TERMS OF REFERENCE FOR CONSULTANTS

I. BACKGROUND

1. Astana is growing fast in terms of economy and population. The rapid growth has also placed increased pressure on ensuring its water security for all. The Astana City Akimat/Government (ACA) has been investing increasingly to its water infrastructure since 2009, including construction of flood dykes, wastewater treatment plants, and water supply networks. However, flood risks remain serious due to a bottle neck for flood flows in the lower section of the Ishim River and a rapid expansion of the urban center. Nearly half of its households have yet to be connected to sewage networks. Water supply and sewage networks need to be expanded to provide quality services to the city's expected population growth and urbanization. It becomes necessary to improve the city's water resources management through an integrated approach. 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.

2. The proposed knowledge and support technical assistance (TA) will support the preparation of an Integrated Water Master Plan for Astana, Republic of Kazakhstan to ensure water security for Astana's sustainable economic development and increasing demand resulted from rapid urbanization and population growth. The TA will produce three main outputs (i) geographic information system-based data and information system for water management established; (ii) Astana's integrated water master plan developed; and (iii) investment programs and projects assessed and prioritized.

3. The TA will be implemented in 14 months from July 2018 to September 2019. The ACA will be the executing agency for the TA. 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. 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).

II. TERMS OF REFERENCE

A. Expertise Required

4. The A list of consulting expertise required is provided in the following table.

Expertise Required

International Position	Person-month	National Position	Person-month
Water Resources Management Specialist/Team Leader	5	Water Resources Management Specialist/Deputy Team Leader	6
Flood Management Specialist	2	Flood Management Specialist	4
Water Supply and Sanitation Specialist	4	Water Supply Engineer	4
GIS Specialist	2	GIS Specialist	3
Climate Change and Hydrology Specialist	2	Climate Change and Hydrology Specialist	3
Water Institutional and Policy Specialist	2	Water Institutional and Policy Specialist	3
Water Utilities Management Specialist	2	Water Tariff/Financial Management Specialist	3

International Position	Person-month	National Position	Person-month
Urban and Land Use Planner	2	Urban and Land Use Planning Specialist	4
Economist	2	Economist	3
		Sanitation and Wastewater Specialist	3
		Social and Gender Specialist	1
Total	**23**		**37**

Source: Asian Development Bank estimates.

B. Scope of Work

5. Overall, the consultants will:

(i) maintain close coordination with ADB and the executing agency;
(ii) develop the detailed study framework and methodology in consultation with ADB and the executing agency;
(iii) develop outlines of the TA inception, interim, and final reports; assign work to respective specialists in the team; compile inputs; and prepare the inception, interim, and final reports;
(iv) review and analyze key issues and constraints of the water management in Astana;
(v) review and assess water resources availability, flood risks, water supply, and wastewater treatment capacity and coverage, and land use type for Astana;
(vi) review current water use by various sectors; review water supply and sanitation investment needs and policies related to:
  a. water resource management and governance; the use of a relevant regulatory framework; demand-side management and planning; institutional coordination and capacity; water security (household, economic, and environmental); the control of waterborne diseases; and resilience to water-related disasters;
  b. water supply infrastructure—coverage, access, and service quality; energy efficiency; and nonrevenue water;
  c. sanitation and wastewater management—access to sanitation, sewerage collection, recycling and disposal facilities;
  d. flood control, including efficient street drainage; and
  e. recommendations and activities on sewage treatment facilities.
(vii) conduct stock-taking of Astana water infrastructures and assessment of their performance;
(viii) development a GIS-based data and information system for Astana's water management, with initial data set inputted;
(ix) review and assess Astana's general plan, land use plan, and other available plans;
(x) project future water availability, use, and wastewater generated taking into consideration Astana's urban master plan and climate change impacts;
(xi) conduct model simulation and forecast of flood situations in Astana;
(xii) assess alternative water sources, including reuse of treated wastewater, beneficial use of flood water, and joint use of groundwater and storm water;
(xiii) perform an evaluation of the city's current and future Supply Alternatives and Demand Management Options to develop strategic portfolios of alternative programs;
(xiv) analyze the existing hydraulic model and develop a comprehensive water supply and sanitation system hydraulic model, including calibration, and perform a hydraulic analysis under various system conditions, including water resources

model and demand model showing various scenarios and options with consideration of all water sources such as storm water, flood water, underground and wastewater;

(xv) identify options and integrated solutions for smart, sustainable, and energy-efficient water supply, sanitation, that use low-carbon technology, geographic information systems, and information technology solutions, including climate change adaptation and mitigation options with indicative incremental costs;

(xvi) provide recommendations and activities for reducing non-revenue water and energy, water saving technology, and policy incentives;

(xvii) review current tariff levels and structures in Astana, and recommendations and activities for tariff regimes and cost-recovery, including incentives for women's role in water saving;

(xviii) conduct household surveys for willingness to pay for water supply and wastewater services and affordability analysis;

(xix) review current institutional settings and recommendation for institutional reforms to apply integrated water resources management (IWRM) in Astana, including capacity building, in particular, for women's participation and empowerment;

(xx) conduct public consultation with key stakeholders including residents for the development of the integrated master plan;

(xxi) develop a set of indicators and targets for integrated water management in Astana;

(xxii) provide recommendations and activities on the creation of independent backup source of water supply for Astana city in case of emergency situations;

(xxiii) provide recommendations and activities on development of storm drainage in Astana and mechanisms for a unified system of water disposal and tariff setting for services on rain and meltwater;

(xxiv) assess investment needs to implement the water master plan developed under the TA;

(xxv) review the city's proposed or planned investment projects at concept level and recommendation for improvement;

(xxvi) rationalize, streamline, and prioritize the investment projects for cost saving and improved synergy among them;

(xxvii) conduct simple strategic environmental assessment for the master plan; and

(xxviii) identify potential financial sources, financial mechanisms for accessing resources, including public–private investments and development of proposals for ADB financing or other international agencies financing.

C. Specific Tasks for Each of the Consultants

6. Specific tasks for each of the international and national specialists are provided below as reference. The consulting firm should assign detailed tasks to each of the specialists in a coordinated and timely manner to complete all the works as outlined above. The consulting firm is ultimately responsible for the consistency and quality of the various assessments and reports required under the consulting services.

1. Water Resources Management Specialists/Team Leader (international, 5 person-months) and Deputy Team Leader (national, 6 person-months)

7. The international and national specialists will have a master's degree or equivalent qualification in water resources or relevant field. The international specialist will have at least 15 years of experience in IWRM. Demonstrated knowledge of, and ideally experience in water resource issues in Central and West Asia is preferred; and good knowledge of Russian language

would be an asset. The national specialist will have at least 10 years of experience in water resources management and experience in international organizations would be an asset. Specifically, the specialists will undertake but not limited to the following tasks:

(i) work as the team leader and have overall responsibility for the effective and timely implementation of the TA and quality of all TA outputs;
(ii) guide and coordinate both international and national consultants for completing their tasks, ensuring that all consultants will work closely with each other and that all individual inputs are well integrated and complement each other.
(iii) liaise with the executing agency and other relevant government agencies for the implementation of the TA;
(iv) prepare activity flow charts and personal assignment schedules; ensure the quality and timely delivery of the required deliverables, workshops, and other outputs as set in the activity charts;
(v) ensure that standards and procedures adopted in the Masterplan conform with national norms and international standards as required;
(vi) provide support to ADB missions and participate in meetings, conduct field visits, and draft or revise sector-related reports as required;
(vii) review and assess international practices in IWRM in developed and developing countries, and prepare a report to document best practices on IWRM;
(viii) review government policies and strategies for IWRM and lessons learned;
(ix) review the constraints in the application IWRM in Astana and what ACA has done to address these constraints and what are the lessons learned;
(x) review and assess water resources availability, flood risks, water supply, and wastewater treatment capacity and coverage, and land use type for Astana;
(xi) review current water use by various sectors;
(xii) review Astana's urban master plan, land use plan, and other available plans;
(xiii) project future water availability, use and wastewater generated in line with Astana's urban master and land use plans taking into account climate change impacts;
(xiv) assess alternative water sources, including reuse of treated wastewater, beneficial use of flood water, and joint use of groundwater and storm water;
(xv) perform an evaluation of the City's current and future Supply Alternatives and Demand Management Options to develop strategic Portfolios of alternative programs;
(xvi) develop a comprehensive water supply system hydraulic model, including calibration, and perform a hydraulic analysis under various system conditions, including water resources model and demand model showing various scenarios and options;
(xvii) provide recommendations for reducing non-revenue water, water saving technology, and policy incentives;
(xviii) review current institutional settings and recommendation for institutional reforms to apply IWRM in Astana, including capacity building, in particular, for women's participation and empowerment;
(xix) develop a set of indicators and targets for integrated water management in Astana;
(xx) assess investment needs to implement the water master plan developed under the TA;
(xxi) rationalize, streamline, and prioritize the investment projects for cost saving and improved synergy among them; and
(xxii) identify potential financial sources, including development of proposals for ADB financing and/or other international agencies financing.

(xxiii) supervise training activities and contribute to workshops, seminars, and reports; and
(xxiv) prepare inception, interim, and final reports of the TA, in coordination with other consultants.

2. Flood Management Specialist (international, 2 person-months; national, 4 person-months)

8. The specialists will have a university degree or equivalent qualification in water resources, or disaster management, or relevant field. The specialists will have at least 10 years of experience in flood and drought management. For international specialist, demonstrated knowledge of, and ideally experience in flood management in Central and West Asia is preferred and good knowledge of Russian language would be an asset. Specifically, the specialists will undertake but not limited to the following tasks:

(i) collect baseline information and data on flood damages to the Astana and assess the flood risks exposed to Astana, including climate change impacts by collaborate with the climate change specialists;
(ii) assess the current constraints in Astana on flood management and ACA's policies, projects, and programs to address the constraints;
(iii) take stock of the structure and non-structure flood measures for Astana and analyze their effectiveness in light of the political, institutional, administrative, and economic contexts of the Astana;
(iv) review best international practices and assess their application in Astana;
(v) compare and analyze the flood emergency management systems and experiences with Astana and other cities;
(vi) together with the climate change and hydrological specialists, conduct model simulation for Astana flood dyke breaches;
(vii) provide recommendations for integrated and balanced structural and nonstructural measures to mitigate flood risks appropriate to the Astana's political and economic contexts, including flood forecasting and warning system, flood emergency plan and preparation, integration of green and gray infrastructure in urban areas—to study and propose managing storm water and flood risk through various gray infrastructures (concrete flood walls, channels, drainage ditches and pipes, deep tunnel systems, underground storm water retention/rainwater storage tanks, permeable asphalt etc.) combined with green infrastructures (like protected flood plains, wetlands, riverfront parks and riparian landscape restoration, permissible pavement, and green roofs and facades, etc.);
(viii) assess the potential and propose recommendations for make use of storm, rain, and snow-melt water;
(ix) assist the team leader in developing a set of indicators and targets for integrated water management in Astana;
(x) assess flood management investment needs to implement the water master plan developed under the TA;
(xi) assist in rationalizing, streamlining, and prioritizing the investment projects on flood management for cost saving and improved synergy among them; and
(xii) contribute to workshops, seminars, and reports.

3. Water Supply and Sanitation Specialist (international, 4 person-months), **Water Supply Engineer** (national, 4 person-months), **Sanitation and Wastewater Specialist** (national, 3 person-months)

9. The Water Supply and Sanitation Specialist (international) will be a senior expert with a degree in engineering, urban planning, urban management or related field with at least 15 years of work experience in the appraisal and design of urban water supply and sanitation systems and utility performance management. Specific experience in non-revenue water (NRW) management, sector policy dialogue and development and water utility management, are supplementary assets. The Water Supply Engineer (national) and the Sanitation and Wastewater Specialist (national) will have a degree in engineering, urban planning, water resources or related field with at least 10 years of work experience in water supply and sanitation projects and utility performance management. The specialists will be experienced with the analysis and optimization of water supply network systems, pumping stations, reservoir capacity, and non-revenue water management as well as sewerage networks. Experience in cost estimate of urban water supply systems is required. Experience in similar ADB Feasibility Study in Central Asian countries is highly desirable. The specialists are expected to be well acquainted with ADB procedures for Feasibility Study, be conversant with ADB procedures, methods, and modes of procurement as well as safeguards policy. The specialists will collectively be responsible for the following tasks:

(i) coordinate, and collaborate with the team leader to ensure timely delivery of outputs detailed in para. 5;
(ii) review current water use by various sectors; review water supply and sanitation investment needs and policies related to
    a. water resource management and governance; the use of a relevant regulatory framework; demand-side management and planning; institutional coordination and capacity; water security (household, economic, and environmental); the control of waterborne diseases; and resilience to water-related disasters;
    b. water supply infrastructure—coverage, access, and service quality; energy efficiency; and nonrevenue water;
    c. sanitation and wastewater management—access to sanitation, sewerage collection, recycling and disposal facilities; and
    d. flood control, including efficient street drainage.
(iii) conduct stock-taking of Astana water supply and sanitation infrastructures and assessment of their performance;
(iv) review current water use and wastewater volumes, and assess and rationalize the Astana's projections of water supply and wastewater by 2030 together with the Urban and Land Use Planner;
(v) provide inputs to the water utilities specialist in the review of the regulatory frameworks in the Water Supply sector and assess the adequacy of any reforms for the water supply sector to provide suitable recommendations;
(vi) propose mechanisms aimed to foster improved coordination among various organizations and stakeholders involved in the water supply and sanitation sector;
(vii) interact with the institutional and water utility specialists and participate in the review of the legal, regulatory, and financial framework for the sector, and determine areas for improvement in urban water supply and sanitation;
(viii) provide inputs to the team leader, institutional and water utility specialists to identify specific needs and to tailor suitable capacity building programs targeting particularly: (a) financial sustainability, (b) tariff setting, (c) system management, and (d) utility management;

(ix) review the investment proposals of the Astana City Akimat and assess investment needs for urban water supply and sanitation, and streamline and prioritize the investment proposals; and
(x) contribute to workshops, seminars, and reports.

4. GIS Specialist (international, 2 person-months; national 3 person-months)

10. The specialists will have a university degree or equivalent in geography or a related field, which has included GIS in the curriculum/training program, or training certificate in GIS/remote sensing. The specialists will have at least 7 years of experience in the use of GIS programs and remote sensing including digitizing mapping and data, preferably in water management or a related field. For international specialist, good knowledge of Russian language would be an asset. Specifically, the specialists will undertake but not limited to the following tasks:

(i) with assistance of national GIS specialists and other relevant specialists, obtain information and data on Astana's river systems, surface and ground water resources, water infrastructure, topography, land use, population and residential areas, major businesses and enterprises;
(ii) analyze and determine how best the information can be displayed using GIS integrate in the GIS system;
(iii) process the information and data, and produce initial versions of GIS maps and other attributed data; and revise the maps and other relevant information at late stage;
(iv) support the development of the early warning system by using GIS to include physical development issues such as land tenure, informal development, topography, drainage, access to land, and location choices for rural development based on available information;
(v) provide training on spatial data processing and spatial data analysis techniques, including use of satellite images and remote sensing;
(vi) review the supervisory control and data acquisition (SCADA) currently used by the water supply and/or wastewater treatment companies, and provide recommendations for linking the GIS and SCADA systems;
(vii) provide recommendation for improving or expanding the GIS system, include software, database design, management, maintenance, and data standards
(viii) contribute to the prioritization of investment proposals; and
(ix) contribute to workshops, seminars, and reports.

5. Climate Change and Hydrological Specialist (international, 2 person-months; national, 3 person-months)

11. The specialists will have an advanced degree in hydrology, hydrological engineering, climate science, or a closely related discipline. The specialists will have at least 7 years of experience encompassing hydrological modeling, civil engineering, infrastructure design, and climate change assessment and risk management. For international specialist, demonstrated knowledge of, and ideally experience in, climate change or related water resource issues in Central and West Asia is preferred; and good knowledge of Russian language would be an asset. Specifically, the specialists will undertake but not limited to the following tasks:

(i) develop an inventory of climate data, including data regarding average, minimum, and maximum temperature, precipitation, physiologically equivalent temperature (PET), relative humidity, soil moisture, runoff, frequency of severe storms, floods and droughts, degree of climate variability for historical timeframes, and compare

with projections from climate models for future timeframes relevant to the project. If possible, use data downscaled for the area;

(ii) collect, review, and summarize relevant scientific literature (both peer-reviewed and gray literature as available);

(iii) develop median and more extreme scenarios for the key climatic parameters and associate climate-related hazards under climate change, using the most current and credible sub-regional climate projections available;

(iv) develop flow simulations for the river basins flowing through Astana, based on an assessment of expected changes in the pattern and level of precipitation;

(v) identify potential changes in the monthly, seasonal, and annual discharge patterns and inflows (e.g., glacial melt) of the rivers, as well as changes in upstream water withdrawals and consumption due to climate change, and the implications;

(vi) examine available data and evidence on patterns and trends in groundwater storage and availability, particularly as related both to flow patterns of these rivers and to abstraction for various uses;

(vii) assess the likely impacts of climate change on surface and groundwater flows, water availability, and infrastructure in Astana;

(viii) together with the flood management specialists, conduct model simulation for Astana floods;

(ix) assist in the detailed assessment and recommendation of adaptation options (including their relative costs and benefits) to reduce and/or manage the climate change risks;

(x) report results and methodological approaches, including documentation of scenario method, data sources, uncertainties in model ensemble forecasts, and caveats;

(xi) assess options for climate-proofing and adaptation measures for Astana in the context of IWRM;

(xii) provide detailed guidance on how the climate data projections and information should be interpreted and applied in prioritize the investment proposals; and

(xiii) contribute to workshops, seminars, and reports.

6. Water Institutional and Policy Specialist (international, 2 person-months; national, 3 person-months)

12. The specialists will have an advanced degree in management, or a related discipline. The specialist will have at least 10 years of experience in formulation and implementation of water policies and institutional reforms. For international specialist, demonstrated knowledge of, and ideally experience in water resource management in Central and West Asia is preferred. Good knowledge of Russian language would be an asset. For national specialist, experience with international organizations is preferred. Specifically, the specialists will undertake but not limited to the following tasks:

(i) review the government policies and institution settings on water resources management, water supply and sanitation services, and flood and drought management;

(ii) review international experience in institutional arrangements for effective IWRM, and for the development, implementation, and monitoring and evaluation of urban water master plan;

(iii) review the institutional settings in ACA, assess constraints for effective IWRM, and provide recommendation for institutional strengthening and/or reforms for implementing the integrated water master plan development under the TA;

(iv) assess the capacity of ACA water related departments, and identify training and capacity development needs for implementing the integrated water master plan;
(v) work together with other relevant specialists, provide recommendations for increased public participation in water resources management, in particular, women's participation in promoting water savings; and
(vi) contribute to workshops, seminars, and reports.

7. Water Utilities Management Specialist (international, 2 person-months) and **Tariff/Financial Management Specialist** (national, 3 person-months)

13. The Water Utilities Management Specialist (international) will have a bachelor's degree in management or related field and be a senior expert with a degree in engineering, water resources management, urban planning, urban management or related field with at least 15 years of work experience in urban water supply and sanitation projects and utility performance management; specific experience in NRW management, sector policy dialogue and development and water utility management, are supplementary assets; experience in cost estimate of urban water supply systems is required; and experience in similar ADB Feasibility Study in Central Asian countries is highly desirable. The Financial Management Specialist (national) will have a bachelor's in financial management or a relevant field and have certified public accountant or equivalent qualifications with 10 years of relevant work experience in project financial analysis and municipal finance; adequate work experience with international finance institutions in development projects; and knowledge of ADB procedures and experience in ADB-financed projects will be an advantage. The specialists will be responsible for the following tasks:

(i) coordinate, and collaborate with the team leader to ensure timely delivery of outputs detailed in para. 5;
(ii) review the regulatory frameworks in the water supply and sanitation sector and assess the adequacy of any reforms for the water supply and sanitation sector to provide suitable recommendations;
(iii) propose mechanisms aimed to foster improved coordination among various organizations and stakeholders involved in the water supply and sanitation sector;
(iv) review the legal, regulatory, and financial framework for the sector, and determine areas for improvement for the utility companies;
(v) assist in the social/household survey for willingness to pay and affordability analysis;
(vi) undertake a tariff and affordability study to propose a tariff setting mechanism for full cost recovery for urban water supply and sanitation projects, including experience and lessons learned from best international practices in developed and developing countries, and recommendations on transparent, equitable and efficient mechanisms for services tariffs setting;
(vii) review and analyze the financial performance of the water utility companies; regarding cost recovery, collection of fees and taxes, accounts receivable, and subsidies as appropriate
(viii) provide inputs to the team leader, institutional and water utility specialists to identify specific needs and to tailor suitable capacity building programs targeting particularly: (a) financial sustainability, (b) tariff setting, (c) system management, and (d) utility management;
(xi) in coordination with the team leader, identify and propose a capacity building program for strengthening institutional structure and implementation capacity of the Astana SU Arnasy with respect to financial sustainability and tariff setting, governance, utility performance, and private sector participation for (a) the

management, and (b) the operational staff of the Astana SU Arnasy identifying specific needs for technical capacity building that must be provided to the Astana SU Arnasy personnel in charge of operation and maintenance through on-the-job training to secure sustainable operation and maintenance of the assets in the long term;

(xii) together with economists, conduct initial financial and economic analysis of the investment proposal and assist in streamlining and prioritizing them; and

(xiii) contribute to workshops, seminars and reports.

8. Urban and Land Use Planner (international, 2 person-months) and **Urban and Land Use Planning Specialist** (national, 4 person-months)

14. The specialist will have a degree in the urban and regional planner (international, intermittent) will, and should have at least 15 years of experience in urban planning, master planning and development, urban renewal and rehabilitation, policy and management, institutional analysis, knowledge and capacity, and skill enhancement; having worked with multiple stakeholders (including government, private, and development partner agencies), and excellent English language skills, including the ability to deliver oral presentations and produce high-quality written reports. The specialist should have demonstrated ability to prepare city development strategies, masterplans and urban assessments or water sector assessments and roadmaps. Work experience in Central West countries especially Kazakhstan will be an advantage.

(i) prepare an urban profile covering economic competitiveness, environmental sustainability, and equity aspects of the city, which will assess and review the following:
   a) urbanization trends – population increase and demands on urban infrastructure, municipal finances – national programs, subsidies to the sector – especially water supply and sanitation, governance – responsibilities and roles, and institutional capacity to undertake urban development programs and projects; and
   b) existing spatial masterplan and land-use plan medium- and/or long-term urban sector plans, such as
      i) policies, plans, standards, and studies for urban infrastructure investments, spatial planning, design, and management;
      ii) socioeconomic development plans and city masterplans, social equity concerns, and policy and institutional reforms;
      iii) subsector development plans, including urban roads and drainage, water supply and sanitation, solid waste management, urban transport, housing, heating and electricity, street lighting, energy efficiency, urban renewal, and national tourism development strategies;
      iv) construction standards and building codes, including certification; and
      v) sustainability of investments, including the vulnerability of critical infrastructure to climate change;
   c) potential for regional development approach such as clustered cities and economic corridors for tourism and local economic development;

(ii) identify future spatial development policies related to:
   a) land management, including mixed land use, densification, quality of affordable housing, public space management, women's safety, street lighting, home zones, urban farming, and technologies related to heritage conservation and green buildings;

b) sustainable urban transport for transit-oriented development and tourism infrastructure;
c) climate risk and vulnerability assessment:
    i) infrastructure resilience, climate change adaptation and mitigation options, potential for greenhouse gas (GHG) inventory,
    ii) adequacy, coverage, and efficiency of urban services;
    iii) water supply and sanitation investment needs and policies related to
        a. water resource management and governance; the use of a relevant regulatory framework; demand-side management and planning; institutional coordination and capacity; water security (household, economic, and environmental); the control of waterborne diseases; and resilience to water-related disasters;
        b. water supply infrastructure—coverage, access, and service quality; energy efficiency; and nonrevenue water;
        c. sanitation and wastewater management—access to sanitation, sewerage collection, recycling and disposal facilities; and
        d. flood control, including efficient street drainage.
    iv) solid waste management investment needs, including policies and applications; a regulatory framework; planning; institutional coordination and capacity; sewerage and septage collection; treatment plants and technology; and e-waste disposal;
        (a) the potential for redeveloping and retrofitting
            i. cultural heritage buildings (conservation and urban regeneration);
            ii. brownfields, including industrial, housing, and informal settlements;
            iii. buildings to improve energy efficiency; and
            iv. innovative, low-carbon technologies for urban infrastructure.
        (b) good practice examples and their potential for replication, including:
            i. environmental infrastructure, disaster risk management, and the climate resilience of critical urban infrastructure and services; and
            ii. livelihoods and creation of jobs through improved tourism, agro-business, green industries, logistics hubs, and low-carbon transport;
        (c) the prioritization of investments using a multicriteria economic analysis to establish a valuation methodology to capture co-benefits from multisector urban projects; and
        (d) an investment program comprising short-, medium-, and long-term investments with an implementation plan, including institutional responsibilities, co-benefits, key timelines, and costing.

(iii) contribute to workshops, seminars, and reports.

9. Economist (international, 2 person-months; national, 3 person-months)

15. The economists will have an advanced degree, preferably a PhD, in economics, or a related discipline. The specialist will have at least 7 years of experience in economic research and economic analysis of investment proposals. For international economics, demonstrated knowledge of, and ideally experience in Central and West Asia and good knowledge of Russian language would be preferred. For national economist, experience in external financed projects in

water sector would be an asset. Specifically, the economists will undertake but not limited to the following tasks:

(i) collect and evaluate relevant socioeconomic data focusing on domestic, municipal, and industrial water use;
(ii) assist in the social/household survey on willingness to pay and affordability analysis;
(iii) analyze economic efficiency of water use in Astana, and assess economic impact of possible water shortages and major flood events in Astana;
(iv) review the Astana's economy patterns and economic growth trend, and assess the projections for future economic growth;
(v) preform initial economic analysis of the ACA's investment proposals in water management and services and assist in prioritizing and streamlining the investment proposals;
(vi) assist in reviewing water tariff structure and levels and provide recommendations for streamlining water tariffs and offering incentives for water savings; and
(vii) contribute to workshops, seminars, and reports.

10. Social and Gender Specialist (national, 1 person-months)

16. The social and gender specialist will have (i) a university degree or equivalent in social sciences, development studies, or other relevant discipline; and (ii) at least 7 years of work experience in areas of social development, gender analysis and mainstreaming, preferably international development banks. Specifically, the specialist will undertake, but not limited, to the following tasks:

(i) oversee the design, preparation, and implementation of social/household survey for households' willingness to pay and their affordability to pay, including collection of secondary data on vulnerability issues and affordability issues;
(ii) under the overall guidance of the team leader, conduct public consultations with key stakeholders including women residents for the development of the integrated water master plan;
(iii) conduct the social and gender analysis, and assess how the master plan can improve gender equality and social considerations;
(iv) assist in reviewing water tariff structure and levels and provide recommendations for streamlining water tariffs and offering incentives for water savings, including incentives for women's role in water saving; and
(v) contribute to workshops, seminars, and reports.

D. Reporting Requirements

17. The consultant will produce (i) an inception report within 6 weeks from TA commencement, (ii) an interim report 5 months after TA begins, (iii) a draft final report 10 months after TA commencement, (iv) the final report within two weeks after receipt of ADB and ACA's comments, and (v) other special reports as outlined in the table below. The reports will be reviewed by the ACA and ADB, and comments will be provided to the consultant. All reports are to be written in English and translated into Russian. Five copies of each report are to be submitted to ADB, and 10 copies are to be submitted to ACA, including electric copies.

Deliverables/Reports Required

Deliverables	Timeline	Remarks
Incept Report	**By Week 6**	
An evaluation report on water resources availability and current water use	By Month 2	
GIS based data and information system on current water resources available, used, and water infrastructure	By Month 3	
A projection for future water use and wastewater generated in line with Astana's urban master, land use plan, and other available plans	By Month 4	
An assessment report on international best practices in water management in major cities and their applicability in Astana	By Month 4	
An assessment report on alternative water sources, including reuse of treated wastewater, beneficial use of flood water, joint use of groundwater, and storm water	By Month 5	
Interim Report	**By Month 5**	
Recommendations for institutional reform, policy incentives including water supply and wastewater tariff, application of water saving technologies	By Month 8	
Recommendations on development of storm drainage in Astana and mechanisms for a unified system of water disposal and tariff setting for services on rain and snow meltwater	By Month 8	
Integrated water master plan	Draft by Month 9 Draft final by Month 10	
An assessment report of the investment needs for Astana to implement the integrated master plan complemented	By Month 10	
A list of projects, including potential financing sources, identified, and prioritized	By Month 10	
Draft Final Report	**By Month 10**	
Final Report	**By Month 12**	