

Chapter 16: Water and Sanitation Projects

MCC will use the feasibility study of the proposed water and sanitation project as the basis to examine the following and make a determination on what supplemental studies, if any, are required to develop the project sufficiently so that appraisal could commence:

- ★ Preliminary description of rationale, including nature and measure of benefits, and beneficiaries disaggregated at the intra-household level by gender, age, income, and ethnicity.
- ★ Demonstration supported by appropriate data, that the proposed project is likely to deliver the stated benefits to the various beneficiaries within households.
- ★ Assessment of demand to assure that it can justify the project financially, economically and operationally. The assessment should take into account total installation costs of main lines (including environmental and social mitigation costs), hook-up costs for lateral connections into households (water and sewer), operational and maintenance (O&M) costs, and forecast the future demand growth.
- ★ Assessment of whether the source of water supply targeted by the proposed program contributes to a trans-boundary water body and ensure that appropriate operational policies and procedures are in place. If such procedures are lacking, the World Bank OP 7.50 on international waterways shall apply.
- ★ Assessment of existing master plans for water supply and wastewater treatment to evaluate capacity available in the water supply system, and respectively, in the wastewater treatment collection and treatment systems, and water reuse schemes, with respect to the projected demand. In cases where there is no water supply master plan available, identify (in preliminary pre-feasibility evaluation) water supply sources to meet the projected demand.
- ★ Demonstration that sufficient reliable hydrology information has been provided in feasibility reports on issues such as riverstage and discharge or borehole yield and drawdown, total solids in suspension, total dissolved solids, and specific substances in suspension and solution, as appropriate.
- ★ Preliminary impact assessment of the proposed water supply and sanitation systems on the appropriate watershed/s.
- ★ Identification of options to meet water supply demand and their respective capital and O&M costs to maximize operating efficiencies for existing and future systems.
- ★ Demonstration that sufficient reliable information has been provided about alternative sanitary sewer systems (other than fully piped collection system and conventional WWTPs) that have been operating effectively in the country, and proven new technologies, from the simplest household latrine to a community wastewater treatment plant, and verify their installation and O&M costs.
- ★ For planned water systems with groundwater supply sources, confirmation that there is no fatal flow in aquifer characteristics, or related environmental issues such as contamination.
- ★ Demonstration that there are no constraining hydrological issues related to capacity of water sources by examining actual data (preferably climatologic data over 25 years), identification of competing water uses (households and industry), and confirmation that there are no constraining contamination impacts on water availability.
- ★ Identification of related policy, legal, regulatory, and institutional frameworks, and evaluation of their potential key impacts and implications on project implementation, including laws on gender equality and resource management/ ownership.
- ★ Preliminary evaluation of capacity for the utility or other agency responsible for the oversight of the water supply and sanitation systems at the local, sub-national, and/or national levels.
- ★ A preliminary evaluation of the financial sustainability and/or rate impact of the proposed investment. A preliminary review of the tariff structure and the potential barriers to serving the poor/promoting economic growth – including but not limited to lifeline tariffs, connection charges, and fixed charges and their impacts on control of, access to, and management of, water and sanitation resources and decisions within households (by gender).
- ★ Identification of data gaps and areas that require more detailed, current or confident information.
- ★ Collection and integration of satellite imagery and topographical maps at the appropriate scale (typically 1:25,000 for urban planning) identifying key elements of existing and proposed infrastructure, rights-of-way, and service areas. In addition, it may be appropriate for the due diligence process to identify other geo-spatial data – including but not limited to census data, water resources, and geological data – and combine them into

a single GIS database.

- ★ Benchmark Data for the utility including those identified by the AWWA and/or IBNET
- ★ Meaningful public consultations (including gender, age, and income-based focus groups in rural and/or urban areas where relevant) among project affected persons and key stakeholders including women's civil society organizations, which includes identification of men and women's roles and responsibilities, as well as distribution of benefits by gender.
- ★ A preliminary description of the applicable local and regional laws, regulations and codes, as well as international agreements/treaties, related to the project.

Once MCC has made the determination to commence appraisal on a project, the infrastructure group will conduct the following assessments and identify key constraints.

Technical Assessment: Engineering

Engineering analysis of the project should follow industry best practices with consideration given to specific country situations. This analysis should establish the technical soundness of the project with regard to civil, mechanical and electrical engineering work.

- ★ Review all aspects of preliminary studies, technical designs and proposed standards and confirm appropriateness for criteria, demand requirements, watershed impacts, and environmental and social factors, including culture and gender appropriateness of design and use, including the location and physical design and the difference in use between men and women.
- ★ Determine that satisfactory survey techniques (i.e., auger holes, trial pits) have been used to test leaching and permeability characteristics where septic systems are planned, and that survey results evaluated.
- ★ For new water supply systems, conduct hydrological and hydrogeological surveys to assess water resource availability using long-term records of aquifer water level, reservoir and lakes level fluctuations, river flow rates, and related water quality. Evaluate affected aquifer radius, or 3 km in absence of data. Evaluate yield, existing and other planned pumping, and pump drawdown data where available within the affected aquifer radius. In the absence of historical data, provide estimates and create simulation models. An MCC engineering consultant must validate the yield studies.
- ★ Evaluate water quality standards for domestic water supply. If existing standards are not suitable, USEPA, WHO, or other standards for clean water will apply, as acceptable by MCC. Evaluate impacts of contamination on water quality.
- ★ Assess wastewater effluent discharge standards and the implications for receiving waters as well as water treatment costs.
- ★ For new water distribution systems connected to existing water supply network, determine if there is adequate capacity in the existing network to support the new distribution systems and what peripheral facilities such as pumping stations, reservoirs, tanks, etc. will be required. Evaluate impact of network expansion on capacity demand and water pressure.
- ★ Conduct adequate topographical and/or aerial surveys along the proposed alignment of major pipelines (or evaluate existing data) indicating locations of buildings, roads, drainage structures, and other infrastructure.
- ★ Conduct geotechnical and sub-surface utility location site exploration along the proposed alignments of major pipelines (or evaluate existing data) to identify subsurface conditions which affect the design and construction of proposed pipelines. Confirm geotechnical properties of underlying soils.
- ★ Prepare preliminary, general specifications for any pumping stations for water and lift stations for sewer (including any power extensions) to provide sufficient pre-bid cost information with an accuracy of +/-20%, to be confirmed by MCC's engineering consultant.
- ★ Prepare preliminary, general specifications for any water tanks or reservoirs that may be required, to provide sufficient pre-bid cost information with an accuracy of +/-20% to be confirmed by MCC's engineering consultant.
- ★ Complete preliminary engineering designs including such items as major pipe lengths and types, valves, metering system, etc. MCC's engineering consultant should confirm that these designs provide sufficient pre-bid cost estimation to an accuracy of +/-20%.
- ★ Evaluate design standards and propose alternative standards if existing ones are not acceptable to MCC.
- ★ Confirm availability of local materials and required construction machinery and installation expertise.
- ★ Evaluate the energy requirements and potential costs and their impacts on willingness to pay by various

beneficiaries for the new systems and the availability of generation capacity and distribution networks to serve these systems.

- ★ Identify other factors that can affect cost or scheduling including: site preparation, road closure and diversions for construction, utility provision (including possible encroachment and relocation), implementation of any Resettlement Action Plan (RAP), construction staging camps, environmental clean-up, and equipment mobilization and de-mobilization.
- ★ If the water supply system includes a dam that is classified as “large” by the International Commission of Large Dams (ICOLD), ensure that all appropriate environmental evaluations and engineering design and safety criteria are met.
- ★ Identify major project risks and quantify, as much as possible, the impact of these risks on project cost, timeline and quality. Develop mitigation measures and estimate the cost of mitigation.
- ★ Develop project cost estimates for the purposes of investment decision, including all associated costs, such as costs relating to environmental mitigation, resettlement compensation, social safeguard measures, construction supervision, project management and technical audits.
- ★ Develop provisions to be included in project cost estimate, such as physical contingency, allowances for specific risks that were identified in appraisal, price contingencies, and allowance for the effects of foreign exchange rate fluctuations, and determine meaningful rates of inflation – local and foreign – to apply to base costs.

Technical Assessment: Economic and Financial

The MCC economist responsible for the assessment of the project will work to ensure that proposed water and sanitation project complies with *MCC Guidelines for Economic and Beneficiary Analysis*. The economic rate of return for each project should be sufficiently high to warrant investment and eligible countries should have reviewed relevant governance practices, including laws and regulations, and undertaken reforms, as possible, to enhance the anticipated economic benefits generated by the infrastructure projects. Infrastructure input to this analysis may include the following:

- ★ Identify benefits expected to flow from project, focusing on increases in incomes for workers, firms, and beneficiaries within households disaggregated by gender, age, income, and ethnicity. Identify the beneficiaries and describe poverty level and gender to the extent possible. Compare projected incomes and other benefits with and without the proposed project for formal and informal businesses by gender, age, income, and ethnicity, as benefits may accrue informally within households and have impacts on livelihoods.
- ★ Assess who pays, how, and where (by gender, age, ethnicity, income), financial flow of benefits and distribution of benefits within households, and what financing is appropriate for water vs. sanitation.
- ★ Assess the capacity of the affected communities to use the available water and utilize the perceived benefits from improved access to water and sanitary sewer facilities, including appropriateness of the technical design taking into consideration various user groups by gender, age, income, and ethnicity, as well as cultural appropriateness.
- ★ Summarize the design standards, design life and cost estimates (capital and maintenance) and confirm these are consistent with the assumed benefits and duration of the benefit stream. Note that the duration of the benefit stream is typically assumed to be twenty years. Assumptions that the duration is longer or shorter than this should be clearly justified.
- ★ Confirm that the costs and project life are consistent with the engineering design.
- ★ Complete a financial analysis for income generating subprojects.
- ★ Confirm that the technologies that are proposed in the project and the engineering design will allow fulfillment of operational performance, as well as financial and economic objectives. Economic objectives have been confirmed as viable and useable through participatory planning approaches that take into consideration various beneficiary groups by gender, age, ethnicity, and income.

Technical Assessment: Environment, Social and Gender

MCC environment and social assessment experts will review the proposed projects for their compliance with MCC Environmental Guidelines, Gender Policy, and Resettlement Guidance (www.mcc.gov), which include an expectation of compliance with host-country laws, regulations and standards, as well as requirements by which the host country is bound under international agreements (including the identification of such international agreements and obligations). Particular attention must be paid to issues which generally arise including, but

not limited to, land ownership and right of way, incursion into sensitive areas (reserves, parks, wetlands, etc.), watershed and aquifer impacts, drainage and erosion control (especially in hilly or mountainous situations) and sludge management. Assessment will also inform design by including gender analysis of use, control of resources, design appropriateness, and how well gender is integrated into project design, participatory planning processes, and implementation.

- ★ Identify country-, region- or sector-level assessments, strategies and commitments with respect to climate change and their relevance to compact activities.
- ★ Identify climate change impacts (from the project) and risks (to the project) and corresponding mitigation and/or adaptation opportunities, as relevant.

Technical Assessment: Legal

The MCC legal staff will work to ensure that proposed water and sanitation projects neither encounter any legal obstacles nor violate any existing laws. The MCC legal staff will also assist in reviewing relevant governance practices, including laws and regulations, and any reforms the country has or proposes to undertake. Finally, MCC legal staff will, if necessary, review and comment on any contracts related to the proposed infrastructure projects. Infrastructure input to this analysis may include the following:

- ★ Identify government policies and regulations specifically related to the project's construction, operation and maintenance. Identify any international agreements specifically related to such construction, operation and maintenance. Identify any issues arising from such agreements, policies and regulations.
- ★ Identify any governmental agencies or other entities whose cooperation and assistance are necessary to the success of the project.
- ★ Identify the proposed chain of ownership of the project, and whether any changes in ownership will be needed upon the end of the proposed compact.
- ★ Identify any unusual arrangements that need to be made with any contractors performing work on the project.
- ★ Confirm that the technologies that are proposed in the project do not require any exemptions from local import regulations.

Sustainability Assessment

- ★ Assess the financial strength and independence of the utility including ability to withstand financial uncertainties and to access commercial and/or bond financing. This assessment also includes a review of the tariff structure and its ability to provide predictable revenue streams; and, the determination of basic utility performance indicators.
- ★ Assess the technical capacity of utility staff by gender, the ability of the utility to hire and retain staff by gender, training programs and gender competency, and the ability to evaluate and procure outside consulting services.
- ★ Evaluate the rate making process.
- ★ Evaluate operational and control procedures of existing systems, including but limited to pressure control, leak identification, repair and maintenance programs; and, metering policy and meter testing/repair/replacement capacity.
- ★ Evaluate customer care programs/community outreach/communication strategies, based on information from participatory planning tools that may include public consultation, focus groups, or surveys (that are gender and culturally appropriate).
- ★ Assess existing water conservation program, including any demand-side management arrangements in place.
- ★ Review current arrangements for ownership, management, maintenance, tariffs structure, and user subsidies of water and wastewater systems by gender, age, income, and ethnicity, including a stakeholder analysis and identification of community engagement. Include details of legal, regulatory and administrative frameworks, funding and maintenance responsibilities.
- ★ Review existing performance with respect to clarity and acceptance of arrangements and responsibilities, and financial and maintenance management, including assessment of existing gender inequalities and gender roles in management. Identify causes of inadequate performance including legal, regulatory or administrative arrangements, resources, technical capability, institutional capacity, and funding availability.
- ★ Review maintenance programs, including responsibilities, resources, and sustainable funding mechanism. Identify shortfalls with current arrangements and provide details of a program to strengthen management and maintenance arrangements.

- ★ Review alternative maintenance funding options, including details of income derived from water and user users by gender, changes in subsidies, and potential rate increases to facilitate sustainable cost recovery.
- ★ Summarize actions needed to maintain water resources management at acceptable level, including gender competent institutional strengthening, funding (responsibility and funding levels), a social and gender integration plan, and additional resources needed.
- ★ Water resource availability in the face of global climate change (increasing variability in precipitation, decreases in average precipitation, changes in snow pack).

Risk Management Assessment

- ★ Identify significant risks to the project, with particular respect to required third party approvals or consents (e.g., from private sector operators already operating within the project), construction cost increases, delays, long-term sustainability of the scheme, local acceptance and take-up of benefits, and other factors affecting economic performance and distribution of benefits, including gender inequalities in control, management, or access to water resources, HIV/AIDS, or impacts of potential resettlement.
- ★ Identify and assess significant risks relating to durability, and confirm that design criteria adopted shall mitigate these risks within acceptable tolerance levels.
- ★ Prepare a risk management plan to minimize the negative impact of the risks.
- ★ Description of existing methods and procedures to manage quality, e.g., existing documentation on quality assurance plans.

Implementation Assessment

- ★ Provide a summary of the technical and construction resources available in country, and experience with projects of similar size, nature and type.
- ★ Market assessment of competent consulting and contractor firms active in area (last 5 years).
- ★ Provide details of implementation options available.
- ★ Identify local factors that may affect the timely completion of the works, including permitting processes, transport to/from the location for the contractor's equipment, fuel and other materials, seasonal weather patterns such as avoiding the wet or freezing seasons, or other health and safety factors including HIV/AIDS, as appropriate.
- ★ Prepare an implementation program including contract awards, any approvals and permits needed, construction times, cash flow, government commitments and other hold points as appropriate.
- ★ Recommend an appropriate procurement procedure, sequencing, and packaging.
- ★ Recommend suitable supervision and management arrangements.

