for the development of the master plan. The TA outputs and results will also be disseminated through the Knowledge and Experience Exchange Program, which was jointly set up by the government and ADB in 2013 to introduce cutting-edge knowledge and best practices to equip the country for capturing development opportunities.

IV. THE PRESIDENT'S DECISION

22. The President, acting under the authority delegated by the Board, has approved the Asian Development Bank administering technical assistance not exceeding the equivalent of $1,200,000 to the Government of Kazakhstan to be financed on a grant basis by the Japan Fund for Poverty Reduction for the Astana Integrated Water Master Plan, and hereby reports this action to the Board.

[11] Terms of Reference for Consultants (accessible from the list of linked documents in Appendix 3).

DESIGN AND MONITORING FRAMEWORK

Impact the TA is Aligned with
Astana citizens' quality of life improved and Astana's water infrastructure modernized (The Capital City's Joining the World's Best 10 Cities by 2050)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
Outcome			
Strategic planning for the management of water resources and related services by ACA improved	Integrated water master plan adopted and issued as a guide by the ACA by 2019 (2017 baseline: NA)	ACA's report and ADB technical assistance completion report	ACA's support for integrated water management is not sustained due to its leadership or policy changes.
Outputs			
1. GIS-based data and information system for water management established	1a. An evaluation report on water resources availability and current water use completed by month 2 1b. An inventory of existing water infrastructure reviewed by month 2 (2017 baseline: NA) 1c. GIS-based data and information system on current water resources available, used, and water infrastructure developed by month 3 (2017 baseline: NA)	1a–c. TA review reports by ADB missions at month 2, month 5, and month 10; and TA consultants' progress report on TA implementation	Inadequate cooperation and data sharing between Astana City Government and river basin organizations
2. Astana integrated water master plan developed	2a. A projection for future water use and wastewater generated in line with Astana's urban master plan, land use plan, and other available plans, taking into consideration climate change impacts, completed by month 4 (2017 baseline: NA) 2b. An assessment report on international best practices in water management in major cities and their applicability in Astana completed by month 4 (2017 baseline: NA) 2c. An assessment report on alternative water sources, including the reuse of treated wastewater, beneficial use of flood water, joint use of groundwater and storm water	2a–f. TA review reports by ADB missions at month 2, month 5, and month 10; and TA consultants' progress report on TA implementation	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
	completed by month 5 (2017 baseline: NA) 2d. Recommendations for institutional reform, policy incentives including water supply and wastewater tariff, and application of water saving technologies proposed by month 8 (2017 baseline: NA) 2e. Recommendations on the development of storm drainage, and mechanisms for a unified system of water disposal including rain and snowmelt water, and tariff setting for using various water sources by month 8 (2017 baseline: 0) 2f. Integrated water master plan, including a set of indicators and targets, including women's participation in IWRM for Astana drafted and discussed by month 9, and finalized by month 10 (2017 baseline: 0)		
3. Investment programs and projects assessed and prioritized	3a. An assessment report of the investment needs for Astana to implement the integrated master plan completed by month 10 (2017 baseline: NA) 3b. The ACA's current investment proposals reviewed for rationalization, streamlining, and prioritization by month 11 (2017 baseline: NA) 3c. A list of projects, including potential financing sources, prioritized by month 12 (2017 baseline: NA)	3a–c. TA review reports by ADB missions at month 2, month 5, and month 10; and TA consultants' progress report on TA implementation	

Key Activities with Milestones

1. GIS-based data and information system on water management established

1.1 Review and assess water resources availability, flood risks, water supply, wastewater treatment capacity and coverage, and land use type for Astana (Q3 2018–Q4 2018).

1.2 Review current water use by various sectors (Q3 2018–Q4 2018).

Key Activities with Milestones

1.3 Take stock of the water infrastructures and assess their performance (Q3 2018–Q4 2018).
1.4 Develop a GIS-based data and information system for Astana's water management (Q3 2018–Q4 2018).

2. Astana integrated water master plan developed

2.1 Identify issues, gaps, and challenges in water management in Astana (Q3 2018–Q4 2018).
2.2 Review and document international best practices in water management in major cities and assess their applicability in Astana (Q3 2018–Q4 2018).
2.3 Review of Astana's urban master plan, land use plan, and other available plans (Q3 2018–Q4 2018).
2.4 Project future water availability, use, and wastewater generated in line with Astana's urban master and land use plan taking into consideration climate change impacts (Q3 2018–Q4 2018).
2.5 Assess alternative water sources, including the reuse of treated wastewater, beneficial use of flood water, and joint use of groundwater and storm water (Q3 2018–Q4 2018).
2.6 Recommend water saving technology, including reduction of nonrevenue water, and policy incentives (Q3 2018–Q4 2018).
2.7 Review tariff levels and structures and recommend tariff regimes and cost-recovery (Q3 2018–Q4 2018).
2.8 Review current institutional settings and make recommendations for institutional reforms and capacity building to apply IWRM in Astana (Q3 2018–Q1 2019).
2.9 Develop an integrated water master plan including a set of indicators and targets for integrated water management in Astana (Q3 2018–Q2 2019).

3. Prioritization of investment programs and projects identified

3.1 Assess the investments needed to implement the water master plan developed under the TA (Q3 2018–Q2 2019).
3.2 Review the city's proposed or planned water-related infrastructure investment projects at concept level and make recommendations for improvement (Q3 2018–Q2 2019).
3.3 Rationalize, streamline, and prioritize the water-related infrastructure investment projects (Q4 2018–Q3 2019).
3.4 Assess potential financial sources from public and private sector equities and/or loans, including the development of proposals for possible ADB financing (Q4 2018–Q3 2019).

Inputs

Japan Fund for Poverty Reduction: $1,200,000

Note: The government will provide counterpart support in the form of counterpart staff, office space and access to the internet, necessary data (including ACA's hydrological and geological survey), and other in-kind contributions.

Assumptions for Partner Financing

Not Applicable

ACA = Astana City Akimat (Astana City Government), ADB = Asian Development Bank, GIS = geographic information system, IWRM = integrated water resources management, NA = not applicable, Q = quarter, TA = technical assistance.

[a] Government of Kazakhstan (Government Decree). 2014. *The Capital City's Joining the World's Best 10 Cities by 2050 (Smart Astana)*. Astana.

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN

($'000)

Item	Amount
Japan Fund for Poverty Reduction[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	603
ii. National consultants	234
b. Out-of-pocket expenditures	
i. International and local travel	86
ii. Goods (rental and/or purchase)[b]	20
iii. Surveys[c]	10
iv. Reports and communications	20
v. Miscellaneous administration and support costs	40
2. Goods (rental or purchase)[d]	92
3. Training, seminars, workshops, forums, and conferences	
a. Facilitators	5
b. Venue rental and related facilities	10
c. Participants	10
d. Representation	5
4. Contingencies	65
Total	**1,200**

Note: The TA is estimated to cost $1,335,000, of which contributions from the Japan Fund for Poverty Reduction are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office space and access to the internet, necessary data, and other in-kind contributions. The value of the government contribution is estimated to account for 10% of the total TA cost.

[a] Administered by the Asian Development Bank.

[b] Including five computers, two printers, one projector, and one copier; and vehicle rental for the consultants to conduct site visits.

[c] Social and household survey for willingness to pay and affordability of water and wastewater tariffs.

[d] Geographic information system (GIS) software, which will be determined based on the consultants' recommendation during the initial phase of TA implementation.

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/LinkedDocs/?id=51353-001-TAReport

1. Terms of Reference for Consultants
2. Procurement Plan