



**NATIONAL OPERATION AND MAINTENANCE (O&M) GUIDELINE
FOR WATER SUPPLY AND SANITATION (RURAL AREAS)
(FINAL DRAFT)**

June 2022

**Local Government Division
Ministry of Local Government, Rural Development and Co-operatives**

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ABBREVIATIONS

AIRP	Arsenic and Iron Removal Plant
BDT	Bangladeshi Taka
CapEx	Capital Expenditure
CBO	Community Based Organization
CSO	Civil Society Organization
DASCOH	Development Association for Self-reliance, Communication and Health
DSK	Dustho Shastho Kendro
DPHE	Department of Public Health Engineering
FGD	Focus Group Discussion
FSM	Fecal Sludge Management
GFS	Gravity Flow System
GoB	Government of Bangladesh
HCF	Health Care Facility
HED	Health Education Division
KPI	Key Performance Indicator
LGD	Local Government Division
LGI	Local Government Institute
MAR	Managed Aquifer Recharge
MHM	Menstrual Hygiene Management
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
OpEx	Operational Expenditure
PPP	Public Private Partnership
PSB	Policy support Branch
PSF	Pond Sand Filter
RDA	Rural Development Academy
RO	Reverse Osmosis
RWH	Rainwater Harvesting
SDG	Sustainable Development Goal
SDP	Sector Development Plan
SLIP	School Level Improvement Plan
SOP	Standard Operating Procedure
SMS	Short Message Service
SSP	Sanitation Safety Plan
STW	Shallow Tube well
UHFPO	Upazila Health and Family Planning Officer
UN	United Nations
UP	Union Parishad
VDC	Village Development Committee
WAI	WASH Alliance International
WASA	Water Supply and Sewerage Authority
WASH	Water, Sanitation and Hygiene
WE-WE	Water Entrepreneurship for Women's Empowerment

1. CONTEXT

1.1 Background

SDG 6 and its associated targets call for universal and equitable access to safe and affordable drinking water and access to adequate and equitable sanitation and hygiene for all by 2030. In light of this, UN Member states have selected the global indicator for monitoring SDG target 6.1 to be the ‘proportion of the population using safely managed drinking water services’, and for SDG target 6.2 it is ‘proportion of the population using safely managed sanitation services including a hand washing facility with soap and water’. Safely managed drinking water and sanitation have created new service norms.

Globally, Bangladesh is well known for the remarkable progress in water supply and sanitation coverage. Bangladesh has successfully achieved MDG’s water supply target, and at present, the basic drinking water supply coverage is 98 percent.* The country has achieved open defecation-free status with a basic sanitation coverage of 54 percent and basic hand washing facility coverage of 58 percent.* But in terms of the safely managed services, this percentage is 59 for water and sanitation is 39 percent. Despite the existence of many water points across the country, there are substantial gaps in the functionality of these water options and water supply reliability in terms of contamination-free safe water due to poor O&M. This statement is applicable for sanitation systems also. Proper operation and maintenance (O&M) is the prerequisites for the longevity and sustainability of the WASH infrastructures, as inadequate O&M reduces the lifetime and makes the whole initiative of capital expenditure (CapEx) go in vain.

It has been reported that, on average, more than 13 percent of public water infrastructures in Bangladesh are non-functional. The non-functional technologies are mostly pond sand filters (47% cases), while ring wells and rainwater harvesting systems are found non-functional in 28 percent and 24 percent cases respectively.† Non-functional water supply and sanitation options have high impact on access particularly for the poor and marginalized (well-off people can arrange alternative source). Due to lack of proper maintenance, the technologies have remained non-functional and become redundant. Similar observations have been made in the case of public and community toilets. Dhaka City Corporations own and manage 69 open access public toilets within Dhaka city; however, only 57 of them are in operation.‡ Lack of initiative for adequate maintenance has rendered the public and community toilets unusable.

The poor condition of drinking water safety at the point of use, in terms of chemical and bacteriological quality, poses a high burden on the health and well-being of the Bangladeshi population both in the short and long term. Consequently, prioritizing drinking water safety will leverage results in addressing the risks associated with poor sanitation and hygiene practices.

* JMP, 2021↓

† Effectiveness of Rural water points in Bangladesh with special reference to Arsenic mitigation, P Ravenscroft, A Kabir, S A I Hakim, A.K.M. Ibrahim, S K Ghosh, M S Rahman, F Akhter and M A. Sattar, Journal of Water, Sanitation and Hygiene for Development, 2014

‡ Study on Developing Business Models for Public Toilets in Dhaka and Other Major Cities of Bangladesh, WaterAid Bangladesh, October 2017

According to the ‘National Policy for Safe Water Supply and Sanitation, 1998’, the user community should bear the total cost of the O&M. The Pro-poor strategy (2005, revised in 2020) recommended sharing the O&M costs for hardcore poor by the non-poor families or from the micro-credit supports from NGOs and other related agencies. National Strategy for Water Supply and Sanitation 2021 encouraged private sector investments for O&M of public/community sanitation facilities. The Water Safety Framework, 2011 has pin-pointed operational monitoring and management strategy for different water supply technologies. The Sector Development Plan (SDP) for the water supply and sanitation sector (FY 2011-25) have assigned the responsibility of community-based organizations (CBOs) for the management and operations of water points and community latrines in rural areas and urban slums. The National Strategy for water supply sanitation 2014 suggested for undertaking a learning approach and its successful replication in Hard-to-Reach areas for O&M of WASH.

The National Cost-Sharing Strategy for Water Supply and Sanitation in Bangladesh (2012) has suggested public subsidy for rural poor and cross-subsidy for urban slum dwellers. The strategy also highlighted that government/ donor subsidies could also act as the source of O&M funds. In the case of options for the higher number of service users like PSF, MAR, AIRP, piped water system, community, and public toilets, it is beyond the capacity of management committee or institutions taking care of these options to ensure their proper O&M unless a system is in place. Sector partners have made sporadic efforts to develop different O&M models, but these are not streamlined due to the lack of policy directives, guidelines, and a common sectoral O&M strategy.

1.2 Objectives and Scopes

The purpose of this operation and maintenance (O&M) guideline is to regularize the ways and means for effective operation and maintenance (O&M) of water supply and sanitation facilities to keep them functional at the desired state. It will also help to achieve the quality targets for the systems, thereby ensuring public health safety and environmental protection.

The purview of the guideline includes public community based WSS services, WSS facilities in all the educational institutes, and community latrines primarily in rural areas. However, this guideline will also be applicable for the community managed water supply and sanitation options in urban/semi-urban or peri-urban areas and any settings similar to rural water sanitation options. Following this guideline, separate SOPs need to be developed or the existing SOPs need to be updated for the O&M of the technologies discussed here.

1.3 Intended Users

The users of this national O&M guideline for water supply and sanitation include but are not limited to the government agencies/departments (e.g., DPHE, LGED, Directorate of Primary Education, Directorate of Secondary and Higher Education and Technical and Madrasah Education Division of Ministry of Education), local government institutions (e.g., Union Parishad, Upazila Parishad, Paurashava and City Corporation) and other sector stakeholders working in designing, implementing and monitoring of water supply and sanitation infrastructure projects

2. O&M SITUATION OF WATER SUPPLY AND SANITATION TECHNOLOGIES

As a part of developing this guideline, the existing O&M situation of water supply and sanitation technologies implemented by both the Government and other sector partners was studied to capture the existing challenges for O&M at the field level in different hydro-geographical settings. Different good practices on the O&M model by sector partners were reviewed and assessed. Recommendations of the users and different sector partners were documented about the sustainable solution of O&M through online/face-to-face Key Informant Interview (KII) and Focus Group Discussion (FGD). Several sample spot visits were made to WSS facilities at different settings such as Barind, Haor, Hill Tracks, Coastal belts, arsenic prone areas, urban slums, schools, and community health care facilities.

Key informants (KIs) suggested the following points during the interview:

- Private mechanic can supply spare parts and provide on-call service for HTW (No.6 HTW and Tara Pump).
- Service contract can be adopted for maintenance of non-revenue generating community use options like PSF, AIRP and MAR.
- Outsourcing or PPP can be applied for O&M of revenue-generating options like piped water, RO plant keeping provision of service regulation by LGI.
- Implement the CBO model for O&M of WSS in slums.
- Delineating responsibility to Union Parishad (UP) for O&M monitoring with technical support from DPHE.
- Standardization of O&M service with essential SDG components of accessibility, quality, quantity, reliability, affordability and non-discrimination or equity.
- Development of WASH fund by LGIs and provision of O&M fund in the revenue budget of the government.
- Integrate rehabilitation and community mobilization components in new WASH investment projects or undertake separate projects for rehabilitation of existing WSS facilities.

The discussion with the user groups and management committee of water supply and sanitation facilities through FGDs in visited locations revealed that site selection was an issue for water supply and sanitation infrastructures, especially for public water points, Community toilet and WASH Block. They also informed that once the Tara pump is out of order, caretakers cannot repair it due to lack of his/her capacity to repair because of labor-intensiveness of the work and unavailability of spare parts in the local markets. The use of the submersible pump is increasing in the Barind area with time, but there is no specific business policy to arrange for O&M cost, including repair/replacement, which is costly. The users of the Gravity Flow System (GFS) in hilly areas informed that sometimes it takes almost a week to make their water supply system functional again from the disruption due to landslides and poor communication/accessibility.

The ground reality of the O&M situation for water supply and sanitation technologies was documented through visits in different parts of the country covering plain lands, hard-to-reach areas, including barind, coastal, hilly, arsenic affected areas, slums, educational institutes, and health care facilities. Tube well with No. 6 hand pump, the most popular and trusted water option, is widely found to be functional and has no significant O&M challenges, because this is a very widely used simple technology and mostly operated by a single household. Rainwater harvesting (RWH) system, the commonly used water option in salinity-affected coastal areas, predominantly suffers from cleaning and operational challenges, because these are seasonally operated by a single household, who

often does not care for proper cleaning and maintenance of the option before rainy season. These include improper cleaning of roofs, water reservoir tanks, improper positioning of piping systems, and bacterial contamination in the reservoir water.

Community-based non-income generating water options like Tara pump, Ring well, PSF, MAR, AIRP are mostly non-functional due to the failure of community caretaking (e.g., lack of ownership, lack of initiative), technical challenges in operation and maintenance, and financial gaps (e.g., unwillingness to pay, poor O&M fund recovery). Private Enterprises and in some cases LGIs are safely managing the income-generating, popular and hi-end user options like RO and piped water supply with available technical supports from the vendors in the markets. Community toilet in many places are well managed by CBOs and community groups in urban slums and LICs because WASH O&M fund is developed and operated by CBO. Climate change and disaster effects on water supply and sanitation infrastructures are now clearly visible in Hard-to-Reach areas. Bangladesh is one of the countries in the world most at risk from the negative impacts of climate change, including increases in incidence and intensity of extreme weather events and hazards such as soil salinization, rising sea levels, and riverbank erosion. The disasters and climate change impacts affect the water supply and sanitation technologies for their existence, functionality, and sustainability.

Overall, the following water supply and sanitation O&M issues were identified from the field visit, consultation with the users, caretakers, operators, technology providers, government agencies, LGI leaders, and officials, which altogether have made the water supply and sanitation technologies non-functional, non-operational or inaccessible:

1. The community-based O&M approach is not functional for most community-based water options, including PSF, AIRP, MAR, and Ring well, due to wrong site selection, absence of ownership and mobilization of the user community, proper O&M plan, and follow-up actions.
2. The absence of local-level technical skills and spare parts at the local markets for sophisticated technological options like Tara pump, RO plant, or any other piloted specialized options keep them non-functional once they go out of order.
3. The coexistence of multiple water options in the same area (like PSF, MAR and RO in the coastal area, and tube well/Tara pump with piped water supply in Barind or other areas) contributes to the number of abandoned water options, as well as lack of ownership among users for any option.
4. The water source is critically impacted by the current operation and maintenance practice for many water supply systems. For example, the extensive use of the submersible pump makes the Tara pump redundant; deforestation causes the drying of natural stream sources, making GFS non-functional and abandoned; saline water intrusion contaminates the fresh pond making PSF non-functional; salty taste and foul odor often restrain people from using MAR water.
5. High-cost involvement and labor-intensive cleaning and maintenance for the filter of AIRP, GFS and PSF demotivate the users and caretakers to clean the systems regularly, resulting in the system's inactivation or poor-quality of water.
6. Technical support is not available at the local level for the community model of rural piped water supply, solar power operated PSF and RO plant which is increasing non-functionality

of these options once they get out of order. Cleaning of system components is irregular, and as a result, the water quality is often not up to the standard.

7. In a non-metering piped water supply system, water is wasted. The flat-rate tariff system fails to maintain equity as it does not consider the consumption rate per household. Also, the tariff does not cover the O&M cost for the system.
8. The absence of a financially viable business model for any community water option with high replacement costs such as submersible pump-driven rural piped water supply system (with or without treatment options) and RO plant-based water supply system in the coastal region. It becomes challenging to run the systems after the expiry of the warranty period.
9. The non-existence of a dedicated and sustainable O&M fund for community-based WASH options at the local-level and Government revenue budget makes the major repair, maintenance, and rehabilitation almost impossible, which results in more non-functional water options.
10. The absence of service standard and standard operating procedure (SOP) for O&M of WASH technologies makes the achievement of SDG indicators (e.g., accessibility, quality, quantity, reliability, affordability, and non-discrimination or equity) more difficult.
11. The absence of a government body/third party for water quality surveillance, monitoring, and service regulation makes the service providers more unaccountable in terms of service provision and its O&M.
12. GoB projects have less focus on the repair and rehabilitation of non-functional water supply and sanitation facilities. GoB projects undertaken for new construction of water supply and sanitation facilities lacks rehabilitation, including O&M and community mobilization components.
13. The NGO facilitated O&M fund in urban slum is not often easily accessible for immediate use by the O&M committee for repair and maintenance of water supply and sanitation infrastructures during emergency. Again, without NGO facilitation, the O&M fund is at risk of misuse.
14. Community toilets are mostly unclean. Toilet facilities are inadequate and not friendly to females and people with disabilities. Septic tanks of these community toilets often overflow, leak, and pollute the environment.
15. The School-level Improvement Plan (SLIP) fund does not cover O&M costs in primary school, and it is absent in high schools and other educational institutions.
16. There is no allocation from GoB for maintenance of the WASH facilities in primary healthcare facilities like community clinics. Currently, repair and maintenance are done with the contribution of money from the patients visited.
17. The provision of running water with the availability of soap in or near the toilet is almost absent in communities, schools, and health care facility toilets. Availability of menstrual hygiene management (MHM) corners with MHM kits and their safe disposal after use is practically absent in almost all these toilet facilities.
18. In clayey soil and high-water table areas, toilets/pits become unusable due to low or no drainage of liquid from the pits, particularly in the wet season. It causes the pit to get filled-up quickly before the expected time.

19. In most cases, both the pits of the twin pit latrines are found to be used simultaneously (i.e., not resting a pit while the other one is used), for which the users don't get benefits of the twin pit latrines. Sometimes the diversion box (Y-junction) suffers operational problems.
20. Climate change-induced events and disasters like cyclones, intense storms, flash floods, droughts cause damage/uprooting/submergence of water supply and sanitation infrastructures and threaten access to water supply and sanitation services during disasters.

3. GUIDING PRINCIPLES FOR O&M GUIDELINE

The National Operation and Maintenance (O&M) Guideline for Water Supply and Sanitation is devised based on the guiding principles detailed below.

***Water and sanitation are basic human rights for all*[§]**

The United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to realizing all human rights on 28 July 2010 through the resolution of 64/297. Therefore, the national Government is obliged to provide financial resources, help capacity-building, and technology transfer to provide safe, clean, accessible, and affordable drinking water and sanitation for all, equitably and without discrimination.

WASH interventions comprehensively incorporate O&M

The O&M is an integral part of any water supply and sanitation interventions to ensure better functionality and longevity, save resources and reduce the hassles of new facility establishment.

***Promote private sector participation in O&M*^{**}**

The strategic partnership at national and local levels for increasing private sector engagement is vital for effective operation and maintenance of the water supply and sanitation facilities implemented by the government bodies, non-government organizations, and development partners and resulting in sustainable water supply and sanitation services.

Raise community voice and demand for standardization of O&M services

Standard O&M service demands a close loop link among community users, service providers, and implementing agencies. The community sensitization on the O&M service standard impacts implementing agencies to ensure standard O&M service.

***Equitable allocation of resources*^{††}**

Funds from the Government to support water supply and sanitation infrastructures' operation and maintenance require equitable distribution throughout the country, considering the scale of facilities, rural and urban settings, types, ability to pay of the user households with the provision of subsidy for pro-poor^{‡‡} and numbers of technological options implemented by Government and non-government agencies in a particular area.

[§] The United Nations General Assembly 2010 (Resolution A/RES/64/292)

^{**} The National Strategy for Water Supply and Sanitation 2014 (revised in 2021)

^{††} The National Sanitation Strategy 2005

^{‡‡} Pro-poor Strategy for Bangladesh Water Supply and Sanitation Sector 2005 (revised in 2020)

Environmental integrity^{††}

Poor quality water supply and sanitation services have unacceptable impacts on the environment, such as pollution of water resources and soil, which should be regulated to ensure effective mitigation measures. Particular attention is required to the adequate separation of latrines, pits/tanks and water points and disposal of liquid waste and sludge with a minimum impact on the environment.

Social, cultural, and technical appropriateness^{††}

Local values and cultural practices need due consideration in designing water supply and sanitation O&M activities. Water and sanitation technologies should be viable, affordable and locally appropriate to carry out the O&M activities. Indigenous knowledge and local skills must be promoted at the local level for providing operation and maintenance services.

Response to climate change and disaster for sustainability

Disasters calls for immediate operation and maintenance (O&M) the water supply and sanitation infrastructures. Adaptation and protection of water supply and sanitation facilities from the adverse impact of natural and manmade disasters, and climate change, are essential for its sustainability.

Gender-sensitive approach^{††}

The gender-sensitive approach through the participation of women in decision making of O&M activities and differently abled, children, elderly, and women-friendly O&M services are fundamental.

Transparency and accountability at all stages of service delivery^{**}

Transparency and accountability are vital for regulating water supply and sanitation O&M activities. The O&M services need to be transparent and visible both to the service providers and service recipients. Accountability at all stages of O&M services, including designing, regulation, and implementation, is crucial to realize health and economic benefits.

4. REVISIONS IN POLICY AND STRATEGIES FOR O&M OF WATER SUPPLY AND SANITATION

Several policy revisions are recommended, and strategies are proposed to overcome the challenges associated with O&M of water supply and sanitation. These policy shifts and strategic directions are based on the guiding principles stated in the previous section and are crucial in enabling and ensuring the desired operation and maintenance (O&M) of water supply and sanitation facilities and access to equitable and quality water supply and sanitation services.

4.1 Recommended policy revisions

4.1.1 Update site selection criteria for public water supply and sanitation options, including O&M perspectives

To ensure water and sanitation services for all the Government, mostly through DPHE, allocates/distributes WSS facilities among the poor or ultra-poor households with a full or partial subsidy. The existing site selection criteria of household groups for a public water point often affects the sustainable service, particularly from the O&M perspective. The site selected to serve the prefixed number of households for a water point, often becomes inconvenient for all the beneficiary households to get equal access to the water point, which discourages them to participate in O&M. In most cases, the household hosting the public water option does not give access to water to other households after a certain period. Hence, universal access to safe water sources as targeted in SDG is not ensured anyway. So, to ensure the accessibility and functionality of water supply and sanitation facilities, the site selection criteria for public water and sanitation options needs to be revised to allow formation of user groups only with the households living in the very close proximity and modification of design of the community water options to facilitate O&M easily manageable by the smaller user groups.

4.1.2 Introduce institutional O&M system

Community-based O&M in many places does not function properly for community-based water supply systems, including Tara pump, PSF, AIRP, MAR, and Ring well, due to the absence of community ownership and mobilization, O&M plan, follow-up actions, and technical challenges. Moreover, the absence of a sustainable business plan, differential tariff system, and technical support make community-based O&M unsuccessful for hi-number of user options like RO plant and piped water schemes. Hence, introducing institutional O&M will make the institutions (LGIs, government agencies like DPHE) responsible for O&M with well-defined role and responsibilities. Institutions can do O&M by themselves or outsource through a suitable contract model. For example, institution can go for service contract for maintenance of non-revenue generating community use options like PSF, AIRP and MAR and management contract (e.g., PPP or lease method) for O&M of revenue-generating options like piped water, RO plant keeping provision of service regulation by LGI.

4.1.3 Develop O&M fund for water supply and sanitation

The non-existence of exclusive O&M funds for water supply and sanitation at the local level and in the government revenue budget makes the major repair, maintenance, and rehabilitation works almost impossible, which increases the number of non-functionalities of the options. Keeping a provision of fund allocation in the government revenue budget for O&M of water supply and sanitation and channelizing them through DPHE would ensure proper O&M of public water supply and sanitation infrastructures by DPHE. At the same time, specifying water supply and sanitation O&M as a separate component in fiscal allocation to LGI from the Government would help to create an LGI-level O&M fund for water supply and sanitation. The O&M fund for water supply and sanitation should also

cover the O&M for water supply and sanitation in educational institutions and health care facilities. However, the use of DPHE water supply and sanitation O&M fund and LGI water supply and sanitation O&M fund should be specified and a mechanism of collaboration and coordination between DPHE and LGI need to be established for rational use of water supply and sanitation O&M fund.

4.1.4 O&M service standardization, monitoring and regulation

The performances of the water supply and sanitation technologies often do not meet the requirements of SDG 6.1 & 6.2 indicators (e.g., accessibility, quality, quantity, reliability, affordability, and equity) due to the absence of the O&M standard for the technologies and its enforcement. Service providers remain unaccountable for the operation and maintenance of their services due to the absence of any monitoring/regulation mechanism. The O&M service standard, monitoring and regulation should be prioritized to meet the SDG 6.1 and 6.2 targets.

4.1.5 Introduce water quality surveillance

Water quality is tested during the installation of the options but the community hardly tests the quality of water afterward. Water quality may deteriorate or may become chemically contaminated over time, but people consciously or unconsciously drink that contaminated poor-quality water. The absence of water quality surveillance in all private and community-based options increases the health risk of the people. So, water quality surveillance system should be in place to ensure testing of water quality of all public water technologies according to approved protocols and if necessary, through engagement of private sector.

4.1.6 Prioritize repair, maintenance, and rehabilitation while planning for new investment and in annual performance agreement of relevant agencies

GoB projects do not substantially consider the repair, maintenance, and rehabilitation of non-functional water supply and sanitation facilities. Most GoB projects are undertaken for construction of new water supply and sanitation facilities, which lacks repair and rehabilitation components. The repair, maintenance, and rehabilitation of new investments should be prioritized while planning for new investments to increase the longevity of the water supply and sanitation infrastructures, thereby maximizing the return on investment of limited resources. Similarly, the Annual Performance Agreement (APA) of project implementing agencies including LGIs are recommended to include APA targets aligned to SDGs, particularly with the WSS O&M service level.

4.2 Strategic directions

The strategic directions complementing the water supply and sanitation O&M guidelines are as below:

1. Increase community ownership for O&M of water supply and sanitation infrastructure by adopting community approach for site selection, O&M suitability of options, mobilization, demand creation and collection of O&M fund as integral part of installation of hardware facilities.
2. Promote carefully the installation of multiple water supply technologies for the same service in a single location to ensure that the options supplement each other for year-round availability of safe water. Provide an area wise guideline for multi-option installation for the same service.
3. Build capacity of the local level private technicians and if possible, establish licencing mechanism for them for providing on-call repairing services to the users of the water supply and sanitation facilities.
4. Establish a supply chain management system to ensure the availability of spare parts in the local community.
5. Introduce business model and O&M management plan for hi-end user and revenue-generating options like RO plant and piped water scheme.
6. Ensure GoB allocation for water supply and sanitation O&M and develop water supply and sanitation O&M fund at LGI level, preferably at the lowest tier.
7. Start gradual shifting from community-based to institutional O&M.
8. Engage the private sector for O&M service delivery and strengthen the institutional capacity of DPHE/ LGIs to carry out monitoring and regulatory functions.
9. Develop standard operating procedures (SOPs) for O&M of all water supply and sanitation technologies, aligning with the SDG indicators. Ensure that O&M of water supply and sanitation technologies is done by following SOPs.
10. Focus role of LGD on policy/ strategy formulation/revision, and DPHE/ LGIs on service regulation rather than service delivery.
11. Implement the water quality surveillance system and ensure water quality monitoring.

5. GUIDELINES FOR WATER SUPPLY AND SANITATION O&M

The policy and documentary analysis, field findings, and recommended policy shift and strategic directions have led to the formulation of the following guidelines for operation and maintenance (O&M) of water supply and sanitation infrastructure. The responsibility matrix for O&M of water supply and sanitation facilities can be found in Annex-I.

5.1 Site selection for public WSS options considering O&M suitability

- Site selection for public WSS options need to consider O&M suitability and gender aspects in addition to existing criteria. The existing criteria may be relaxed if a suitable location is not found from the O&M perspective of any option set by the DPHE. The community needs to be adequately mobilized regarding the options to be used, its O&M process and responsibilities of caretaker. DPHE will engage LGIs in the project implementation process from the beginning and ensure that LGIs provide hands-on training to the community caretakers and management committee on O&M before handing over the technology. The management committee would be facilitated to implement the business plan and oversee O&M.

5.2 O&M for technological options

- Area wise appropriate single technology would be selected, promoted at the community level, and the use of other technologies would be regulated for the same service in the same area. Provision of multiple options in the same area would only be considered when the options can supplement each other due to seasonality or other factors. A uniform system needs to be developed to maintain data relevant to water supply and sanitation technologies and associated O&M requirements at different levels. Depending on the intensity of use, service quality, and scale of service coverage, technologies need to be graded as hi-user and low-user options for regulating the installation of both the options in the same area.
- The technological requirements for convenient and sustainable O&M of latrines and toilets would be prioritized and ensured during the commissioning of interventions. For example,
 - To ensure operational life of pit latrines, a layer of coarse sand would be provided around the pit to facilitate drainage of liquid from the pit immediately after flushing the toilet and provide safety against pit overflow in clayey soil. The raised pit can facilitate continued use of the toilet in high-water table areas, even during a flood event.
 - To maintain operational modalities of the twin-pit latrine, the minimum distance between two pits (equivalent to the effective depth of the pits) would be maintained to avoid cross-soaking between two pit-contents. Around 18-24 months decomposition period would be given to the pit contents to become pathogen-free. Flushing toilets with sufficient water and regular inspection of diversion boxes need to be in place to avoid operational difficulties. As an alternative to a diversion box, a flexible pipe can be used to divert the flow of excreta from one pit to another pit.
 - For community toilets, growth centres, educational institutions, and health care facilities, where large number of users use sanitation facilities daily septic tank should be installed for better O&M and environmental consideration.
- Collaborative arrangements need to be made with selected manufacturers to produce components/spare parts of the technologies and make them available at the community level through a supply chain and ensure after sales services. Tara/submersible pump/RO plant producers would be brought under an arrangement to operate their sale centre or engage

distributors in the areas where Tara/submersible pump/RO plant are widely used. Furthermore, UPs can engage local licenced mechanics to keep a mini stock of rare spare parts (not available in the local market) of Tara/submersible pump/RO plant who can sell them to the users while repairing.

- Disaster calls for immediate operation and maintenance (O&M) of the water supply and sanitation infrastructure. The water supply and sanitation infrastructure would be resilient to climate change effects and disasters particularly in hard-to-reach areas, focusing O&M of infrastructures, particularly during emergencies and in the post-disaster period. Funding arrangement and stock of supplies would be ensured for inspection, rehabilitation, major repair, maintenance, and reconstruction on an emergency basis.
- Preventative maintenance approaches like water safety plans and sanitation safety plans need to be practiced.
- Preventive approaches for the sanitation systems like scheduled desludging of septic tank/pit following safe disposal after treatment would be encouraged and ensured to avoid technology failure and reduce overall maintenance costs.
- Handwashing facilities with running water and soap would be secured in educational institutes' toilets, and HCFs toilets. Similarly, the availability of sanitary pads in MHM corners followed by a safe disposal option would be ensured.

5.3 Service contract and business model for O&M

- Service contract and other business models such as management contract models (e.g., PPP, lease method) need to be encouraged over the community-based model for performance-based institutional O&M of water supply and sanitation facilities. However, only one model should be practiced in one area for a single service. For the service contract model, payment would be made after the successful completion of services. For area or zone-wise management, the service contract /management contract model would be introduced for different water supply and sanitation infrastructures according to the following arrangement.
 - DPHE/LGIs/Institutions would use service contract model for maintenance of Low-user options like Tara pump, AIRP, Ring well, GFS, school toilet, community toilet, and HCF toilet.
 - Management contract model for O&M can be considered for Piped water supply systems, RO and Solar PSF, based on revenue sharing or lease method or PPP system. DPHE may provide technical support through LGI by linking with the service chain.
 - Maintenance of household-based water options like STW and RWH systems would be done through the registered private mechanics and by developing the local spares market.
- Registered local technicians/ mechanics would be identified and trained on O&M and linked with the user community to register, repair service, billing, fee collection, and regular monitoring of the performance.

5.4 Dedicated O&M Fund

- A dedicated O&M fund for water supply and sanitation would be developed and executed by the responsible person/institute/third party. The Government would estimate recurring O&M costs and make annual allocation from the government revenue budget and channelize that

through government departments (like DPHE) and specify water supply and sanitation O&M as a separate component in fiscal transfer to LGIs. Following potential sources could be considered for developing a water supply and sanitation O&M fund at LGI level.

- Collection of 10% revenue income from the options run on business model^{§§}
- Allocation of a lump sum money for UP/ LGI from GoB allocation or income from holding tax^{§§}
- The DSK-CBO water supply and sanitation O&M fund model could be replicated in other urban slums in the country. Maximum up to 5% of water supply and sanitation O&M fund could be released immediately on demand to the water supply and sanitation infrastructure-based O&M committees in a slum to use in emergency for repair-and maintenance.
- A dedicated water supply and sanitation O&M fund would be developed at educational institutions from the revenue budget. Government allocation for water supply and sanitation funds can be made based on the value of recurring O&M costs per year per student. The fund could be channelized through Govt. departments like DPHE, DPE, DSHE, TMED (Technical and Madrasah Education Division). Govt. would ensure bi-annual/annual inspection of water supply and sanitation facilities in the educational institutions. If they are unable to manage O&M, then the service contract model can be utilized.
- The patient contribution would be structured and formalized to ensure water supply and sanitation O&M in primary health care facilities (e.g., community clinics). The LGIs (e.g., Union Parishad, Upazila Parishad) may take initiative in consultation with the UHFPO to formalize this contribution at local level. Water supply and sanitation funds in healthcare facilities would be allocated from the Govt. revenue budget based on the value of recurring O&M cost per year per patient visit and channelized through DGHS, HED, or PWD. If they are unable to manage O&M, then the service contract model can be utilized.

5.5 Standard Operating Procedure (SOP), monitoring and surveillance for O&M

- Standard operating procedure (SOP) would be developed and established for the O&M of each technology. The requirement of SDG indicators (e.g., accessibility, quality, quantity, reliability, affordability, and equity) needs to be addressed in the SOP for each water supply and sanitation technology/facility. Performance monitoring/service regulation through developing KPI (such as customer satisfaction, record keeping, accountability etc.) would also be introduced by the contracting authority.
- Water quality surveillance would be prioritized and implemented for all available water technologies (focusing technology-wise parameters, frequency of testing, and seasonal variations). Standard field kits and laboratory-based water quality testing protocols would be developed. Water quality monitoring of all public water technologies needs to be ensured as per approved protocols through the engagement of private sector.
- The institutional capacity of DPHE/ LGIs would be strengthened, and designated personnel would be ensured.
- The investment projects should have a component on ‘operational/business model’ with regulatory functions performed by LGIs.

^{§§} To be introduced

- Integrate a rehabilitation component in every new project for water supply and sanitation investment and prioritize rehabilitation of existing non-functional water supply and sanitation facilities over new installation.

5.6 Research and innovations

- Research and innovations on existing and promising water supply and sanitation technologies, with special focus on hard-to-reach areas, disaster and climate change resilience would be promoted and piloted to overcome the technical barriers related to O&M.

6. REPORTING FOR O&M OF WATER SUPPLY & SANITATION OPTIONS

The O&M contracting authorities like local DPHE/LGI/Management Committee may outsource (it may be lease method/service contract/PPP) private sector, NGO/third party for executing O&M of water supply and sanitation options.

Upon signing outsourcing agreement O&M executing institution (private sector, NGOs/third party) will regularly (monthly/quarterly) submit O&M report to the contracting authorities against key performance indicator in a prescribed format (to be supplied by O&M executing institution) and receive payment upon satisfaction and acceptance of the report by the contracting authorities.

The contracting authority will review the submitted report and may ask for clarification to O&M executing institution, if any, and send a copy to DPHE District Office for their feedback and record keeping.

ANNEX-I: RESPONSIBILITY MATRIX FOR O&M

Responsibility Matrix for O&M of WSS Facilities	Community Level			Educational Institutes	Primary Health Care Facilities	Sanitation for all entities
	Less Complex Management	Medium Complex Management	Demand Professional Service			
	Technologies/Facilities	Community HTW (Tara), Tube well with submersible pump	Community Rainwater Harvesting System, pond sand Filter, Community Toilet, Gravity Flow System			
O&M Model	User group management model	Service contact model (e.g., out sourcing)	Management Contract model (e.g., Lease method/ppp)	Service contact model (e.g., out sourcing)	Service contact model (e.g., out sourcing)	Management Contract model (e.g., Lease method/ppp)
Operation	User	User/ Entrepreneurs	Private Operators/Investors	User/College Governing Body/School Management Committee	User/HCF Management Committee	Private Operators/Investors
Maintenance	Trained local technicians/mechanics	Entrepreneurs	Private Operators/Investors	School Management Committee/ Entrepreneurs	HCF Management Committee/ Entrepreneurs	Private Operators/Investors
Sources Of fund for O&M	GoB allocation to LGIs/DPHE and user fee/tariff	GoB allocation to LGIs/DPHE and user fee/tariff	Revenue earning from users and support from GoB through DPHE/LGI	Revenue budget	User fee/tariff and support from Govt through DPHE/LGI	User fee/tariff and support from Govt through DPHE/LGI
<p>*Standard Operating Procedure (SoP) for each of the technologies to be developed and followed.</p> <p>* Standard Template for Contract with specific target and clear terms and conditions to be developed and followed.</p> <p>Service contract model: the O&M service of a system is contracted out to a party (agency/individual) through an agreement by the Govt. agencies/LGIs/owner</p> <p>Managed Contract model: the entire system is established and the service is taken care of by third party (partially/fully) through arrangement like leasing or ppp with Govt. agencies/LGIs/owner</p>						

ANNEX-II: ROLES OF DIFFERENT ENTITIES FOR O&M OF WSS

PSB-LGD:

- Develop WASH O&M fund
- Allocate govt. revenue budget for O&M
- Revise 1998 policy and make a provision for institutional O&M
- Issue a circular to follow DPHE-prepared area-wise technology map
- Strengthen the institutional capacity of DPHE/ LGIs in terms of resources
- Delegate O&M regulatory function to the LGIs
- Issue a circular to include O&M as a separate component in the fiscal transfer
- Revise the site selection criteria for community water options considering O&M

LGI:

- Make NGOs/others bound to follow DPHE- prepared technology mapping
- Seek fiscal transfer (ADP) for O&M to Ministry and utilize it
- Allocate a portion of holding tax in O&M
- Execute regulatory role for O&M

DPHE:

- Prepare an area-wise technology map (grading to hi- and low-user options) and regulate the installation of technologies by others
- Sign agreement with Tara/submersible pump/RO plant producers to ensure supply chain during an emergency period
- Conduct O&M by private through service/management contract models using govt. revenue budget
- Ensure the component on 'operational/business model' in the investment projects
- Integrate a rehabilitation component in every new project for water supply and sanitation investment
- Undertake a separate project on rehabilitation of existing non-functional water supply and sanitation facilities
- Develop standard operating procedure (SOP)
- Develop water quality testing protocol

Private operators:

- Practice WSP, SSP and meet KPI for O&M

ANNEX-III: BUILDING ON SUCCESS AND LESSON LEARNED

Several successful models for O&M are available in the field. These model(s) are deserving candidates to be reviewed, customized, and replicated, using available enabling factors, following local context.

- **Upazila complex piped water supply scheme operated by a management committee:** DPHE implemented a GoB-UNICEF-funded surface water-based piped water supply scheme in Gowainghat Upazila complex under Sylhet district in 2019. This system treats river (Gowain) water and supplies it to around 500-600 households through 55 tap stands, where each tap stand is shared by 10-12 households. It is the only suitable water option for drinking and cooking for these households, and people use central pond water for other domestic purposes. Piped water is supplied twice a day, and a tariff for water use is set at BDT 300 per month per tap stand, which is shared by the households taking water from that tap stand. In fact, each household pays BDT 300 each month on a rotational basis, and one particular household in each tap stand is given the responsibility of caretaking, including repair and maintenance of the tap stand. A central management committee, under the leadership of UNO and representation from almost all Upazila officials, runs this water supply scheme by appointing a caretaker for its operation. A Sub-Assistant Engineer of DPHE looks after technicalities and day-to-day management of the scheme. With this O&M arrangement, the scheme is currently running well without any financial deficit. Users' contribution of BDT 2000 per tap stand is now being deposited into a bank account which is reserved for any major repair, if necessary. This is an excellent example of the Upzilla model piped water supply run by a management committee for almost 3 years.
- **Rural piped water scheme operated by the Union Parishad:** DASCOH Foundation implemented a piped water supply scheme through Union Parishad (UP) in Ranihati Union of Chapai Nawabganj Sadar in 2014 with technical support from RDA. This scheme supplies arsenic-free safe water to 1517 households through direct house connection, and there is a considerable demand for this piped water supply. The UP has been operating this scheme successfully for six years through a ring-fencing account, with four staff members having accounting support from the UP Secretary. The same operating staffs are also responsible for maintenance of the scheme. Each household pays a monthly tariff of Tk 100 per connection through a software-based printed billing system. Recently, a metered billing system has been introduced in a Ward of Ranihati Union. Collection efficiency through the previous system was low, resulting in an outstanding amount of about BDT 10 lakh during FY 2016-19. Ranihati UP has made a significant effort to increase the tariff collection, and the scheme is now running at the break-even point with a collection rate of 60%. This scheme is also helping The UP to regularize the holding tax from the users.
- **Community model for PSF:** This is an improved PSF in Kocha village of Bazua Union in Dacope, Khulna, introduced in 2018 by Rupantor, an NGO with technical and financial support from WaterAid. The PSF covers 350 households having no other safe sources of water, and where people are entirely dependent on this source for getting safe water. This PSF is being operated through a cost-recovery model, where each household deposits BDT 50 for every 6 months in a bank account. The O&M is taken care of by an 11-member committee, including two caretakers. The PSF filter is cleaned every three months by the committee

themselves. The user community has not faced any technical and social challenges for two years of its operation.

- **Enterprise model for cluster-based rural piped water supply:** Max Social Enterprise, a company affiliated with Max Foundation, works with a local entrepreneur to maintain a mini-grid piped water supply for 40-70 households through a partnership with an NGO for market development. The co-investor (the local entrepreneur) is responsible for operational duties, including small repairs/regular maintenance. The local entrepreneur receives an operational bonus when he meets the O&M KPIs. If it fails, the return on their co-investment is jeopardized. The Max Foundation provides with technical support to the local entrepreneur by linking them with certified partners/ vendors/ plumbers.
- **DSK-CBO model for O&M of WASH infrastructure in urban slums:** Dustho Sastho Kendro (DSK), a local NGO, started to work in urban WASH intervention programs in 1992. For the urban WASH program, DSK forms a CBO. The CBO develops a WASH O&M fund by contributing a certain fraction of the cost of intervention (in this case, 10% of the capital cost of a WASH infrastructure). The WASH O&M fund is deposited into a joint bank account, operated by two CBO representatives and one DSK representative. The CBO takes care of regular day to day operation and minor maintenance on their own with a financing limit up to BDT 5,000. In case of any major repairing and rehabilitation work requiring more than BDT 5,000, the CBO takes a resolution and sends it to DSK for approval. After verification, DSK approves it, and the CBO can withdraw cash from the account for spending on repair maintenance. DSK continues follow-up as a signatory of the WASH account. This arrangement ensures transparency and fund security. This DSK-CBO model for O&M is operated based on a guideline which states the processes on how the CBO would develop this fund and how the fund would be used to maintain WASH infrastructures. This DSK-CBO model is currently in practice in around 300 slums in Dhaka city and Chattogram city.
- **WaterAid WE-WE model for RO Plants in climate-vulnerable regions:** The Climate Resilience Programme of WaterAid Bangladesh has developed an innovative Water Entrepreneurship for Women's Empowerment (WE-WE) model for Reverse Osmosis (RO) Plants. The WE-WE model is an iterative approach at solving coastal water crisis in Bangladesh through a business-focused solution that empowers local women entrepreneurs from marginalized households and expands safe water supply in vulnerable communities at an affordable price. A women group (usually 5-10 members) is selected, then trained on business, operation and maintenance (O&M) modalities, involved throughout all implementation phases, and are given proprietorship of the plant. The women group contribute and deposit 20% of the construction cost of the RO plant as a WASH O&M fund into a joint bank account, where two members from the women group and one representative from the implementing partner become signatories. The group is instructed to not take the business profit unless the total amount of WASH O&M fund is deposited, which is only to be utilized for major O&M needs upon approval from the implementing partner. This model ensures liability, transparency and community ownership of the RO plant intervention. The WE-WE model follows a guideline which is updated regularly. Currently, 10 RO plants of WaterAid Bangladesh have been installed with the WE-WE- model.

- WASH Desk-a solution for O&M of WASH facilities and realization of human rights:** In collaboration with LGIs & DPHE, WASH Alliance International (WAI)- WASH programme of Siamvi and its partners have introduced WASH Desk with a view to providing support to people for operation and maintenance (O&M) of WASH facilities, accessing to all WASH related information and solving WASH related issues of the users. LGIs arranged a room in their office and appointed one person for this desk. There are two (2) registers at this desk, one is for writing complaint/problem of the users and the other one for writing the service that has been provided. A complaint box is kept for the WASH users to drop their problem/complaint related to WASH service. They can also lodge complaint through mobile phone/SMS. There is an option of providing feedback. In the WASH Desk, WASH related information, policies and strategies are displayed. DPHE tube well mechanics, pit emptier and sanitation workers, mobile numbers are available in the WASH Desk, and people can call them for installation or O&M of WASH facilities. Youth and CSO group also engage themselves to facilitate WASH Desk work. This WASH Desk has made a bridge between WASH service providers and users.
- Village Development Committee successfully running the Pipeline Water Supply system:** The Village Development Committee (VDC) of Golabari village of Kasba union, Nachole, Chapai Nawabganj is managing the water supply system with worth approximate BDT 16,00,000 covering 578 households with the community contribution of BDT 85,000 and the Kasba Union Parishad contribution of BDT 50,000. The VDC is managing the system with the tariffs of community user groups by paying the electricity bill, associated operation, repairing and maintenance costs. An inclusive and differential tariff system has been set by analyzing the ability to pay and considering the extreme vulnerability of the peoples. A separate bank account is being maintained for managing the tariff through joint signatory manner to ensure the transparency. The Golabari Pipeline Water Supply System is registered in the Kasba Union Parishad as a rural asset. The coordinated initiatives among the VDC and the Kasba Union Parishad have ensured the smooth functioning of the Pipe-water Supply Scheme even after five years of phase out of the project.