TERMS OF REFERENCE FOR CONSULTANTS

Asian Development Bank and the Islamic Republic of Pakistan
TA 51324-001 PAK: Revitalizing the Ecosystem of Ravi River Basin
Terms of Reference for an International Consulting Firm or Consortium
Consultancy Services for River Basin Assessment and Management Planning

I. BACKGROUND

1. ADB is preparing a knowledge and support technical assistance (TA) to develop a plan to revitalize and build resilience in the Ravi River Basin in the Province of Punjab, Pakistan. A team of consultants, which will comprise international and national experts led by an international consulting firm (ICF), will be engaged with performance-based procurement by the Asian Development Bank (ADB) in accordance with its Procurement Policy (2017, as amended from time to time) and its associated project administration instructions and/or technical assistance staff instructions.

2. The Ravi River is one of the six transboundary rivers of the Indus River system. It flows from the Himalaya in northwestern India through eastern Pakistan. The river merges into the Chenab River and then the Indus, which flows to the Arabian Sea. About 50 million people live in the basin within Pakistan.[1] This includes 24 million urban dwellers in Punjab's major cities of Lahore (population 11 million) and Faisalabad (4 million), and in about 70 other urban areas. The basin experiences huge flow variations, ranging from 10 cubic meters per second in the dry season to 10,000 cubic meters per second in the wet season.

3. The river provides critical ecosystem services that support Punjab's economy. The river forms part of the Indus Basin Irrigation System within Punjab, the world's largest contiguous irrigation system, and irrigates 2.9 million hectares of agricultural lands that account for about 30% of Pakistan's agricultural cultivation. The river's previously rich biodiversity hosted at least 31 fish species, among other wildlife, that offered livelihoods for Punjab's rural poor.[2] Its partial flow through the Lahore Canal also has recreational and cultural value to residents of Lahore

4. Despite its economic value, the river basin has become heavily polluted since the 1990s. Punjab's cities, industries, and agricultural areas have developed without effective infrastructure to control, capture, and treat their discharges of polluted water, and without effective policies and regulations in place to reduce the pollution at source. This problem is not unique to the Ravi basin but is made worse there because of its large population and many farms, cities, and industries. Pakistan treats only about 1% of its urban wastewater.[3] The ADB country partnership strategy for Pakistan notes that Pakistan's environmental management is weak and ineffectual, with root causes including policy and regulatory gaps, insufficient monitoring and enforcement, technical and capacity constraints, low public awareness, and low levels of investment.

5. Pollution of the river basin and its health risks are not well documented. The river is biologically dead (i.e., lacking dissolved oxygen) along much of its reach downstream of Lahore, according to a 2009 report by the Punjab EPD.[4] The report noted major pollution sources as

[1] Pakistan Bureau of Statistics. 2017. *District-Wise Census Results: Census 2017*. Islamabad.
[2] U. Moza. 2014. *River Ravi Ecology and Fishery*. Delhi: Indian Council of Agricultural Research.
[3] Friends of Democratic Pakistan, Water Sector Task Force. 2012. *A Productive and Water-Secure Pakistan: Infrastructure, Institutions, Strategy*. Islamabad.
[4] Government of Punjab, EPD. 2009. *Environmental Monitoring of River Ravi*. Lahore.

household wastewater, industrial effluent, agricultural runoff, and solid waste.[5] A 2014 report by the World Wide Fund for Nature Pakistan (WWF-Pakistan) assessed the situation of the river near Lahore, mapping major urban drains and industrial discharges, and concluded that the Ravi is Punjab's most polluted river.[6]

6. Notwithstanding lack of data, experts agree that pollution has been creating major health, environmental, food, and water safety risks that hurt Punjab's economy and worsen its poverty. Poor sanitation and wastewater management in Pakistan cost 3.9% of gross domestic product in 2006, of which about 90.0% was health related.[7] In 2015, more than 50% of all reported diseases in Punjab were waterborne.[8] Pakistan has insufficient water resources, and poor water quality makes this worse. Farmers, for instance, are forced to use polluted water to irrigate their crops, which creates scarcity of safe food as heavy metals and harmful chemicals can accumulate in crops irrigated with polluted water. Fish and other wildlife cannot live in a dead river, depriving rural poor people of a critical food source and livelihood. The river's recreational and cultural value has also declined, with media reports characterizing it as a "dumping pit" and "sludge carrier."[9] Pollution has a direct economic impact on local water suppliers as well. The Water and Sanitation Agency in Lahore, for example, reportedly needs to draw groundwater from depths of about 200 meters—with major pumping costs—to avoid pollutant contamination at shallower depths.

7. Pakistan is among the world's most climate-vulnerable countries, and climate change may alter the river's flow and increase floods and droughts that worsen pollution risks. Regional climate change models project that, by mid-century, the river's seasonal flow variations may increase because of rainfall variability, glacial melt, and rising water demand from higher temperatures.[10] Climate change could raise the risk of extreme floods or droughts, which pose major economic threats to the basin's 50 million people. Droughts and reduced flows can concentrate pollutants in the river, while floods can create pollution spikes by washing polluted soil and solid waste into the river.

8. Risks will worsen without urgent action by the government and society. The government needs to strengthen its policies, institutions, and regulations to improve water quality management in the basin. Punjab's cities, industries, and agricultural areas need to invest in pollution control infrastructure and services. Policies and investments also need to be resilient to reduced river flows and increased flow variability that may be caused by climate change.

9. Punjab has requested ADB support to ensure that its actions avoid repeating past failures. Pollution in the Ravi River has been a known problem since at least 1995, though past clean-up efforts rarely moved beyond the concept stage.[11] Two national water sector strategies from 2002 and 2012 highlighted the need to clean up the river and included investment

[5] The report, however, has questionable data because of flawed sampling methodologies.
[6] A. Qureshi and A. H. Sayed. 2014. *Situation Analysis of the Water Resources of Lahore: Establishing a Case for Water Stewardship*. Lahore: WWF-Pakistan. The report also lamented the lack of available data on pollution levels and impacts.
[7] World Bank. 2011. *The Economic Impacts of Inadequate Sanitation in Pakistan*. Islamabad.
[8] Government of Punjab, Planning and Development Department. 2015. *Punjab Growth Strategy 2018: Accelerating Economic Growth and Improving Social Outcomes*. Lahore.
[9] I. Gilani. 2015. River Ravi Pollution Puts Lives at Risk. *The Nation*. 2 February; and S. Malik. 2012. Water Pollution: Ravi No Longer a River, but a Sludge Carrier. *The Express Tribune*. 12 April.
[10] ADB. 2017. *Climate Change Profile of Pakistan*. Manila.
[11] ADB. 2015. *Fourth ASEAN Chief Justices' Roundtable on Environment: Role of the Judiciary in Environmental Protection—The Proceedings*. Manila.

proposals, but these have not materialized.[12] A government-endorsed wastewater treatment feasibility study prepared with financial support from the Japan International Cooperation Agency in 2009 recommended a $413 million investment, while a similar study by a French consultant in 2011 recommended a $118 million investment. Neither project went ahead (footnote 11). In 2012, the Lahore High Court ordered the establishment of the Ravi River Commission to help clean up the river. The commission reviewed the situation and prepared a report recommending a low-cost ($500,000) bioremediation plant in Lahore as a first step (footnote 11). Soon after, however, the Lahore Development Authority proposed a $3 billion waterfront urban development project for the river that could preclude the treatment plant and pose further environmental risks. These organizations have been debating the issue in court and progress has stalled.

10. Technical and institutional constraints prevented the success of these efforts. The government has struggled to prioritize pollution risks to date because of lack of data and awareness on the risks and impacts of pollution, and cost-effective ways to reduce pollution. Solving the problem also needs a coordinated, multistakeholder response to reduce pollution at different sources, including local governments, industries, and urban service providers in basin cities and towns. The Ravi lacks a river basin management agency or its equivalent that could coordinate its many stakeholders and decide on issues such as the conflicting bioremediation and waterfront development projects mentioned in para. 9.

11. With growing public awareness of the pollution crisis, the government of Punjab has appointed new environmental managers in the EPD and committed to take actions for the river basin with ADB assistance. The EPD has already budgeted for a contribution of up to PRs200 million to support this effort. The proposed TA aims to contribute to addressing the pollution crisis by improving monitoring and enforcement capacity, filling regulatory and institutional gaps, raising awareness on pollution risks and cost-efficient ways to reduce pollution, and increasing levels of investment and public priority toward this crisis. The TA will support activities to assess the pollution problem, identify and close institutional gaps, raise awareness, and develop a long-term plan to revitalize and build resilience in the basin, with detailed investment recommendations.

12. ADB is a strong partner to Pakistan and offers experience from its portfolio of river revitalization projects elsewhere.[13] For example, ADB funded a TA to clean up the Songhua River Basin in the People's Republic of China (PRC) in 2002. The work was rated *highly successful* and led to an ongoing, now 15-year engagement in the basin, with projects comprising $1.2 billion of ADB financing.[14] ADB also offers lessons from its "GrEEEn Cities Operational Framework", such as its multi-stakeholder work to revitalize the Melaka River in Malaysia, and the TA team will consider opportunities to develop Green City Action Plans or similar initiatives for champion cities in the basin.[15] ADB will also add value by leveraging potential cofinance for proposed investments, such as from the Green Climate Fund.

[12] Footnote 3; and Government of Pakistan, Ministry of Water and Power. 2002. *Pakistan Water Sector Strategy*. Islamabad.
[13] As such, a grant-financed project approach is not preferable, as it would impede this lesson learning.
[14] ADB. 2006. *Technical Assistance Completion Report: Songhua River Water Quality and Pollution Control Management*. Manila.
[15] ADB. 2016. *GrEEEn Solutions for Livable Cities*. Manila.

II. OBJECTIVE AND PURPOSE OF THE ASSIGNMENT

13. The objective of the assignment is, as a part of the proposed TA, to support the Government of Punjab to undertake a comprehensive assessment of the pollution situation in the river basin and to develop a long-term, multi-sectoral plan to revitalize and build resilience in the basin, including recommendations for investment projects and institutional reforms.

III. CONSULTING SERVICES AND IMPLEMENTATION ARRANGEMENTS

14. The overall implementation arrangements for the TA includes this ICF and a knowledge partnership between ADB and WWF Pakistan. The ICF and WWF Pakistan will each be responsible for separate deliverables, but are expected to coordinate and cooperate closely during their work.

15. ADB will administer the TA and will select the ICF. ADB and the government of Punjab will coordinate the TA activities and will oversee the timely delivery of the deliverables of each partner and consultant. The indicative implementation period will be March 2018–September 2019, which is sufficient to mitigate risks of delay. The Punjab Planning and Development Board will chair a TA steering committee of government departments. The EPD, through its Strategic Planning and Implementation Unit, will be the executing agency and provide day-to-day support to the activities and coordination of the steering committee and its technical working group(s). The ICF team will report to the ADB Team Leader and the designated officials from the TA Steering Committee.

16. The TA steering committee will convene to make key decisions on TA progress and deliverables, and may comprise senior staff from the following Punjab government agencies and partners (subject to confirmation and after TA approval): EPD; Irrigation Department; Agriculture Department; Local Government and Community Development Department; Primary and Secondary Health Care Department; Housing, Urban Development, and Public Health Engineering Department; Industries, Commerce, and Investment Department; and WWF-Pakistan.

17. The TA will convene technical working group(s) to support the ICF and partners with their day-to-day activities, and these groups may comprise mid-level staff from the steering committee member agencies, as well as from agencies such as the Punjab Food Department; Punjab Forest, Wildlife and Fisheries Department; local chambers of commerce; prominent local academics; Indus Waters Commission; urban water and sanitation agencies; urban waste management companies; urban development authorities; and the Urban Unit.[16] The TA may also engage national agencies where relevant, including the Ministry of Water Resources, the Pakistan Environmental Protection Agency, and the Planning Commission.

18. This is a complex assignment and ADB will select the ICF using performance-based procurement, including quality-based selection with preparation of full technical proposals. The ICF will need to handle multiple stakeholders effectively while remaining focused on the TA's outcome of improving environmental water management in the river basin through new investments and institutional reforms.

19. ICF experts should be based mainly in Lahore for the duration of the assignment. The EPD may be able to provide office space. Interested proposing entities may contact the EPD to

[16] The TA should engage urban agencies from at least three major cities in Punjab, including Lahore.

assess the available space and whether it suits their needs or whether to propose additional or separate office costs. The expected duration of the assignment is 15 months from the start date, expected to be April 2018, and the assignment of experts is intermittent in nature. The terms will be revised based on consultations between the parties involved in the assignment per changes and/or additional requirements identified during implementation.

IV. SCOPE OF WORK

20. The ICF will lead most of the activities to deliver the TA, including technical assessments of pollution and climate risks in the basin and their health risks; institutional assessments of the existing arrangements for environmental water management; multi-stakeholder visioning and basin planning exercises; trainings and workshops; public outreach and awareness raising; comparative cost-benefit analyses of potential investment options; pre-feasibility studies including economic, financial, and safeguard analyses; and other on-demand support as needed. The tasks and outputs are defined below. The ICF will act as a credible scientific assessment center and as a change management agent to facilitate the planning process, liaising regularly with government and other key stakeholders. An international team leader will lead the ICF's work, will report to ADB and the TA Steering Committee, and will coordinate and cooperate closely with the other TA partners.

V. DETAILED TASKS

21. The ICF team will undertake a comprehensive assessment of the pollution situation in the basin, its health impacts, its risks and vulnerabilities from climate change, and its related institutional gaps and development needs. The team will use these results to facilitate the development of a long-term, multi-sectoral plan to revitalize and build resilience in the basin, including recommendations for investment projects and institutional reforms. The plan will include at least one or two pre-feasibility studies for priority projects selected by ADB and the TA Steering Committee during the process, for follow-on ADB transaction technical assistance and possible investment. More specifically, the ICF will be responsible to manage the implementation of the outputs, deliverables, and tasks below.

Output 1: Successful management, reporting, communications, and coordination among key stakeholders

I. Maintain close communication and coordination with ADB, the TA Steering Committee, the TA technical working group(s), and WWF Pakistan, to ensure the quality and timeliness of TA implementation;
II. Mobilize rapidly after contract signature and work productively throughout the duration of the TA;
III. Prepare an **inception report** that proposes the structure for each subsequent deliverable and that details a project work plan, project communication plan, risk management framework, and staffing structure to deliver the outputs of the contract on time and on budget;
IV. Manage the implementation of contract activities in relation to the inception report work plan, and take corrective action as required, to ensure timely delivery of TA deliverables in consultation with ADB and the TA Steering Committee;
V. Organize workshops, meetings, and trainings as necessary, in consultation and close coordination with the key stakeholders;
VI. Prepare brief **interim reports**, indicating activities undertaken to date, any issues arising, actions suggested to address the issues or improve project delivery, a

reflection on project risks and communications, and updated timelines for the remaining contract activities and deliverables;

VII. Prepare a **final report**, reflecting on activities undertaken, any issues arising, actions taken to address the issues or improve project delivery, project risks and communications, lessons learned for future work, and recommendations for scaling up the TA's efforts at national level and in other polluted river basins in the country; and

VIII. Undertake other reasonable tasks as may be required from time to time.

Output 2: Successfully document and assess the water pollution situation and water quality levels in the basin

I. Review and gather data on the hydrology, geography, hydrogeology, climate, and demography of the river basin;

II. Review and gather data on past studies of pollution, ecotoxicology, and water quality in the river basin and in its adjacent shallow groundwater aquifers, including sources of pollution along its length within Pakistan, levels of transboundary pollution, and quantity and characteristics of pollution discharges (considering both liquid and solid waste discharges);

III. Undertake an initial visual assessment of key parts of the river and its tributaries and drains, and of the EPD laboratory and other accredited laboratories, and undertake trial runs of surface and groundwater, soil, and food sampling (e.g., at-risk crops and fish);

IV. Develop a **pollution assessment methodology report**, which proposes an annotated table of contents for the final pollution assessment report and gives proposed approaches to: (i) map key sources of pollution to the river and its tributaries and aquifers (use of innovative remote sensing and modeling approaches will be valued); (ii) sample surface and groundwater / soil / food quality at strategic locations along its length in at least two rounds of sampling (one in dry season and one in wet season); (iii) estimate a water balance of the river and the possible impacts of water abstraction on the pollution situation and propose, for each significant river stretch, a minimum flow for each stretch, according to seasonal variation; (iv) conduct activities jointly with EPD laboratory staff where possible to build their capacity; (v) analyze and present the data for effective public awareness, including close attention to delivering credible results (use of independent, international laboratories to check some of the samples may be necessary in this regard); and (vi) generate actionable recommendations on key pollution hotspots to target for improving the basin's water quality;

V. Undertake the pollution assessment as described in the methodology and as modified by comments from ADB and the TA Steering Committee; and

VI. Finalize the results and prepare a **pollution assessment report** that details the findings.

Output 3: Successfully document and assess human health risks and impacts arising from the water pollution situation in the basin

I. Review and gather literature data on human health risks that may arise from pollutants found in the river basin, including impact pathways and toxicity thresholds;

II. Review and gather data on past studies of pollution and its health impacts in the river basin, including known communicable and non-communicable disease outbreaks (e.g., there are reports of villages suffering bone deformities and skin lesions linked to their use of polluted river water);

III. Undertake initial visits to local health centers; conduct interviews with medical practitioners and affected villagers and medical practitioners; and collect data related to health impacts of pollution on people living along the river's course within Punjab;
IV. Develop a **health impact assessment methodology report**, which undertakes a scoping process to identify affected community groups and their health status, proposes an annotated table of contents for the final health impact assessment report, and gives proposed approaches to: (i) establish a historical baseline of existing health conditions in the river basin; (ii) assess the current status and determinants of health in a sample of rural and urban communities in the basin; (iii) assess people's access and use of healthcare services at different levels, and the capacity of the local healthcare system, both in general and in terms of its capacity to prevent, identify, and treat pollution-related ailments; (iv) assess the status of any relevant government health programs being implemented in the basin; (v) analyze and present the data for credibility and effective public awareness; and (vi) generate actionable recommendations to reduce and mitigate current and future health impacts from pollution in the basin, including cost estimates;
V. Undertake the health impact assessment as described in the methodology and as modified by comments from ADB and the TA Steering Committee; and
VI. Finalize the results and prepare a **health impact assessment report** that details the findings.

Output 4: Successfully document and assess climate change impacts, risks, and vulnerabilities in the basin and their links to the water pollution situation

I. Review and gather data on mean and seasonal climate and hydrology of the river basin;
II. Review and gather data on past studies of climate change impacts in Pakistan, climate change impacts on water quality and quantity, and relevant adaptation measures;
III. Develop a **basin-level climate resilience assessment methodology report**, which proposes an annotated table of contents for the final basin-level climate resilience assessment report and gives proposed approaches to: (i) develop an inventory of climate data, including data on average, minimum, and maximum temperature, precipitation, physiologically equivalent temperature, relative humidity, soil moisture, runoff, frequency of severe storms, floods and droughts, and degree of climate variability for historical timeframes, and compare with projections from climate models for future timeframes relevant to the investment planning process, ideally using downscaled data at basin level; (ii) develop flow simulations for the river basin, based on an assessment of expected changes in the pattern and level of precipitation, which may involve modeling of the entire river basin beyond the boundaries of Punjab since climate impacts are expected to affect upstream glacier and snowpack dynamics; (iii) develop median and more extreme scenarios for key climatic parameters and associated climate-related hazards under climate change using the most current and credible sub-regional climate projections available; (iv) identify potential changes in the monthly, seasonal, and annual discharge patterns and inflows of the river, as well as changes in water withdrawals and consumption due to climate change and the implications for people, assets, and systems in the basin, including consideration of both acute and sustained risks and interactions with current levels of pollution in the basin; (v) examine available data and evidence on patterns and trends in groundwater storage and availability, particularly related to flow patterns of the river

and to abstraction for agriculture, drinking water supply, and other uses, and identify potential changes due to climate change; (vi) assess options and actions, for climate-proofing and adaptation measures for hard and soft potential future investments in pollution control and water quality management, and estimate their costs; (vii) analyze and present the data for credibility and effective public awareness; and (vi) generate actionable recommendations to reduce vulnerability in the basin through efforts to control pollution while ensuring that such efforts are themselves resilient to future climate change impacts;

IV. Undertake the basin-level climate resilience assessment as described in the methodology and as modified by comments from ADB and the TA Steering Committee; and
V. Finalize the results and prepare a **basin-level climate resilience assessment report** that details the findings.

Output 5: Successfully document and assess water quality institutions and political economy in the basin

I. Convene individual and group meetings and workshops with key stakeholders, including the proposed members of the TA Steering Committee and technical working group(s), and representatives from at least three of the major cities in the river basin, to understand their mandates, relevant past and ongoing initiatives, and key requests and roles within the basin revitalization process;
II. Compile and review old feasibility studies, project designs, investment plans, sector strategies, and other relevant work undertaken or developed by these stakeholders;
III. Compile and review relevant national and provincial legal policies, regulations, institutional information, investment priorities, projects, and other information necessary to understand the current institutional environment for advancing pollution control and water quality management efforts;
IV. Develop an institutional and political economy assessment methodology report, which proposes an annotated table of contents for the final institutional and political economy assessment report and gives proposed approaches to: (i) identify current institutional strengths and weaknesses; (ii) identify key operational and policy gaps; (iii) assess the status and effects of ongoing water quality and pollution control efforts within the basin; (iv) analyze and present the data for credibility and effective public awareness; and (v) generate actionable recommendations to close institutional gaps and strengthen institutional mandates and functions, coordinating as necessary with another, ongoing ADB TA that aims to transform the Punjab Irrigation Department into a Water Resources Department (whose new mandate may involve a stronger focus on water quality management);[17]
V. Undertake the institutional and political economy assessment as described in the methodology and as modified by comments from ADB and the TA Steering Committee; and
VI. Finalize the results and prepare an **institutional and political economy assessment report** that details the findings.

Output 6: Successfully prepare a manuscript for an ADB knowledge product that summarizes the TA pollution assessment effort

[17] ADB. 2016. *Technical Assistance to the Islamic Republic of Pakistan for the Institutional Transformation of the Punjab Irrigation Department to a Water Resources Department*. Manila.

I. Summarize the key results of the four reports from Outputs 2–5 into **at least one ADB knowledge product manuscript** (a technical report, a flagship report, and / or a series of policy briefs and awareness-raising materials – to be proposed by the ICF) aimed at public and government audiences in Pakistan and other ADB member countries, including basic layout and ideally submission of both English and Urdu versions.

Output 7: Successfully undertake multi-stakeholder visioning exercises that develop an analytical framework for the plan to revitalize the basin

I. Convene multi-stakeholder meetings and visioning exercises to facilitate their development of a time-bound vision statement reflecting how these stakeholders see the future of the river basin and its water quality;
II. Convene multi-stakeholder meetings and workshops to discuss and agree the key elements and sections needed for an effective and sustainable plan to revitalize the basin (e.g., on institutional roles, responsibilities, and financing commitments; on priority investment projects and institutional reforms; and on future capacity development needs) as well as the necessary technical analyses that will underpin the plan (e.g., cost-benefit analyses of different investment and institutional reform options, hydrological and pollutant flow modeling from different options and their comparative effects on total pollution levels in the river basin, etc.);
III. Develop and propose a structured consultation process and ranking method (e.g., multicriteria analysis) for identifying and prioritizing potential investment projects, and validate it with the TA Steering Committee; and
IV. Prepare a **multi-stakeholder visioning report** summarizing the results of the reviews and discussions.

Output 8: Successfully undertake training and international exposure for key government officials to support the planning process

I. Design and undertake a study trip for selected government officials to relevant ADB-funded river revitalization activities in the People's Republic of China (proposing entities' financial proposals should include all costs for this trip[18]), such as to the Songhua River Basin, preparing a **study trip proposal** prior to ADB authorizing the trip that describes a structured selection process for participants, the agenda, training methods, and cost estimates, and a **study trip report** after the trip that summarizes the event;
II. Provide ongoing, on demand leadership of any trainings and workshops needed for the successful implementation of the TA, including their design, preparation, facilitation, and/or reporting, with due consideration to involve lessons learned and expert trainers or resource speakers from ADB's relevant work in the Bagmati River Basin of Nepal, the Melaka River in Malaysia, various rivers in the People's Republic of China, and elsewhere within ADB member countries.

Output 9: Successfully develop the draft and final revitalization and resilience plan for the basin with feedback from stakeholders, long-listing potential investments and prioritizing roles and actions

I. Based on the agreed framework of the multi-stakeholder visioning report, undertake the technical analyses and develop the sections and elements into the

[18] Some in-kind support to arranging visas and logistics may be provided by ADB's People's Republic of China Resident Mission or by local executing agencies of ADB projects, which will be confirmed during the study trip preparation phase.

draft revitalization and resilience plan, which should include substantial detail to prioritize a long list of investment options and institutional reforms (for short-listing by the TA Steering Committee and ADB) and to propose institutional roles, responsibilities, and financing commitments. The plan should include attention to the following issues and investments, among others:

- Urban planning and wastewater treatment, industrial and agricultural effluent control, solid waste management, waterborne and non-communicable disease control, setting up a river basin management agency or equivalent, strengthening the EPD's monitoring and enforcement mandate;
- Assessment of "nature-based" pollution treatment, resource recovery, and bioremediation options compared to more "conventional" or high-technology options;
- Assessment of centralized versus decentralized treatment alternatives;
- Assessment of potential public-private partnerships, especially for urban wastewater treatment in cities like Lahore, where several feasibility studies were previously prepared and may still have viable components;
- Comparative assessment of efforts to treat pollution discharges (from urban, industrial, agricultural, and solid waste discharges, among others), versus those to reduce them at source, versus those to secure additional water quantities in the river to dilute existing pollution (e.g., from link canals, from efforts to improve water use efficiency by existing users especially agriculture, and/or from efforts to secure minimum environmental flows from India through the Indus Waters Treaty)
- Comparative assessment of both traditional, project-based investment packages and more innovative, policy-based, sector-based, or results-based investments, following ADB's typical structuring of project loans, policy-based loans, sector loans, sector development programs, or results-based loans, as discussed in its Operations Manual;
- Consideration of potential external financing sources for the actions of the plan, such as the Green Climate Fund or Global Environment Facility, among others;
- Consideration of environment safeguards and land acquisition and resettlement safeguards for potential investments in line with ADB's Safeguard Policy Statement (2009), including how these may affect project viability; and
- Consideration of the economic and financial viability of long-listed investments, in line with ADB's Guidelines for the Economic Analysis of Projects (2017) and technical guidance notes on Financial Management Assessment (2015), Project Financial Reporting and Auditing (2015), Preparing and Presenting Cost Estimates for Projects and Program Financed by the Asian Development Bank (2014), and Financial Management and Analysis of Projects (2005).

II. Alongside the planning process, provide advisory support to the EPD on the use of their PRs200 million budgeted contribution to support the TA outcome, which may include providing training, design advice, or a pre-feasibility study for a nature-based pollution control project that aligns with the planning process;[19]

[19] Proposing entities should prepare for a flexible approach to this activity in their proposals, which may need to occur early in the TA process prior to the start of the main visioning and planning stage, and which may require anywhere from a small to significant amount of time inputs, depending on the EPD's flexibility with the funds and their

III. Present the draft plan to the TA Steering Committee and facilitate multi-stakeholder meetings and workshops to review and prioritize the long list of investment and institutional reform options proposed into workable short lists for short-, medium-, and long-term investment horizons (e.g., 0–5, 5–15, and 15–25 year horizons), and to clarify and agree roles, responsibilities, and financing commitments;
IV. Facilitate meetings with the TA Steering Committee to agree one or two priority projects from the short list for immediate follow-on investment by ADB or other development partners in the short-term;
V. Incorporate feedback received and prepare the **final revitalization and resilience plan**, which should be professionally edited and laid out as a public document.

Output 10: Successfully develop pre-feasibility studies – or update existing feasibility studies – for the one or two priority projects selected by the TA Steering Committee and ADB, and provide inputs to ADB's follow-on project concept paper(s) and transaction technical assistance proposal(s)

I. Depending on the status of the investment concepts, undertake necessary field visits, data collection, designs, sector assessments, environmental and social safeguard analyses, economic and financial viability analyses, poverty and gender strategies, and/or risk assessments **to prepare one or two full pre-feasibility reports for these concepts, or to update their existing feasibility studies**; and
II. Use the results of these studies to support the ADB Team Leader in preparing necessary internal documentation to enable ADB to begin considering these investment concepts for loan or grant financing – which will include **providing inputs to the project concept paper and its attached transaction technical assistance proposal**, on project rationale, proposed solutions, financing plans, implementation arrangements, safeguards, and terms of reference for consultants to prepare the full feasibility studies (if pre-feasibility studies were prepared) or detailed engineering designs (if existing feasibility studies were updated).

VI. DELIVERABLES

22. Each of the minimum required deliverables listed in Table 1, below, will be reviewed by and will receive inputs from ADB and relevant agencies within the TA Steering Committee or technical working group(s) (e.g., the Primary and Secondary Healthcare Department would probably review the health impact assessment reports). Proposing entities should anticipate that some deliverables may require more than one round of review and should reserve some time for this possibility. The ICF's team will address their comments and inputs from these in finalizing each deliverable. All deliverables shall be produced in English, except where the use of Urdu is justified and agreed in advance by ADB and the TA Steering Committee – e.g., for media or awareness raising materials. Draft deliverables shall be submitted to the designated focal points in the EPD in both hard copy and electronic format, and to ADB in electronic format. ADB will formally accept or return each revised deliverable, guided by the advice of the TA Steering Committee.

23. Upon formal acceptance of each revised deliverable by ADB, the milestone payments will be made by ADB to the ICF per the payment schedule specified in the contract. The ICF may propose a mobilization advance that will be negotiated. The outputs and tentative

capacity to support the process. Any required design work or pre-feasibility study should follow the same principles and processes as those for the main studies in Output 10. Updates on the achievements of this activity should be included in the winning firm's interim and final reports for the TA.

milestone payments are in Table 1. Table 2 presents a tentative payment schedule based on Table 1. Proposing entities may propose alternative completion dates, milestone payment percentages, and payment schedule, though these will be subject to negotiation.

Table 1: Deliverables of the ICF and target milestone dates and payments

Deliverable Number	Deliverable	Tentative Completion Date	Tentative Milestone Payment (% of total)
1.1	Inception report	- Draft due 4 weeks after mobilization - Revised version due 7 weeks after mobilization	2%
1.2	Interim report 1	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	1%
1.3	Interim report 2	- Draft due 38 weeks after mobilization - Revised version due 42 weeks after mobilization	1%
1.4	Final report	- Draft due 58 weeks after mobilization - Revised version due 62 weeks after mobilization	1%
2.1	Pollution assessment methodology report	- Draft due 7 weeks after mobilization - Revised version due 11 weeks after mobilization	3%
2.2	Pollution assessment report	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	8%
3.1	Health impact assessment methodology report	- Draft due 7 weeks after mobilization - Revised version due 11 weeks after mobilization	3%
3.2	Health impact assessment report	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	8%
4.1	Basin-level climate resilience assessment methodology report	- Draft due 7 weeks after mobilization - Revised version due 11 weeks after mobilization	3%
4.2	Basin-level climate resilience assessment report	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	8%
5.1	Institutional and political economy assessment methodology report	- Draft due 7 weeks after mobilization - Revised version due 11 weeks after mobilization	3%
5.2	Institutional and political economy assessment report	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	8%
6.1	Knowledge product manuscript	- Draft due 28 weeks after mobilization - Revised version due 32 weeks after mobilization	3%
7.1	Multi-stakeholder visioning report	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	8%
8.1	Study trip proposal	- Draft due 21 weeks after mobilization - Revised version due 25 weeks after mobilization	2%

8.2	Study trip report	- Draft due 38 weeks after mobilization - Revised version due 42 weeks after mobilization	2%
9.1	Draft revitalization and resilience plan	- Due 38 weeks after mobilization	10%
9.2	Final revitalization and resilience plan	- Due 62 weeks after mobilization	11%
10.1	One or two pre-feasibility study reports or updated feasibility study reports	- Draft due 51 weeks after mobilization - Revised version due 62 weeks after mobilization	11%
10.2	Inputs to ADB project concept paper and attached transaction technical assistance proposal	- Draft due 51 weeks after mobilization - Revised version due 62 weeks after mobilization	4%

Source: Asian Development Bank.

Table 2: Tentative payment schedule

Invoice Number	Tentative Completion Date	Relevant Milestones (if completed and accepted)[a]	% of Total Payment
0	Upon mobilization (optional mobilization advance)	None	N/A
1	7 weeks after mobilization	1.1	2%
2	11 weeks after mobilization	2.1, 3.1, 4.1, 5.1	12%
3	25 weeks after mobilization	1.2, 2.2, 3.2, 4.2, 5.2, 7.1, 8.1	43%
4	32 weeks after mobilization	6.1	3%
5	38 weeks after mobilization	9.1	10%
6	42 weeks after mobilization	1.3, 8.2	3%
7	62 weeks after mobilization	1.4, 9.2, 10.1, 10.2	27%

[a] Milestone numbers correspond to the deliverable numbers in Table 1. Any listed milestone that is delayed or not accepted before its tentative completion date listed in the table may be invoiced for and paid during the subsequent payment.
Source: Asian Development Bank.

VII. REQUIRED EXPERTISE

24. The consultancy will be led by an international firm with preferably 10 years' experience delivering river basin or water quality assessment and management planning, or similar work in closely-related sectors, preferably with ADB and throughout the Asia Pacific region, including Pakistan. Given the complexity of the assignment, ADB welcomes proposing entities submitted by consortia or joint ventures of international and local consultants in order to furnish the skill sets and expertise needed to deliver the outputs successfully. In selecting partners, the lead firm must demonstrate successful experience managing consortia for similar assignments and any sensitivities arising from proposing consultants from countries with whom Pakistan does not share good diplomatic relations. Consortia that include specialized and respected local firms proposed in ways that maximize their expertise will be assessed favorably.

25. The contract will be awarded using performance-based procurement and thus **proposing firms will determine the number and the nature of experts they will require** to achieve the deliverables, in accordance with their proposed approach and methodology. However, **ADB requires all proposing entities to propose a Team Leader**, as detailed below. In addition to this position, **proposing entities must include in their technical proposal,**

personnel work plan, and financial proposal all other experts required in accordance with their proposed approach and methodology.

26. Proposing entities must determine and indicate whether each expert is proposed as an international or national specialist, the number of person-months required for each, and how these inputs will be allocated to achieve each deliverable. Proposing entities are required to propose the Team Leader for **at least four person-months** of inputs, to be based mostly (more than 75%) in Lahore, but are free to propose higher inputs for this expert. All experts proposed must be citizens of one of the ADB eligible countries.

27. Only one curriculum vitae (CV) must be submitted for each expert included in the proposal. The CV of the Team Leader will be evaluated and scored against the minimum person qualifications detailed below. All other CVs will be reviewed and assessed on the relevance of the expert's qualifications and experience against the expert's proposed roles and responsibilities stated in the proposing entities' "approach and methodology".

28. The Team Leader will be assessed on the extent to which their **CV clearly demonstrates** the following core skills and experience for the assignment:

I. At least 15 years of relevant international experience (mostly acquired in lower-income countries) on complex river basin planning, water quality management, pollution control, water resource engineering / water supply and sanitation engineering, urban planning, and/or public health assignments;
II. At least seven years of proven experience as a team leader or as a manager of diverse teams of international and national experts on complex assignments to deliver effective results;
III. Masters' degree or equivalently rigorous professional training in a relevant field, preferably focused on river basin management;
IV. Evidence of continued professional development through relevant training courses and membership in relevant professional associations within the last five years will be preferred; and
V. Evidence of previous assignments with the lead firm or any of its joint venture partners or sub-contracting firms will be preferred.

29. Each proposed expert, including the Team Leader, will also be assessed on the extent to which their **CV clearly demonstrates** the following core skills and experience for the assignment:

I. Strong diplomatic and facilitation skills to operate effectively within a politically sensitive, complex, and multi-stakeholder river basin planning exercise;
II. Strong understanding of technical, policy, and regulatory issues that affect water quantity and quality in lower-income countries, including Pakistan and Punjab;
III. Prior professional experience in Pakistan, ideally in Punjab, is highly desired for the Team Leader and will be preferred for the other international experts;
IV. Proficient oral and written communication skills in English; and
V. Proficiency in Urdu will be preferred.

30. The overall balance and mix of skills within the proposed team of key and non-key experts will also be assessed and awarded points for "approach and methodology" as part of the technical evaluation of proposals. The successful proposing entities' combined skills and team should include, but not be solely limited to:

I. Water, soil, and food quality sampling and laboratory analysis;

II. Water quality management and ecotoxicology, including identifying and characterizing point and non-point source pollution discharges;
III. Health impact assessment of pollution-related ailments and healthcare system assessment with trained medical practitioners;
IV. Climate modeling and data analysis, and identification of climate change adaptation options;
V. Hydrological and hydrogeological modeling and data analysis, including modeling of river self-purification capacity for identified pollution loads;
VI. Public awareness raising and public communications;
VII. Governance, public financial management, legal, institutional, and political-economy analyses;
VIII. Facilitation and consensus building skills for large, mixed groups of stakeholders with competing interests;
IX. Training and capacity building of government officials including study tours, job shadowing, structured learning, twinning arrangements, and international exposure;
X. Transaction support for public-private partnerships; and
XI. Infrastructure identification, prioritization through multicriteria analysis or equivalent, feasibility study, detailed design, modeling, and engineering for water resource, water supply, sanitation, wastewater treatment, river restoration, nature-based treatment and bioremediation, resource recovery, multipurpose green infrastructure, integrated pest management, high-efficiency irrigation, industrial processes, sanitary landfills, and other possible, relevant water quality management investments, including experience with ADB environmental and social safeguards and economic and financial viability analyses.

VIII. PROPOSAL PREPARATION

31. Shortlisted entities will be requested to prepare a full technical proposal. The proposal should include a detailed description of how they propose to deliver the outputs of the contract in the “approach and methodology” section, and should detail the proposed experts and their roles and responsibilities. In this narrative, proposing entities should be explicit in explaining how they will achieve the outputs and include any information on their existing activities upon which they may eventually build. Proposing entities must also describe their experience on similar assignments and their experience in Pakistan.

32. Technical proposals need to demonstrate a deep understanding of the key issues. Merely providing general statements of information and a can-do attitude will not generate high scores. Proposing entities should give a convincing methodology to achieve results, while ensuring optimal value for money over the contract duration. The methodology should include clear links between performance outputs and pricing mechanisms, proposing a milestone payment schedule similar or equivalent to that indicated in Table 1, which will be subject to negotiation. The methodology should include monitoring and performance management initiatives and tools where appropriate, such as critical path analysis, risk mitigation plans, communication plans, etc. A detailed work plan should be provided that breaks down activities and outputs, which are cross referenced to payment milestones and quality assurance mechanisms. Strong examples should be used to demonstrate that the proposed methodology has been applied successfully in other contexts relevant to this assignment. A well-balanced team should be proposed that provides the right mix and level of skills, with assured availability at the right time and with the right number of person-month inputs. Proposing entities should

explain their recruitment methodology and how the use of local and international team members has been tailored to ensure best value.

33. Contract payments will be made in accordance with the principles of performance-based procurement, according to the quantity of outputs delivered at the required level of quality. ADB may reduce or retain payments for lower-quality outputs and pay a premium for higher-quality outputs, which will be negotiated with the first-ranked entity. This will be negotiated with the successful entity. Proposing entities are welcome to propose a payment structure to this effect in their financial proposal.

34. As noted above, only one curriculum vitae (CV) must be submitted for each expert included in the proposal. Only the CV of the Team Leader will be scored within the points awarded for "personnel" as part of the technical evaluation of proposals. The CVs of other experts will be assessed within the points awarded for "approach and methodology" as part of the technical evaluation of proposals. ADB will also review and individually approve or reject on a "pass/fail" basis each CV for each expert proposed, according to the requirements of their proposed roles and responsibilities within the proposal.

35. All positions under the contract must be included and budgeted for in the financial proposal in accordance with the person-month allocation required for each as defined by the proposing entity.

36. Proposing entities may propose to purchase or rent small goods within their financial proposals if they consider it necessary to deliver the TA outputs, such as office equipment or pollution sampling equipment. Procurement will use the shopping method and will be subject to ADB's approval. Any procurement will follow 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] Any fixed assets that are purchased by the winning entity during TA implementation will be turned over to the EPD upon TA completion. To avoid issues that may arise with asset turnover, ADB prefers proposing entities to propose the rental or lease of goods where possible.

37. Proposing entities' financial proposals will be assumed to include:

I. All experts under the contract based on the person-month inputs identified in the proposing entities' "approach and methodology";
II. Mobilization and demobilization costs of all experts and the consultant's personnel, including travel, accommodation costs, per diems, etc.;
III. Costs for field visits, desk research, data collection, sampling and laboratory costs, modeling, legal research fees, surveys, design studies, or other technical investigations;
IV. Costs for workshops, training sessions, study tours, and meetings;
V. Costs for sub-consultants or consortium partners (where necessary);
VI. Costs for reports and communications, and any administrative support; and
VII. Corporate overheads, including office operation costs and insurances in Lahore.

----- End of Terms of Reference -----

[20] ADB. 2017. *Procurement Regulations for ADB Borrowers: Goods, Works, Nonconsulting, and Consulting Services*. Manila.