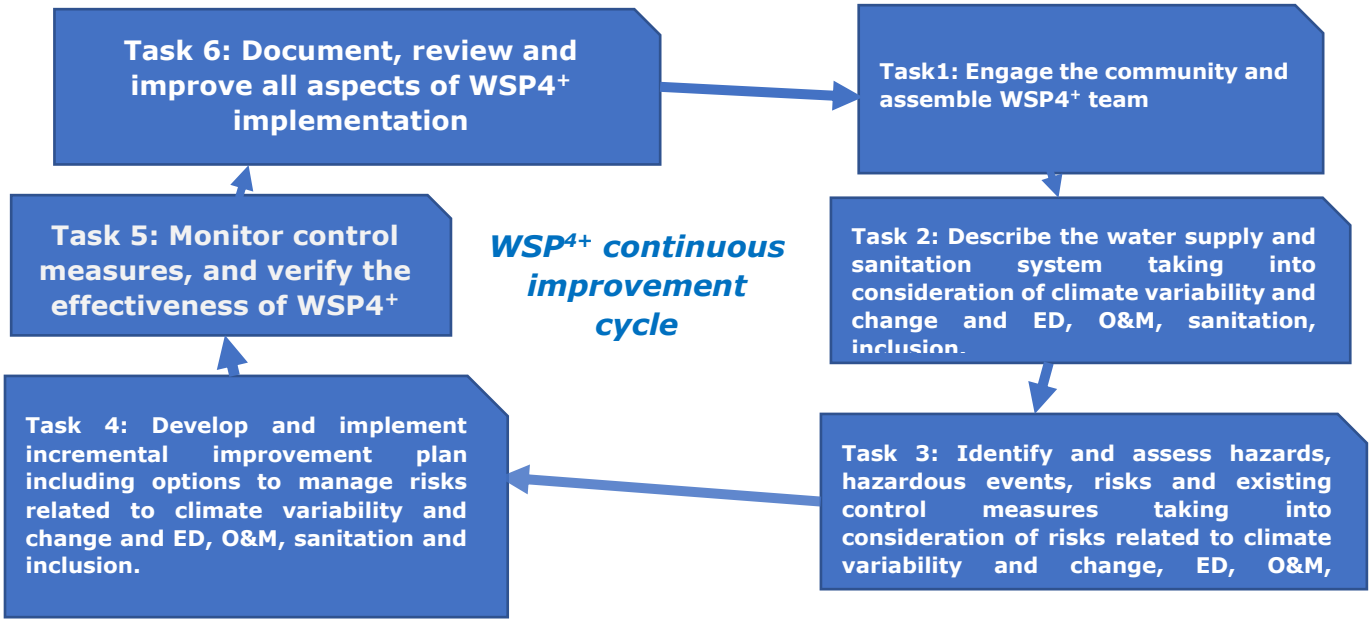
SUOMI
FINLAND

Ministry of Water and Energy (MoWE)

Community-Led Accelerated WASH (COWASH) project



WSP4+ Working Manual for COWASH IV Project

Mussie Hailegeorgis

Climate and Environmental Risk and Water Safety Specialist

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NIRAS

CMP

Acronyms

BH	Borehole
BoEd	Bureau of Education
BoH	Bureau of Health
BoLSA	Bureau of Labor and Social Affairs
BoW	Bureau of Water
CESDWS	Compulsory Ethiopian Standard Drinking Water Specification
CLTSH	Community-Led Total Sanitation n and Hygiene
CM	Control Measure
CMP	Community Managed Project
COWASH	Community-Led Accelerated WASH
CR-WSP	Climate Resilient Water Safety Planning
DPO	Disabled People Organization
DRR	Disaster Risk Reduction
DWQS	Drinking Water Quality Standard
ED	Environmental Degradation
EFCCC	Environment, Forest and Climate Change Commission
EPHC	Ethiopia Public Health Unit
FDRE	Federal Democratic Republic of Ethiopia
FTAT	Federal Technical Assistance Team
HDA	Health Development Army
HDW	Hand Dug Well
HEWs	Health Extension Workers
HH	Household
KOLSA	Kebele Labour and Social Affair
MoA	Ministry of Agriculture
MoWE	Ministry of Water and Energy
MoWIE	Ministry of Water, Irrigation and Energy
O&M	Operations and Maintenance
PWD	Persons With Disabilities
RSU	Regional Support Unit
SDG	Sustainable Development Goal
SIF	Sanitary inspection forms
SOPs	Standard Operating Procedures
SW	Shallow Well
ToT	Training of Trainers
WASH	Water, Sanitation and Hygiene
WASHCOs	Water supply, Sanitation and Hygiene Committees
WHO	World Health Organization
WoA	Woreda Office of Agriculture
WoWCA	Woreda Office of Women and Children Affaires
WoLSA	Woreda Office of Labor and Social Affair
WSP	Water Safety Planning
WWT	Woreda WASH Team

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1. Introduction

1.1. General

Water and Sanitation as a Basic Need and Right

Safe, adequate and equitable drinking water and sanitation is a basic need for human development, health and well-being. Water supply from improved sources does not always guarantee that the water is safe for drinking.

Climate Variability and Change

The water, sanitation and hygiene (WASH) sector is already affected by climate change and variability in many different ways such as risk of drying or decreasing of yield of water sources during dry seasons causing water shortage. Community managed rural water supply sources located in flood prone areas have been experiencing total or partial damage due to floods. Water sources can be contaminated by flood loaded contaminants. In such a condition, communities revert temporarily to unsafe sources. Sanitation facilities can also be damaged by flood water contaminating water sources and creating public health problem.

Water Quality Testing

In Ethiopia, water quality testing (monitoring) and sanitary surveys to community managed water supplies are not conducted on regular basis mainly due to:

- shortage of skilled human resources specially at woreda level
- lack of water quality testing equipment and reagents
- focus on increasing access than ensuring safety
- lack of uniform performance monitoring system between regions
- shortage of finance and transport to conduct water quality tests and to reach out all remote community water supplies.

Even when testing is done to sort out suspects of contamination, results are obtained too late after many people consumed unsafe water and their health was already affected. Furthermore, the test result is limited to providing information on where and when contamination happened in the water supply systems.

Groundwater and Sanitation Hazards

In the context of Ethiopia specifically in rural community, water from improved sources is frequently derived from groundwater via protected springs, protected dug wells, tube wells, and boreholes. Most rural communities, school, health facilities, faith-based institutions, kebele administration offices and rural market centers there use onsite sanitation system, mainly pit latrines. These on-site sanitation facilities may be a significant source of ground water contamination. In addition to on site sanitation, other source of contamination of ground water includes: solid waste dumps and refuse pits, stormwater drains, stagnant surface water, agrochemicals used for crop production, and animal enclosures and free-range animals. Contamination risk is also high inside the households due to unhygienic water withdrawing and unsafe water storage practices.

There are also hazardous and infection wastes generated from health care institutions, and hazardous wastes from school laboratory. If wastes with these natures are handled, treated or disposed incorrectly, it can spread disease, poisoning people, livestock, wild animals, plants and entire ecosystems including water supply system. Hence, school and health care facilities waste management are one of the major issues to safeguard the public health and water safety.

Access to Water and Sanitation and Inclusion

Safe water and adequate sanitation for all without discrimination is a human right, officially recognized by the United Nations (UN) in 2010. The global commitment to safe water and sanitation for all is further demonstrated through the Sustainable Development Goal (SDG) 6, target 6.1 to achieve universal and equitable access to safe and affordable drinking-water for all. The SDG 6 also set target 6.2 to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations. However, many people cannot yet claim their fundamental right to water and sanitation services, and this lack of access is felt disproportionately by those who are disadvantaged socially, economically, demographically or geographically. Equitable access to safe drinking-water and sanitation services will therefore only be achieved if particular attention is paid to vulnerable groups to understand and address disparities. For the purpose of this manual, the term vulnerable groups apply to groups of people including women, children, elderly, the poor, Person with Disability (PwD), and socially excluded people due to their occupational specialty (such as potters, blacksmiths, etc). In addition to creating access to water and sanitation infrastructures, participation and decision-making power of these groups of the community in all aspects of WASH development processes is critical.

Operation and Maintenance

Community managed water supplies mostly suffer from frequent breakage, inadequate operation and maintenance, and gross microbial contamination by intrusion of human and animal excreta by surface runoff during rainy season. Strong operations and maintenance (O&M) programs underpin the effectiveness and sustainability of any drinking-water supply and sanitation system. Failure to adequately address O&M can bring serious consequences, including operational and/or infrastructural failures, contamination events and economic losses. Despite the critical role of O&M in the provision of safe and adequate drinking water supplies and sanitation system, basic O&M functions are often under-resourced – marked by undertrained staff and/or inadequate funding.

Therefore, this working manual integrate the above mentioned four aspects of WSP, and the WSP is modified into WSP^{4+} (WSP with four pluses): Climate Resilience and DRR (+), O&M and Water Fee Collection (++), Inclusion (+++), and Sanitation (++++).

1.2. Objectives and scope this manual

The objective of the manual is to establish clear procedures and methodologies for planning and implementation of WSP^{4+}. This manual is used for COWASH IV project staff at FTAT and RSU, WSP^{4+} teams at Woreda, Kebele and Scheme Specific level when implementing WSP^{4+} for COWASH IV financed WASH facilities construction and rehabilitation.

2. Concepts of WSP^{4+}

2.1. Definitions of WSP and WSP^{4+}

Water Safety Plan (WSP): According to WHO, WSP is a comprehensive risk assessment and risk management approach that encompasses all steps in the water supply, from catchment to consumer. It proactively identifies sources of hazards and level of risks that affect adequacy and quality of the rural water supply service delivery systems.

WSP^{4+}: It uses the same approach as conventional WSP to assess and manage risks to drinking water supply systems with special consideration to the current and anticipated impacts of climate change on the quality and quantity of the rural water supply systems, impact of sanitation system on the drinking water supply and public health, O&M and Water Fee Collection, and Inclusion.

2.2. Objectives of WSP^{4+}

The Objectives of WSP^{4+} are to:

- Prevent or minimize contamination of water sources, and to prevent re-contamination of water during collection in the reservoir tank, distribution, storage, and use at household level;
- Reduction or removal of contaminants through treatment processes;
- Minimizing the health risks caused by inadequate sanitation conditions at household, institutions (school and health facilities), and other public on-site sanitation system such as at kebele administration, bus stations and market places;
- Minimize the direct and indirect impact of climate variability and change, and environmental degradation on the water supply and sanitation system (flood, drought, wider catchment degradation, contamination, land slide and gullies);
- Prevent or minimize O&M related risks to the community managed water supply and sanitation (community/household, school, health care facilities and public toilet) system;
- Ensure that the needs of different vulnerable groups are integrated in the WSP^{4+} processes.

2.3. Benefits of Implementing WSP^{4+}

Implementing WSP^{4+} has the following benefits to all stakeholders along the water supply chain including water suppliers, regulatory bodies, and the community.

- *maximizing public health protection, efficient and effective use of existing resources, provide information to maximize current and future investments, improve water suppliers' practices, and facilitate decision making on safe drinking water framework for all stakeholders;*
- *Secure continuity of water supply and sanitation services by mitigating and adapting to direct and indirect environmental and climate-induced hazards that may threaten safe and adequate water supply and sanitation services;*

- *Prevention of water contamination and hazards to the scheme is less costly and more effective than acting after the damage has already taken place;*
- *Operation and Maintenance (O&M) plan is integrated along with the water safety plan. It is of utmost importance to collect adequate water tariff to cover regular operation and maintenance and repair works;*
- *Water contamination along the water supply system prevented/minimized and public health protected through improved sanitation at household and institutions, agricultural field, solid waste damping site, and other sources; and*
- *Equitable WASH service delivery ensured through integrating equity issue in the* WSP^{4+} *processes. It helps* contribute to equitable realization of access to safe and adequate water and sanitation services, minimize any (inadvertent) discrimination through the WSP^{4+} process, and strengthen WASH effectiveness through an inclusive WSP^{4+} approach. It also helps vulnerable groups to participate/engage in the decision-making process in all WASH service delivery processes.

2.4. Basis for Successful WSP^{4+} implementation

User's participation, including the PwD and other vulnerable groups, and users' commitment is essential to keep the water safe, adequate, equitable and reliable. Therefore, for the successful implementation of WSP^{4+}, the following points should be taken into account:

- ✓ *Each water scheme should have strong and committed Water Supply, Sanitation and Hygiene Committee (WASHCO) that conduct meetings regularly. WASHCO should be with minimum of 50% representation of women and proportional representation of vulnerable Groups including PwD or representative of Disabled People Organization (DPO);*
- ✓ *It is also highly recommended that WASHCO legalized for the successful WSP^{4+} implementation. For this purpose, as part of the WSP^{4+} processes;*
    - o *Woreda/Kebele water experts should promote those WASHCOs implementing WSP^{4+} on the needs for legalization, the process for legalization and what is required from WASHCO for legalization.*
    - o *Based on that COWASH support WASHCO in fulfilling what is required from them and can apply to WoW for legalization.*
- ✓ *School, health facilities and other public on-site sanitation facilities should have strong management system including O&M and ensuring sufficient budget for O&M. This may include establishment of* WSP^{4+} *at school, and health care facilities;* [1]
- ✓ *Public auditing & hearing and mass meetings conducted on regular basis;*
- ✓ *Establishment of Operation and Maintenance (O&M) fund and development of operation and maintenance regulation;*[2]

[1] Rural Water Supply Operation and Maintenance Manual was prepared during COWASH II and sseparate school WASH O&M manual is under preparation in COWASH IV parallelly with this manual

[2] In COWASH the upfront cash contribution for O&M before the approval of financing of water supply scheme implementation or rehabilitation is imbedded into the community managed project approach followed in COWASH IV

- ✓ *Establishment of Credit and Saving Association to support household sanitation construction and maintenance;*[3]
- ✓ *WASHCO carry out minor repair and maintenance work on regular basis;*
- ✓ *Trained maintenance worker(s) or Micro Small Enterprises (MSE), who carry out their work regularly;*[4]
- ✓ *Regular collection of sufficient water fee;*
- ✓ WSP^{4+} *Team at all level especially at woreda, kebele and Scheme levels should be committed to planning, implementing, monitoring of* WSP^{4+}*. Each WASH scheme should have* WSP^{4+} *plan with budget.* WSP^{4+} *team specially at woreda, kebele and scheme level should have regular meeting time, and meet and review* WSP^{4+} *performance regularly.*[5]
- ✓ *The improvement plan activities including monitoring actions should be included into regular activities of* WSP^{4+} *members.*
- ✓ *Top management support at all level specifically at woreda level by Woreda WASH Team (WWT) is crucial. WWT should ensure that each water supply and sanitation system have* WSP^{4+}*, sufficient resource is allocated for* WSP^{4+} *implementation (*WSP^{4+} *institutionalized),* WSP^{4+} *performance monitored and reported periodically.*
- ✓ *Water quality analysis should be done for water points where the* WSP^{4+} *is being implemented. This is first during the risk assessment time as a base line information, and also after starting* WSP^{4+} *implementation to verify whether* WSP^{4+} *is effective in addressing the safety issue.*

[3] Household level sanitation financing modalities are parallelly going to be developed with this manual

[4] Maintenance and spare part supply MSE development is also part of COWASH IV intervention

[5] In COWASH all new schemes will have social, environmental and climate risk management plan prepared during the project appraisal stage. This plan contributes to the WSP^{4+} development.

3. WSP^{4+} processes for Rural Water Supply

The development and implementation processes of the WSP^{4+} for community managed water.

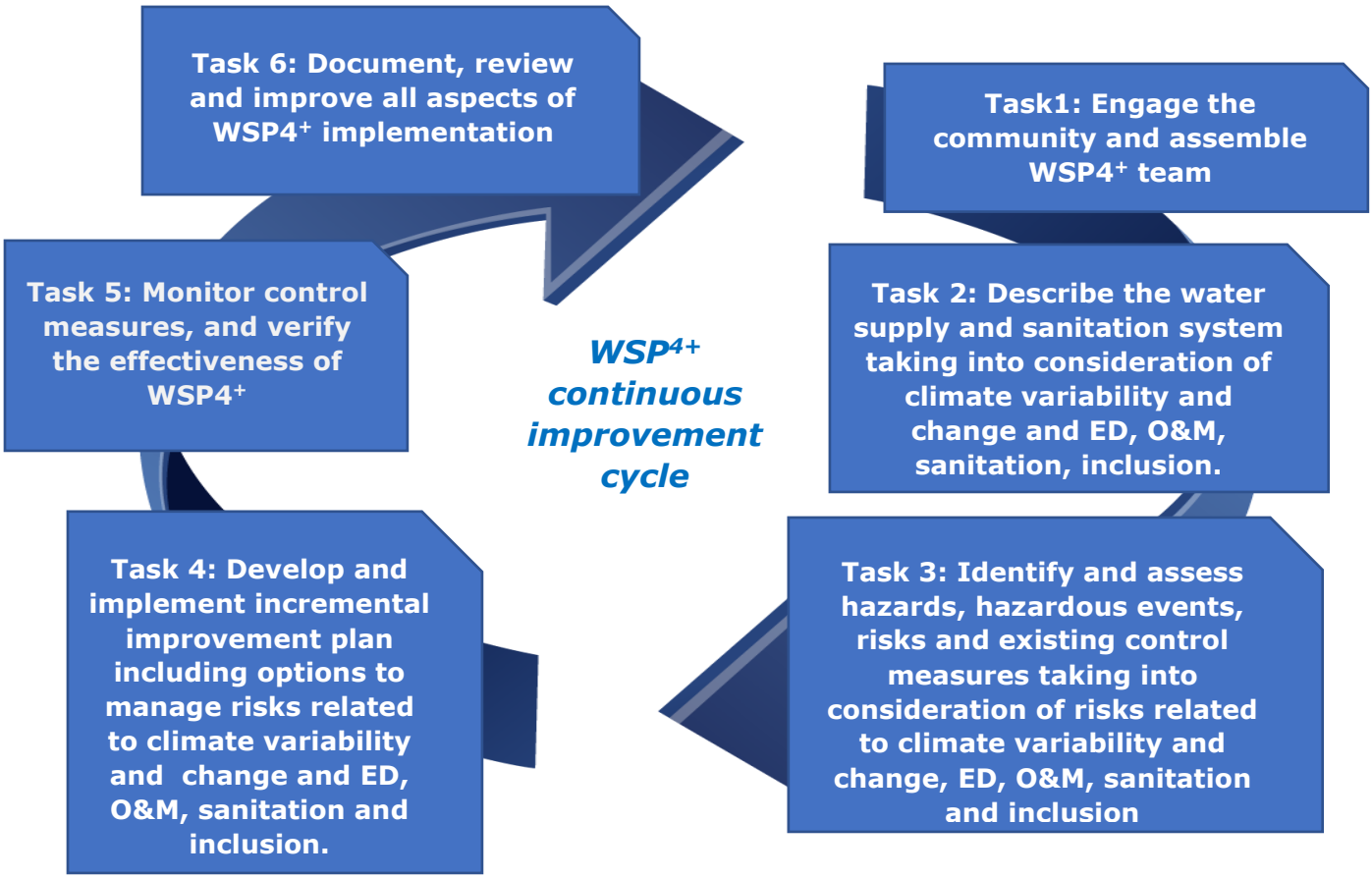


Fig. 1: WSP4+ *Tasks for rural water supply (adapted from MoWIE, 2016, and modified by COWASH IV)*

Task 1: Engage the Community and Assemble WSP^{4+} Team

Task 1.1. Engage the Community

For effective implementation of the WSP^{4+}, it is important that the community, particularly community leaders and decision-makers specially at woreda and kebele level, and also at school and health care facilities understands the WSP^{4+} instrument and its benefits. For successful WSP^{4+} implementation, it is important to secure the support of community leaders and decision-makers, and agree who is doing what under the WSP^{4+} development and implementation.

In WSP^{4+}, it is critical that different user groups including vulnerable groups meaningfully participate and be members in the WSP^{4+} team. This helps in integrating equity into the rest of the WSP^{4+} process. Hazards, hazardous events, risks and control measures are experienced

differently by different groups and are better understood by those people that experience them first hand. To ensure equity at this process:

- *Include representatives of men and women on the* WSP^{4+} *team. The women representative should be minimum of 50%.*
- *Include representatives of vulnerable user groups on the* WSP^{4+} *team. Where representation of vulnerable user groups on the* WSP^{4+} *team is not possible, their representative structure at kebele or sub-kebele level (such as Labor and Social Affairs) shall be member of* WSP^{4+} *team, and decision-making processes shall include needs and interests of all groups. For Woreda level* WSP^{4+} *team, one relevant person from Woreda Office of Labor and Social Affairs (WOLSA) shall be member of the team.*

How to engage the community?

- ✓ *Call for a mass meeting of all the users, and facilitate the identification of active and committed members of the community to represent the community's interests as part of a* WSP^{4+} *team;*
- ✓ *By making the benefits of a WSP^{++++}clear for all users using practical examples and information materials;*
- ✓ *By advocating the users with the requirements and meanings of The Ethiopia Drinking Water Quality Standards (ESA, 2021);*
- ✓ *By educating the users to the impacts of environmental degradation and climate variability and on how these may change the functionality of the water supply and sanitation system;*
- ✓ *By advocating the users on the importance of addressing risks related to lack of proper O&M, sanitation system in the provision of safe, adequate, and equitable WASH services and how to address them;*
- ✓ *By inviting the experienced persons, who have disability, to advocate the users on the benefits of the participation and involvement in the* WSP^{4+} *process*
- ✓ *Organizing and conducting visit of the users to a nearby community that has successfully applied a* WSP^{4+}*. Seeing is believing. This is a good way to trigger users' interest towards the* WSP^{4+} *approach.*

Task 1.2. Assemble WSP^{4+} Team

The Ethiopian CR-WSP strategic framework of (Table 4, page 27) and CR-WSP implementation guideline for community managed water supply system establishes the structure from federal to scheme level for the planning, implementation and monitoring of CR-WSP, and technical and management support for the same. The composition of CR-WSP team members and their roles and responsibilities are detailed below. COWASH IV uses the same structure to implement WSP^{4+} except including additional staffs that are required for O&M and inclusion aspects of WSP^{4+}.

National CR-WSP task force: the task force is led by the MoWE, and memberships from MoWE, MoH, MoF, Universities, and WASH development Partners. Their role includes agrees on national CR-WSP approach, creates guidance documents and tools, provides CR-WSP training, etc.

Regional CR-WSP Task force: the task force is led by regional water bureau, and memberships from BoH, BoEd, BoA, regional Environment bureau, BoFED, regional WASH

development partners, BoLSA. Their main roles include agrees on Regional CR-WSP approach, provide support to Woreda level CR-WSP team and CR-WSP implementation, provide CR-WSP training, etc.

1. **Woreda WSP^{4+} team:** The team is led by Woreda Administrator with membership from Water office, health office, education office, agriculture, environment, women, finance, Woreda Office of Labor and Social Affairs (WOLSA). The heads of all these institutions are member of Woreda WASH Team (WWT). The main roles and responsibilities of the team include:
    - steers the woreda WASH implementation including WSP^{4+};
    - agrees on WSP^{4+} approach;
    - support the implementation of WSP^{4+} by ensuring that WSP^{4+} implementation is mainstreamed in the institutions plan, reported and monitored;
    - ensure the provision of technical support to kebele/scheme specific level WSP^{4+} team;
    - report WSP^{4+} implementation to region as part of the WASH performance report.

There are technical experts from all these institutions who are practically implementing WSP^{4+} with the following main roles and responsibilities:

- provide training and technical support to Kebele and Scheme level WSP^{4+} teams in the planning (WSP^{4+} team formation, system description, risk analysis, and improvement plan preparation), implementation, monitoring, reviewing and updating of WSP^{4+};
- regularly reports to WWT on the performance of WSP^{4+} implementation and challenges faced.

In COWASH IV, the woreda WSP^{4+} technical team will include the following institutions and experts from these institutions.

Table 1. Institutions and Experts of Woreda WSP^{4+} Technical Team

S. No	Institutions	Expert in the existing CR-WSP team	Remarks
1	Woreda water office	Water supply expert and water quality expert.	The water supply expert leads the WSP^{4+} technical Team. The water quality expert is responsible to monitoring of the water supplied to the community.
2	Woreda Health Office	Environmental Health expert	To manage sanitation aspects of WSP^{4+}
3	Woreda Environment Office	Environment and climate change expert. If there is metrology agency in the woreda, relevant expert from this agency will be represented in the team	To manage climate resilience and DRM
4	Woreda Agriculture Office	Natural Resource management expert	To manage climate resilience and DRM
5	Woreda education office	Focal person for COWASH/WASH expert	To manage WSP^{4+} for school schemes
6	WoWCA	COWASH focal person/gender mainstreaming expert	To manage gender and children aspect of WSP^{4+}
7	WoLSA), or if WoLSA is not available, DPO if there are at woreda level.	Disability inclusion expert	To manage Inclusion of vulnerable user groups aspects of WSP^{4+}

2. Kebele WSP^{4+} Team

Kebele WSP^{4+} *team will be established wherever more than one scheme shares the same micro-watershed in the same Kebele*. Kebele WSP^{4+} team is also needed if the water scheme is crossing several Gotts/village in the Kebele or if the scheme covers several Kebeles (multi-village piped scheme).

Kebele WSP^{4+} team consists of the following actors:

1. Kebele Administrator, Kebele Manager, Kebele Women's Affair,
2. Kebele Water Users Association representative (if any)
3. Sub-Kebele development committee chair from sub-kebele where the micro-watershed is located in this sub-kebele,
4. WASHCO chair persons of respective selected water schemes where they are included in the micro-watershed,
5. Development Agent/natural resource management DA,
6. Environmental protection and land administration officer
7. Community and religious leaders
8. Kebele water technician
9. Health Extension Worker (HEW)
10. School director
11. Kebele Labour and Social Affair (KoLSA) representatives, if any (additional for WSP^{4+} purpose) or Disabled Person's Organization (DPO) if available or PWD of both sexes to represent PWDs in the community.

However, sometimes it is difficult to get all these in one team, and the following members are mandatory to get in the Kebele WSP4+ team: Kebele Manager; Kebele Women's Affair; members listed under # 3, 4, 5, 8, 9, and 11.

The main roles and responsibilities of kebele WSP^{4+} team, with technical support from Woreda WSP^{4+} team, include:

- ✓ Provide WSP^{4+} training to scheme specific WSP^{4+} team;
- ✓ Lead and coordinate the planning, implementation, monitoring, reviewing and updating of WSP^{4+} in the Kebele;
- ✓ Advocate and promote the WSP^{4+} implementation in the Kebele for the users;
- ✓ Provide technical support for the scheme specific WSP^{4+} teams in the development and implementation of the WSP^{4+};
- ✓ Monitor the WSP^{4+} implementation and management in the Kebele and report to Woreda WSP^{4+} team.

3. Scheme Specific WSP^{4+}

In a situation where different water schemes in the same Kebele are located in the different micro-watersheds, formation of scheme[6] specific WSP^{4+} team is important. Members could be

[6] As per the Ethiopia CR-WSP guideline for community managed water supply, in a situation where different water schemes in the same Kebele are located in the different micro-watersheds, formation of scheme specific WSP^{4+} sub-team is important. The team is responsible manage micro-catchment that may affect that specific water point.

the Sub-kebele leader, WASHCO members, representative from **PwD,** scheme caretaker, Health Development Army (HDA) leader, Health Extension Worker (HEW) responsible to that village, director of the school, community and religious leaders with technical and management support from Kebele WSP^{4+} team.

Task 1.3. Mapping/documentation of WSP^{4+} team members

Once Woreda, Kebele and scheme specific WSP^{4+} teams are identified, member names and roles should be documented and shared with all team members and the community. The documentation should be updated whoever member is changed. See annex 1 form 1.1, form 1.2, and form 1.3 for the documentation of Woreda, Kebele and Scheme specific WSP^{4+} team respectively.

WSP^{4+} teams at school and health care institutions

WSP^{4+} team at health post and health centers

1. Manager (acts as team leader)
2. WASH technician from the nearby community
3. Member of community health or water committee
4. Maintenance or cleaning person

WSP4^{+} team at School

1. School director (acts as team leader)
2. Teacher representatives
3. Parent representative
4. WASH technician from the nearby community
5. Member of community health or water committee
6. Maintenance or cleaning person

See also annex 1 form 1.4 and form 1.5 for the documentation of health care facilities and school WSP4^{+} team respectively.

Task 1.4. Organize capacity building training program for WSP^{4+} teams

Building technical knowledge and skills of the WSP^{4+} teams on the steps to be followed (tasks) during development, implementation and monitoring of WSP^{4+} is important. The training will be given as follow.

1. ***Regional Training of Trainers (ToT):*** Regional ToT will be given to COWASH IV RSU selected/relevant staffs and relevant regional bureau staffs by FTAT as indicated below:
   a. RSU staffs: Team Leader, CMP specialist, Sanitation and Hygiene specialist, and Gender and Inclusion specialist;
   b. Regional WASH bureaus: one regional WSP focal person from BoW who have been trained by MoWE, and Water Supply Engineer.
2. ***Training to Woreda WSP^{4+} team***: regional experts who get the WSP^{4+} ToT as indicated above under #1 will cascade the training to woreda WSP^{4+} team. The participants of the training are listed under section 1.2 table 1 above. WWT will get awareness on WSP^{4+} objective, benefits and approaches during the COWASH management workshop/training for woreda implementors.
3. ***Training to Kebele and scheme specific and school and health care facilities WSP^{4+} teams:*** Woreda WSP^{4+} team who get the WSP^{4+} training will cascade the training to Kebele and Scheme specific, and also to school and health care facilities

WSP^{4+} teams. The participants for kebele, scheme specific, school and health care facilities WSP^{4+} training are indicated under task 1.2 above.

The WSP^{4+} training will be given for *five days* focusing on issues indicated below.

- The national WASH policies, strategies, national water quality standard specifications, and forming and leading team work;
- Climate change/weather variability and environmental degradation, and their effects on sustainable WASH service delivery;
- The importance of managing water and sanitation safety and public risks related to climate variability and change and environmental degradation, lack of strong O&M including water fee collection system, poor sanitation system, and inclusion in providing safe and equitable water supply and sanitation in a sustainable manner;
- Concepts, principles and tasks of the WSP^{4+};
- How to describe water supply and sanitation systems, identify hazards, hazard events and to characterize risks and existing control measures;
- How to develop and implement an incremental improvement plan, how to monitor control measures, and verify effectiveness of the WSP^{4+}; and,
- How to document, review and improve all aspects of WSP^{4+} implementation.

Task 2: Describe the Community Water Supply and Sanitation System

The WSP^{4+} teams should get an understanding of the water supply and sanitation system as a whole and its components and their locations. A complete map and description of the water supply system from the catchment to point of use, and sanitation system are a precious source of information that will help the WSP^{4+} team and the community members identify hazards and their potential impacts on water and sanitation safety.

How to do it?

Task 2.1 Map all the Water Supply and Sanitation System

The WSP^{4+} team should make a map/flow diagram of:

- *water supply system from catchment to point of use including relevant elements of the catchment area (land use practices) and the community served (including indicating where PwD are located);*
- *the existence of on-site sanitation system such as pit latrine (at household level, school, health facilities, and other public on-site sanitation facilities), existence of open defecation practices, waste management at school and health care facilities. Other sources of pollution to groundwater (i.e. community solid waste dumps and refuse pits, agrochemicals from agricultural fields, stormwater drains, stagnant surface water, and animal enclosures and free-range animals);*
- *environmental degradation aspects of the catchment like gully, flood areas, landslide, etc;*
- *breakage and leakage of water along the water supply system, and also none-functioning sanitation system.*

This exercise helps the team to identify hazards and hazardous events, and put control measures.

Task 2.2: Gather Supporting Information

Make visits and visually observe all components of the community and institutional (School and health care facilities) water supply and sanitation systems. **Kebele and Woreda WSP^{4+} teams with technical support from Woreda WSP^{4+} team should gather the following information:**

1. Relevant water quality standards of Ethiopia, see annex 2 of this manual;
2. The type and components of the community and institutional water supply system, and list the type of infrastructures, and their conditions (functioning/non-functioning and why);
3. The type of the community/household, health facilities, schools, and other public on-site sanitation system and their conditions (functioning/non-functioning and why). For school and health care facilities sanitation system, whether the sanitation system is safe and accessible and clean for all users, does it cause any pollution impact to the water supply for the community, school, and health facility. Whether the sufficiency of number of toilets for the patients, availability of toilet for staffs and patients, separate toilet for MHM purpose and place/mechanism for disposal of used sanitary pads, equitability;

4. The waste management practices and technologies at the community, schools and health care facilities (including hazardous and infectious) to protect our water schemes and public health;
5. known or suspected changes in source water quality relating to climate change and extremes (flood/drought), or other pollution sources such as poor sanitation system, agrochemicals, waste management (both animals and human waste), etc;
6. Information on catchment land uses, and catchment degradation status;
7. Water treatment, distribution and storage details;
8. Who uses the water supply and for what purpose including access to vulnerable groups? System assessment should include identification of all the different users and their experience in accessing safe, adequate, and equitable the water supply and sanitation services and their challenges;
9. Who is responsible for operating the water supply and sanitation systems and what education and training they received? The needs and practices of O&M for the water supply and sanitation system;
10. Financial and human resources available for managing and operating the system. Who is responsible for the O&M work of the water schemes? Does WASHCO and similar committees at school and health care facilities collect water fee regularly and is sufficient for the O&M activities;
11. Information on geological condition to assess whether geological conditions are likely to provide reliable groundwater with a reasonable yield, and also the difficulty of the geology for digging well should be assessed and mapped;
12. Information on catchment size in relation to the estimated recharge needed to meet the projected demand for water across seasons and between wet and dry years, and taking into account project population and demand increase;
13. Information on water sources characteristics like quality, quantity, reliability/seasonality of the sources considering seasonal variability and variability between years, for example due to droughts);
14. Information on climatic and environmental factors that directly or indirectly influence the resilience of the water supply system (flood, drought, gully, land slide).

WSP^{4+} teams should use **annex 3** and respective **Sanitary Inspection Form (SIF)** for each technology (**annex 4**) to accomplish task 2.2. Woreda WSP^{4+} technical team shall provide technical support when Kebele and Scheme Specific WSP^{4+} teams accomplish Task 2.1 and 2.2.

Task 2.3 Check the Map and Water Supply and Sanitation Description

It is important for the WSP^{4+} team to physically check the description of the water supply and sanitation system through a walk or site inspection to verify that the description is thorough and accurate.

Task 2.4 Discuss and Identify Community and institutions' Water Supply and Sanitation Objectives

It is important to discuss the benefits of safe drinking water, good sanitation and hygiene practice with the community, institutions (schools and health care facilities) and the linkages among water supply, sanitation and hygiene and agree on water supply and sanitation objectives.

The following questions can help in developing holistic community and institutions' water supply and sanitation objectives:

- *What do we want and need from our water supply and sanitation system?*
- *What are our current water supply and sanitation systems, and how they are operated?*
- *What problems are there with the water supply and sanitation system?*
- *Who is involved, and who should be involved, in ensuring that we have the water and sanitation services we need and want?*
- *What else, other than the water supply and sanitation services, is needed for a healthy and sustainable community?*
- *Why is important to consider inclusion in WASH services delivery, and how to do that?*
- *What is the role of strong O&M system for the safe and adequate WASH service delivery in a sustainable manner? What are the challenges and how to solve it?*
- *What other water supply aspects should/can be considered (e.g. other activities for which water is needed, such as fruit and vegetable gardening, crop production, livestock production, others)?*

TASK 3–Identify Hazards, Hazardous Events, Evaluating Existing Control Measures, and Asses Risks

For each component identified in the water supply and sanitation map (Task 2.1 above), and the water supply and sanitation system description/analysis done in Task 2.2 above, the next task by the by WSP^{4+} team is to analyze different hazards and hazardous events that can disrupt the sustainable provision of safe, adequate, and equitable water supply and sanitation services. This task is at the heart of the WSP^{4+}. To complete it, the WSP^{4+} teams need to ask the following questions for each step of the water supply and sanitation system: what can go wrong (**hazard**)? How and why might it go wrong (**hazardous event**)? At what times and where might it go wrong? Is anything being done to prevent it from going wrong (**existing control measures**)?

When identifying hazards and hazardous events, the WSP^{4+} teams at scheme/kebele level, and also at school and health care facilities with ***technical support from woreda WSP^{4+} team***, should do the following:

- In collaboration with the woreda health office or other pertinent institution, shall conduct basic water quality test including bacterial contamination, turbidity, pH and record the result. This should be done for all water supply chain (source to household);
- Visit, each and every scheme structure, track down the possible areas and ways of water contamination. Water turbidity at the source should be physically observed;
- Visit on-site sanitation and waste management systems at community/household, schools, health facilities (including hazardous and infectious wastes) and other public on-sit sanitations place like market places in the catchment to identify hazardous and hazardous events to the water supply system and public health;
- Identify any socio-economic activities around the water source in the catchment that may affect the safety and adequacy of the water supply (e.g. agrochemicals use and storage, waste damping/discharge, livestock production, etc.);
- Identify hazards and hazardous events related to O&M, and non-inclusiveness of WASH service delivery;
- Identify direct and indirect climate and environment induced hazards and hazardous events that can affect safe water supply and sanitation services (e.g. land slid, gully, catchment degradation, flood, drought, etc.…).

Hazard: A chemical, physical or microbial agent that can cause harm to public health. It also includes flooding and damage to WASH infrastructures, and lack/shortage of water.

What are the most common hazards?

- ***Microbiological (M) contamination*** of drinking water, referring to microorganisms with the potential for acute impact on public health, such as bacteria, viruses, and pathogenic protozoa;
- ***Presence of unwanted and elevated chemicals (C) such as Arsenic and Fluoride*** in drinking water which have acute or chronic public health impacts;
- ***Presence of physical (P) constitutes*** that may result aesthetic effect to the drinking water (turbidity, colour, odour, tase). Water that is safe but has a bad appearance, taste, or odor may not be accepted by consumers, who may choose alternatives that are aesthetically acceptable but also less safe.
- ***Water shortage or water supply interruptions*** due to siting/design/construction/operational failure/problems, human made disasters, flood, drought, catchment degradation (land slide, gullies);
- ***Public health hazard due to flooding of on-site sanitation systems*** as faeces contaminate the surrounding areas (***M***)***;***

- ***Water schemes and on-site sanitation infrastructures are not accessible*** (***P***) to PwD, children, and others due to none-inclusiveness of site selection, design and construction.

Hazardous event: An event or situation that introduces hazards to, or fails to remove them from, the water supply and sanitation system.

Task 3.1 Identify Hazards and Hazardous Events

When identifying hazards and hazardous events, the WSP^{4+} team should first look for signs that may signal issues caused by contaminated water supplies or interruption of WASH Services. When identifying hazards, consider each step in the water supply and sanitation chain and ask: ***What could possibly go wrong? How, when, where and why?*** The WSP^{4+} team should consider not only the obvious hazards and hazardous events associated with the water supply and sanitation system, but also the potential occurrence of hazards and hazardous events.

Sanitary inspection is a powerful on-site tool for risk assessment that can strongly support WSP^{4+} implementation. The various checklists provided in **Sanitary inspection forms (SIF)** particularly support the WSP^{4+} team in identifying potential hazards, hazardous events and problematic conditions related to the water supply and sanitation system. Please refer **annex 4** to sanitary inspection forms for the following water supply and sanitation infrastructures.

- Dug well with hand pump
- Shallow well with hand pump
- Deep borehole with mechanized pumping
- Protected spring
- Rain water collecting and storage
- Storage reservoirs
- Distribution lines
- Public tap of piped water
- Collection and household containers
- School or health facilities or public toilet (such as market place toilet)
- Hand wash facilities in the household/school/health facilities/public toilet

In addition to considering the obvious hazards associated with water supply (e.g. biological, chemical, or physical contamination captured under a conventional WSP), attention should be paid to environmental and climate-induced hazards, O&M related hazards, and hazards related to non-inclusion of WASH processes and services.

When identifying hazardous events, be specific! Clearly indicate what hazard could be introduced, and how. A good hazardous event reads like this: **X happens** *(to the water supply and sanitation system)* **because of Y.**

X = what can happen to the water supply and sanitation system (Hazard); **Y** = how it can happen (i.e., Hazardous event/cause)

Examples:

- Source water becomes faecally contaminated (**X**) because of discharge of untreated domestic waste/poorly managed on-site sanitation system from households (**Y**)
- Water in the pipe network becomes contaminated (**X**) because of improper pipeline repair practices (**Y**)
- Water is over- or under-dosed with chlorine (**X**) because of insufficient operator training (**Y**)

- Water source becomes chemically/faecally contaminated (**X**), due to the damage of WASH infrastructure by flood (**Y**)
- Water source becomes chemically contaminated (**X**), due to wash of agrochemicals by flood from farmlands and entering into the water source (**Y**)
- Water source yield decrease (**X**) result in water washed diseases, because of catchment degradation - (**Y)** (e.g. by deforestation, overgrazing, land slide, soil erosion, etc.).
- Shortage of water (**X**) due to inappropriate source selection, drought, limited groundwater recharge as a result of catchment degradation (**Y**)
- Water supply service interrupted (**X**) due to pump failure due to wrong choice of pump capacity/improper maintenance of pumps/absence of pump maintenance due to spare part problems (**Y**)
- Water supply service interrupted (**X**) due to improper functioning of electromechanical components because of nonavailability of trained and dedicated technical support (**Y**)
- Water supply service interrupted (**X**) due to the source/reservoir infrastructure damaged by flood/landslide/expanding gully (**Y**)
- Water contaminated microbially at household (**X**) due to storage of water in open containers or poor hygiene practices in dispensing water (e.g. dipping a dirty cup or hand into the container) (**Y**)
- PwD cannot access drinking water (**X**) due to the water collection point is not accessible and comfortable to them (**Y**)
- The poor in the community cannot access drinking water (**X**) because they cannot afford the water fee (**Y**)
- Public health problem happened (**X**) because school latrine damaged by flood which causes environmental contamination (**Y**).
- The source water is faecally contaminated (**X**) due to nearby market place latrine located upstream of the source at less than 30 m distance (**Y**).
- Water contamination caused by the accumulation of solid particles on the reservoir floor and creation of breeding ground of algae, etc., (**X**) due to lack of, or improper and sporadic cleaning (**Y**).
- Women in health care facilities cannot wash themselves after delivery, negatively impacting their dignity and comfort and increasing infection risks (**X**) due to shortage of safe water supply (**Y**).
- School absenteeism of students increased (X) due to lack of safe water supply in the school (Y).

Weak example:

Hazardous event: Agriculture in the catchment
X = What can happen to the water supply
Y = How it can happen

} Are these clear enough?

Stronger examples:

Hazardous event: The source water is *chemically* contaminated (X) due to *pesticide* use on crop lands upstream of the source water and runoff enters into water source (Y).

Weak example:
Hazardous event: old pipes
X = What can happen to the water supply
Y = How it can happen

Not clear enough

Stronger examples:
Hazardous event: *Physical and microbial* contaminants enter the pipe network (X) due to *breaks and leaks* in old pipes (Y)
Hazardous event: The water supply is *chemically* contaminated (X) due to leaching from old *lead* pipes (Y).

Task 3.2 Identify Existing Control Measures and Evaluate their Effectiveness

Control Measures (also referred to as barriers or mitigation measures): are any activities and/or processes put in place to prevent/reduce/eliminate hazardous events from the occurrence of water supply and sanitation safety hazards. Example; flood diversion ditch prevents runoff from the water sources, fencing of water source, reservoir, and distribution point prevents animals, chlorination to kill/remove pathogenic microorganisms, training of caretakers/artisans, etc. Control measures can be technical (e.g. disinfection), infrastructural (e.g. fencing), behavioural (e.g. pesticide use) or related to planning (e.g. land use). (See table 2 below)

For each hazardous event identified in Task 3.1 above, the WSP4^{+} team needs to identify what control measures are already in place to mitigate the risk of that hazardous event. Then determine how effective the existing control measure is at reducing the risk of that hazardous event. If control measures are ineffective or are not currently in place for an identified significant risk, this should be noted and suggestions for improvement listed. See Task 4 for additional information on control measures.

Table 2: Example of identified hazardous events paired with hazard type and condition of existing control measures, importance of the hazardous event and additional control measure needed

Hazardous events (at each component of water supply & sanitation system)	What type **of hazard** (microbial, chemical, physical) is there due hazardous event?	**Is this hazardous event under control?** (Existing control measures and validate their effectiveness)	**Risk level: high, medium or low?** (How important is this hazardous event? How frequently does it happen?)	**What additional control measures are needed**? (These will be further developed in Task 4.)
Open defecation around the borehole, deep cracks on the well head platform runoff washes faeces and enters in to the well	Microbial contamination	No control measure	Highly important because majority of the households are open defecators and contamination is there during rainy season	Building flood diversion ditch, Sanitation and hygiene promo-tion through CLTSH, Maintenance of well headwork
Cattle and sheep can access the well and the immediate area around it, which could result in animal faecal matter entering the water supply.	Microbial contamination.	No control measure	Highly important as Hazardous event is likely to occur and has major consequences, and no control measures are in place.	Fencing of the well.

Hazardous events (at each component of water supply & sanitation system)	What type **of hazard** (microbial, chemical, physical) is there due hazardous event?	**Is this hazardous event under control?** (Existing control measures and validate their effectiveness)	**Risk level: high, medium or low?** (How important is this hazardous event? How frequently does it happen?)	**What additional control measures are needed**? (These will be further developed in Task 4.)
Flood/Heavy rain damage the headwork of the borehole and consequently runoff washed animal and human faeces, and agrochemical from uphill grazing and crop land and directly enters the well,	Microbial and chemical contaminants, turbidity	Diversion ditch exist. However not able to protect run off of heavy rain	Highly important and common during rainy season of 3-4 months of the year	Implement watershed management work in the upper catchment of the water point. Build flood protection dike uphill of the borehole and rehabilitate the well and repair infrastructures Promoting Integrated Pest Management approaches to manage pests. Treatment of the catchment upstream of the water point.
Damage to water supply infrastructure from land slips and gullies.	Water shortage	No control measures	Highly important due to the event people turned to unsafe source	Construct check dam, and implement watershed management work to rehabilitate the gullies and prevent/minimize the land slide.
Hand pump broken due to continuous pumping and lack of greasing of moveable parts (lack of regular preventive maintenance)	Physical (system is not working)	No control measure	Highly important 2-3 months the system is out of function and people turned to unsafe sources	Proactive operation and preventive maintenance with supply chain Regular inspection of the water supply infrastructures
Inundation or erosion of pit latrine with flood	Physical loss of infrastructure Microbial contamination of nearby water/public health	No control measure	Highly important and during rainy season	Site latrine away from drainage channel. Install robust upper foundations, collar and footing to protect from erosion and flooding damage. Build bunds (banks, dykes or levees) to divert flow away from latrine. Adopt more conservative design standards for infrastructure to take higher and more frequent events into consideration (more expensive), or have systems that can be quickly and cheaply replaced.
Water supply infrastructures and latrines are not accessible to PWD and lead to alternative & less safe water sources	Microbial/chemical	No control measure	Medium for the water supply as community support them to collecting water. High as they are deprived of using pit latrine and exposed to health risk.	Additional infrastructure should be constructed for PWD so that the water supply and sanitation system are accessible for PWD. And also the site selection, design and construction should take into account PWD and should involve PWD in the processes.

Source: part of it taken from FDRE, MoWIE, 2016 (Ref: 5).

In evaluating existing control measures (task 3.2 above) and proposing additional one (task 4.1 below), the WSP^{4+} should evaluate and assess control measures for positive or negative equity outcomes. For each relevant control measure evaluated and proposed, the WSP^{4+} team should ask:

- ✓ *Would/will the control measure provide equitable benefit to vulnerable groups?*
- ✓ *Were/are there any potential negative consequences of the control measure to vulnerable group?*
- ✓ *Are there alternatives, modifications or compensation measures for any control measure that is expected to cause harm or inequitable benefit?*
- ✓ *Are different control measures needed for different users based on their unique needs?*

WSP^{4+} team should ensure equitable communication and participation in control measure selection and implementation.

Task 3.3 Assessment of Risks Associated with Each Identified Hazards

The hazard identification in Task 3.1 will yield a large number of hazards and hazardous events, some of which will be serious while others will be moderate or insignificant. Task 3.3. establishes the risk associated with each hazard and hazardous events, so that the WSP^{4+} team can prioritize interventions.

Risk assessment involves identifying the ***threats*** to human health/water supply and sanitation system posed by each hazard, in relation to both the *likelihood* and the *severity* of occurrence of the hazard.

Risk: The *likelihood* of a hazard causing harm to exposed populations/water supply and sanitation system in a specific time frame and the magnitude of its *consequences* of that harm.

Both the likelihood and the severity of the consequences arising from the hazard or hazardous event, as well as the effectiveness of existing control measures, are likely to change due to climate variability and change, with environmental degradation, and also with the vulnerability of vulnerable groups.
The practice of open defecation creates a risk associated with microbial pathogens in human excreta, especially during rainfall, as runoff/flood containing human excreta is likely to contaminate drinking-water sources with disease-causing organisms. A road construction may expose a section of buried mains high-density polyethylene pipeline for a water supply system. A vehicle can damage this pipeline (hazardous event), potentially causing disruption of safe water supply to some 70 households (risk).

There are two methods to make risk assessment namely the ***descriptive risk assessment*** and ***risk ranking methods***. In this manual, we use the risk ranking method which is more complex and depends on likelihood of the hazardous event to happen and associated severity of its consequences. It is more *formal and two step processes*. Risk score is the product of likelihood and consequences. The two steps processes are:

(i) developing a risk matrix and defining the ***likelihood and consequence*** of risk, and
(ii) assigning likelihood and severity to each identified risk and mapping the results in the matrix to obtain a risk ranking.

For the first step, the WSP^{4+} team draw up the risk matrix (table 4 below) and definitions for the likelihood (unlikely, possible, very likely, or almost certain) and consequence (minor, moderate, major, or catastrophic impact) categories (table 5 below).

For the second task, the WSP^{4+} team carry out risk scoring following site visits, examination of data/information collected under task 2.2, sanitary inspection, and asking the community and relevant stakeholders including vulnerable groups on their experience on the likelihood and severity of the consequences.

The assignment of likelihood was essentially based on staff experience. The likelihood of occurrence can be assessed on the basis of the answers to the following questions: Has this happened before in the system? If so, how often does this event occur? Is it likely to happen again in the foreseeable future? Are there weaknesses in the system that will allow the failure to occur more often in the future than in the past?

Tips: *In undertaking risk assessments, the WSP4^{+} team needs to consider the likelihood and consequence of future events, and not be limited to basing likelihood and consequence predictions on the past. Some hazardous events will be more likely in the future than they were in the past, whilst others might be less likely. For instance, in an area likely to become warmer and wetter due to climate change: Contamination of source waters due to high intensity rainfall may have been rare in the past and unlikely in a specific context, but might become more frequent in the future. An area likely to become more drier due to climate change:*

Risk = Likelihood X Consequence (Severity)

Table 3. Definition of Likelihood and Consequence for the risk ranking approach

Descriptor	Description
Likelihood	
Likely	Will probably occur in most circumstances; has been observed regularly (e.g. daily to weekly).
Possible	Might occur at some time; has been observed occasionally (e.g. monthly to quarterly or seasonally).
Unlikely	Could occur at some time but has not been observed; may occur only in exceptional circumstances.
Severity/Consequence	
Major impact	Major water quality impact; major damage on water supply and sanitation infrastructure due to flood/landslide/gully; major compliant due to shortage of water during the driest period; illness in community associated with the water supply; water supply and sanitation services interrupted due to poor/delayed O&M services to infrastructures; large number of people have no access to water due to water supply infrastructure damage and cause large number of complaints; significant level of customer concern; major problem that vulnerable people are not able to access water and sanitation services and are not consulted, informed and represented; significant breach of regulatory requirement.
Moderate impact	Minor water quality impact (e.g. not health related, aesthetic impact) for a large percentage of customers; clear rise in complaints; community annoyance; minor breach of regulatory requirement; damage on water supply and sanitation infrastructure due to flood/landslide/gully but is not as serious to cause major system interruption; water shortage during the driest period but not serious; delayed O&M problem to the water and sanitation systems but not cause serious service interruption and can be fixed immediately; few vulnerable people have no access to water/limitation in representation, consultation and getting information.
No/Minor impact	Minor or negligible water quality impact (e.g. not health related, aesthetic impact) for a small percentage of customers; some manageable disruptions to operation; rise in complaints not significant.

Source: Adopted from the WHO, 2012), and revised by COWASH taking into account CR &DRM, O&M and inclusion

Table 4: Example of risk ranking approach (Adopted from the FDRE, MoWIE, 2016) (Ref: 5)

			Consequence		
			No or minor impact	**Moderate impact**	**Major impact**
			1	**2**	**3**
Likelihood	**Unlikely**	**1**	**1**	**2**	**3**
	Possible	**2**	**2**	**4**	**6**
	Most likely	**3**	**3**	**6**	**9**
	Risk Score		**≤ 2**	**3 -5**	**≥ 6**
	Risk level		**Low**	**Medium**	**High**
	Low	**Clearly not a priority**			
	Medium	**Medium to long term priority and needs attentions**			
	High	**Clearly a priority and requires urgent attention**			

Table 5. Example risk ranking definitions to prioritize actions (WHO, 2012)

Risk ranking	Meaning	Description	Risk Management
High	Clearly a priority: requires urgent attention	Actions need to be taken to minimize the risk. Possible options should be documented (as part of the improvement plan developed in the next task) and implemented based on community priorities and available resources.	High priority requires urgent improvement in control measures
Medium	Medium- or long-term priority: requires attention	Actions may need to be taken to minimize the risk. Possible options should be documented (as part of the improvement plan developed in the next task) and implemented based on community priorities and available resources. **Or** where the likelihood of a hazard occurring is low because effective control measures are in place but the consequences are major (e.g. microbial risks), special attention should be given to maintaining the control measures and their appropriate operational monitoring to ensure that the likelihood remains low.	Medium- or long-term priority requires improvement in control measures in the medium or long term Control measures are adequate; appropriate Operational monitoring and vigilance required to ensure risk remains low
Low	Clearly not a priority	Actions may need to be taken but not a priority, or no action is needed at this time. The risk should be revisited in the future as part of the WSP review process. **Or** control measures are effective, and attention should be given to ensure that the risk remains low.	Not a priority

Example 1: Risk Analysis

Hazardous event: The water supply may become contaminated when dirty water enters the pipeline during pipe bursts/repairs (Fig 3 below)
Hazard: Microbial, Physical (turbidity)
Existing control measures: No control measures in place

Likelihood = 2 (Possible – has been observed occasionally)
Consequence = 2 (Moderate impact – illness considered unlikely)
Risk Score: 2x2 = 4
Risk level = Medium



		CONSEQUENCE		
		No/minor impact	Moderate impact	Major impact
		1	2	3
LIKELIHOOD	Unlikely 1			
	Possible 2		4	
	Likely 3			

Risk score:	≤2	3 - 5	≥6
Risk level:	Low	Medium	High

Fig. 2: Risk Analysis for example 1 above (Adopted from the FDRE, MoWIE, 2016) (Ref: 5)



		CONSEQUENCE		
		No/minor impact	Moderate impact	Major impact
		1	2	3
LIKELIHOOD	Unlikely 1			
	Possible 2			
	Likely 3			9

Risk score:	≤2	3 - 5	≥6
Risk level:	Low	Medium	High

Fig. 3: for risk analysis for example 2 above. (Adopted from the FDRE, MoWIE, 2016) (Ref: 5)

Example 2: Risks analysis for fig 4

Hazardous event: Bird excreta could enter well and contaminate the water supply

Hazard: Microbial; **Likelihood** = 3 (Likely – will probably occur)

Consequence = 3 (Major impact – possible illness in the community)
Risk Score: 3x3 = 9
Risk level = High
Existing control measures: No control measures in place

Table 6: Examples for Risk Assessment Matrix for the examples 1 and 2 above

				Are controls effective?				Risk assessment				Additional Control measures		
Process step	**Hazardous events**	**Hazard type**	**Existing control measures**	**Yes**	**No**	**Some what**	**Validation notes**	**Likelihood**	**Consequences**	**Risk score**	**Risk level**	**Yes**	**No**	**If yes, proposed controls**
Catchment/ Source	Bird excreta could enter well and contaminate the water supply	Microbial	No control measures in place					3	3	9	H	x		Covering the well
Distribution	The water supply may become contaminated when dirty water enters the pipeline during pipe bursts/repairs	Microbial, Physical (turbidity)	No control measures in place					2	2	4	M	x		Repair the pipe

Note: WSP^{4+} team should use this same Risk Assessment Matrix template for the actual risk assessment when preparing WSP^{4+}. Refer annex 6 for the template.

TASK 4 – Develop and Implement an Incremental Improvement Plan

A key output of WSP^{4+} is the improvement action plan addressing key risks and other concerns identified in the risk assessment, Task 3. Task 4 allows flexibility in selecting new control measures or other improvements that address these risks at the most effective places in the system.

Task 4.1 Identify Additional Control Measures to Improve Drinking Water and Sanitation Safety

In developing and implementing an incremental improvement plan, the WSP^{4+} team must first review the significant risks determined to require additional control and, for each of these risks, list possible control measures that could be put in place to address it. The aim of control measures includes, but is not limited to:

- Eliminating or reducing contaminants in the source water, thus preventing them from entering the water supply system;
- Removing particles and chemicals from the water or killing or inactivating pathogens (i.e. using control measures through treatment, if necessary);
- Preventing contamination during drinking-water storage, distribution and handling;
- Preventing or reducing the direct and indirect climate and environmental impacts such as water supply and sanitation infrastructures damage due to flood and land slide and gully, flood loaded contamination, decreased yield of water source due to drought, etc;
- Preventing or reducing public health problem from poor on-site sanitation system and waste management (including hazardous and infectious wastes) at household, institutions (school and health facilities), and other public on-site sanitations infrastructures;
- Preventing or reducing inclusion related risks to the vulnerable groups in WASH service delivery;
- Preventing or reducing risks related to O&M and water fee collection.

Multiple barrier approach: When thinking about control measures, we should consider a multiple-barrier approach which consists of an integrated system of activities and processes that collectively ensure drinking-water and sanitation safety by preventing, eliminating or reducing the occurrence of a water and sanitation safety hazards. See table 7 for examples of multiple-barriers approach.

Table 7: Example of multibarrier approaches

Source catchment	Storage	Distribution point	Household
Demarcation of the watershed/catchment, prohibition of agricultural activities, and fencing. Community awareness creation on the health effects of agricultural chemicals	Fencing, flood diversion ditch, sealing man-hole cover, cutting large trees and chlorination/ disinfection	Fencing, flood diversion ditch, regular site cleaning,	Use of narrow necked storage container, keeping water storage container covered and clean and placing the container off-floor. Community education on the importance of safe water storage practices
For all abstraction points (e.g. spring boxes, wells, boreholes, streams): Prohibit latrines and fix leaky septic tanks in the vicinity of the abstraction area. Regular cleaning, inspection and maintenance.	Chlorinate to ensure residual chlorine in the distribution network, including in the service reservoir. Regular cleaning, inspection and maintenance of storage tanks.	Repair leaks to minimize opportunities for contaminant ingress.	Educate consumers about proper hygiene and safe water storage practices Inform consumers on point-of-use treatment options where applicable (e.g. boiling, filtration, chlorination).

Task 4.2 Develop an Incremental Improvement Plan

After listing of the possible control measures to be implemented at each stage of the water supply and sanitation system (Task 4.1 above), the WSP^{4+} team should prepare an incremental improvement plan taking into account the capacity of the community to implement and available resources. Therefore, short-, medium- and long-term actions should be identified based on risk priorities.

The incremental improvement plan needs to be realistic and appropriate to the community's limited resources. The following criteria can support the WSP^{4+} team to select priority control measures and to develop and implement incremental improvement plan.

- The level of risk associated with each hazard and hazardous event (as discussed in task 3.3 above),
- Appropriate control measures to address each risk and how to implement,
- Responsible person or organization for implementing, managing and monitoring the proposed new controls (i.e who?),
- The time when the control measure (s) is implemented,
- Acceptability and reliability of the control in relation to local cultural and behavioral habits,
- The meaningful communication and participation of vulnerable groups in the incremental improvement plan preparation,
- The financial resources needed to implement control measures (allocate budget), and
- The training, communication, consultation and reporting requirements to implement the proposed control measure.

See table 8 below/next page for examples of incremental improvement plan. Also use annex 5 to develop operation and maintenance plan.

Table 8: Example of Incremental Improvement Plan

Hazardous event	Hazard	Control measures **(What and How**	Responsible person/ organization **(Who)**	Implementation timeline **(when)**	Estimated implementation cost (in ETB) **(Budget/cost)**	Implementation status
Animals walkways cross over the Spring cap/box and animal faeces observed on the spring box and contaminants could wash into the spring	Microbial	Fencing of the spring box	WSP[4+] team at Kebele/Scheme level, and the community/ users	Immediately	To be determined (labor, logs, skills is contributed by the users) and nail is purchased	
Access to water storage tank could result in bird/animal waste entering treated water	Microbial	Fence the storage tank, Repair leaking covers, implement an annual inspection program (to include all system tanks) and develop a suitable sanitary inspection form	WSP[4+] team at Kebele/Scheme level, and the community/ users	Immediately	To be determined (labor, logs, skills is contributed by the users) and nail is purchased	
Cattle graze in catchment land/ watershed and animal faeces could enter the water sources with runoff during rainy seasons	Microbial	Delineation/demarcation and fencing of the catchment at 30-meter radius Construction of diversion n ditches Consultation with office of agriculture/land use and compensation for land and property owners	WSP[4+] team at woreda, Kebele, and scheme level, The community, Woreda office of water and agriculture	Immediately	To be estimated	
Flood directly flows and passes over the spring box and box cover is muddy during rainy season and contaminants could enter the spring protection box	Microbial, chemical, physical	Divert runoff up stream of the spring box Implement soil and water conservation measures upstream of the spring	Same as above	Before the rainy season start	Labor contribution by the community	
Drought resulted in lowering of the ground water table and as a result hand dug and shallow well dried,	Shortage of water	Implement groundwater recharge activities If possible, replacement of the hand dug and shallow wells and infrastructures with more drought tolerant/resilient deep boreholes For new water point, consider catchment size, geological condition, and sitting of the water point to get maximum yield. Consider climate change impact in site selection, technology selection and design.	Woreda, kebele, and scheme WSP[4+] team, The community, Woreda office of water and agriculture	During site selection and design time	To be determined	
Hand pump broken due to continuous pumping and lack of greasing of moveable parts (lack of regular preventive maintenance), and delayed maintenance due to budget	Service interruption	Proactive operation and preventive maintenance with supply chain Regular inspection of the water supply infrastructures Improved water fee collection from the users	Scheme care taker, kebele water technician, Kebele/scheme level WSP[4+] team,	Immediately, and periodically	To be determined	

Hazardous event	Hazard	Control measures **(What and How**	Responsible person/ organization **(Who)**	Implementation timeline **(when)**	Estimated implementation cost (in ETB) **(Budget/cost)**	Implementation status
			woreda water office			
Inundation or erosion of pit latrine at school with flood	Microbial Infrastructure	Site latrine away from drainage channel. Install robust upper foundations, collar and footing to protect from erosion and flooding damage. Build bunds (banks, dykes or levees) to divert flow away from latrine.	Woreda office of education, agriculture, school administrative, the community.	Immediately for the old During study and design period for new one	To be determined	
Open defecation around the borehole, deep cracks on the well head platform runoff washes faeces and enters in to the well		Maintaining the cracks, community education to the community on hygiene and environmental sanitation and build household latrine	Kebele and scheme WSP[4+] team, and health extension workers, Woreda office of health	Immediately maintain the cracks, continuous community education before and after construction of water scheme	To be determined	
Contamination of treated water in household storage containers due to poor hygiene (e.g. hand dipping of cups)		Control potential sources of contamination at the household level Develop and implement a consumer education programme (to include pamphlet distribution and information sessions at primary and secondary schools)	Kebele and scheme WSP[4+] team, and health extension workers	Continuously	No cost	
Water supply infrastructures and pit latrines are not accessible to PWD and lead to alternative & less safe water sources		Additional infrastructure should be constructed for PWD so that the water supply and sanitation system are accessible for PWD. And also, the site selection, design and construction should take into account PWD and should involve PWD in the processes.	Woreda water office, woreda/kebele/scheme WSP[4+] team,	During study and design time	Part of the investment	

TASK 5: Monitor Control Measures and Verify the Effectiveness of the WSP^{4+}

The purpose of Task 5 is to confirm that the community and institutional water supply and sanitation system including waste management practices are operating as expected and that the WSP^{4+} is protecting drinking-water safety both in terms of quality and quantity, and also protecting public health. This task also helps WSP^{4+} team check whether the control measures are benefiting all users equitably and think about how to monitor the satisfaction and water quality of diverse users, particularly vulnerable groups. This task also helps to confirm that the control measures planned and implemented are preventing or reducing risks related to climate variability and change, environmental degradation and O&M.

How to do it?
It is done by ***operational*** and ***verification monitoring*** to the water supply and sanitation systems. The how to do of the operational and verification monitoring is described in the following sections.

Task 5.1: Establish a monitoring program

1. *Operational monitoring* (controlling of the control measures)

It is planned, ongoing regular observations using checklists for ***visual on-site inspection*** and ***simple water quality measurements*** to assess whether a community and institutional water supply and sanitation system are operating normally. It is a regular activity of WSP^{4+} team to check whether control measures are able to remove and/or reduce potential risks of contamination, climate and environment induced infrastructure damage and contamination, water quality and quantity problem, inequality issues, functionality problem, public health problems, proper functioning of sanitation system, and to take timely corrective actions specially before supplying water to the community.

Examples of Operational monitoring: checking integrity of fences, free chlorine concentration, operational reliability of generators, quantity of water supplied, benefits of control measures to all users including vulnerable groups, construction of diversion ditches and its integrity, implementation of watershed management activities, occurrence of flood and land slide, household water storage and handling practice, regular operation and maintenance of water supply system/functionality of the system, functioning of HH and institutional latrines, etc.

Table 9: examples of basic water quality testing parameters for operational monitroing

Water quality parameter	Description	Operational monitoring data indicates	Method(s) of measurement
Turbidity	Turbidity is caused by the presence of organic and inorganic particles in water (e.g. minerals, microorganisms) giving water a cloudy appearance	• Potentially hazardous events in the water supply system (e.g. poor source water quality, failure of the water treatment process, loss of distribution network integrity, such as water main leak/burst, illegal connection) • Potential for reduced effectiveness of disinfection • Potential for consumer acceptability issues (e.g., taste, odour, appearance)	• Turbidity tube • Turbidity meter
Chlorine (if chlorination is practiced)	Chlorine is added to drinking-water to kill or inactivate harmful microorganisms and to protect the	• The effectiveness of disinfection • The degree of residual protection from recontamination by microorganisms during distribution	• Disposable chlorine test strip • Comparator test kit

Water quality parameter	Description	Operational monitoring data indicates	Method(s) of measurement
	water from microbial recontamination during delivery to the consumer	• Potential hazardous events in the water supply system (e.g., increase in the presence of organic/inorganic material in the water6, over-/under-dose of chlorine, loss of distribution network integrity) • Potential for consumer acceptability issues (e.g., chlorine taste, odour)	• Chlorine meter
pH (if chlorination and/or chemical coagulation is practiced)	pH indicates the acidity or alkalinity of water	• Potential for reduced effectiveness of a water treatment process (e.g., coagulation/flocculation, chlorine disinfection) • Potential hazardous events in the water supply system (e.g., discharges of waste in the catchment, over-/underdose of water treatment chemical)	• Disposable pH test strips • Comparator test kit • pH meter

Source: WHO, Regional Office for South-East Asia, 2017 (Ref: 26)

In addition, there should be a *critical limit* for each of the control measures and quality parameter so as to compare results of the water quality testing and sanitary inspection against the critical limits, and to take *corrective action* if limits are surpassed. For example, intact fencing no animal access to water distribution points can be taken as a critical limit, damaged fencing can be taken as a breach of the critical limits and fencing can be taken as an example of improvement plan/ action. If fence is damaged, it is considered as critical limit is surpassed and inform the WASHCO to take corrective actions (maintenance of the fence).

Table 10: Example of operational monitoring program

Control measures	Where	What	How	When	Who	Critical limits or target condition	Corrective actions if critical limit surpassed
Well is fenced to prevent animal access within 30 metres, platform cleaned, and ground is sloped away from wells.	On site at the well area.	Sanitary integrity of the well and fence (Fence Platform Runoff way)	Visual inspection by using inspection (annex 4)	Monthly sanitary inspection	Sanitarian/ HEWs/WASHCO/community caretaker.	Fence is intact Platform is not cracked and is clean Flood water cannot pass over head work	Repair fence and platform Clean mud and dirt on the platform Dig flood diversion ditch
	Well	Fecal coliform	Water quality test	Every six month	Woreda Water Office	0 faecal coliform count/100ML	Check for intrusion of runoff through cracks on the head work and casing, and disinfect the water
	HH water storage	Residual chlorine	Water quality test	Every six months	PHCU/ Sanitarian	Cl2: 0.2mg/L	Promote household water treatment, and safe water storage practices

Control measures	Where	What	How	When	Who	Critical limits or target condition	Corrective actions if critical limit surpassed
Cover on water storage tank and vermin screening over vent piping.	On-site at storage tank area.	Integrity of covers and screens.	Visual inspection by using inspection form (annex 4).	Quarterly	Community care taker/WSP^{4+} team members	Integrity of covers or screens are compromised per information collected from relevant inspection form.	Repair/replace cover and/or screen.
Implementing watershed management including constructing flood diversion ditch upstream of the spring box: Flood protection, ground water recharge, no contamination	On-site at the spring box	Spring yield improved/maintained, Spring box infrastructure protected from flood, No contaminant reaches into the source	Discharge measurement, visual inspection of infrastructure, water quality test	During driest time for yield measurement, after heavy rainfall	Community care taker/ WSP^{4+} team members	Designed yield maintained, Integrity of infrastructure, water quality standards	**I**mplement watershed management including diversion ditch construction/rehabilitation, repair the spring box infrastructure, check the intrusion of contaminants through the spring box, chlorinate reservoir, advise household water treatment.
Repair cracks on the shallow well headwork	On-site at the well headwork	Integrity of the wellhead	Visual inspection by using inspection form	Quarterly sanitary inspection	Sanitarian/ HEWs/WASH CO/community caretaker	The well headwork is not cracked	Repair well headwork
Rehabilitating school latrine damaged by land slide, and constructing retaining wall /protection structure	On-site at the school compound	Integrity of the latrine	Visual inspection by using inspection form	Quarterly sanitary inspection	Sanitarian/ HEWs/school WASH committee	The latrine is functioning	Repair the latrine, and construct retaining wall
Design and construct the water collection tap accessible and comfortable for PWD	On-site at the water collection tap	The collection tap is accessible and comfortable for PWD to collect water	Visually inspecting the tap infrastructures and its accessibility	During construction, and annually	WSP^{4+} team	The water collection tap is accessible and comfortable	Construct tap infrastructures in such a way that it is accessible and comfortable for PWD to collect and transport water

2. *Verification monitoring*

Verification monitoring is an action taken to confirm water quality and sanitation targets are being achieved, water supply and sanitation systems are operating properly, and WSP^{4+} is thorough and effectively functioning. It is based on compliance monitoring through water quality testing, internal and external auditing of the adequacy of the WSP^{4+}, and checking of the consumer satisfaction.

2.1. Compliance Monitoring

Compliance monitoring is typically based on water quality testing for faecal indicator organisms and harmful chemicals such as fluoride, nitrate, and Arsenic; and the test results are checked against national drinking water quality standards. It is carried out by external body such as public health laboratories or by woreda/zone/regional health offices/bureaus. It should be conducted across sites representative of all different points along the water supply system and all diverse user groups including vulnerable groups, ensuring that the most vulnerable areas and users of the system are included. The results should be communicated back to all diverse users in ways accessible to all.

2.2. WSP^{4+} Auditing

Auditing is a critical element for the effective and sustainable implementation of any WSP^{4+}, as it provides a check that the WSP is complete, adequately implemented and effective, and it supports continuous WSP^{4+} improvement.

WSP^{4+} auditing can be defined as an independent and systematic check of a WSP^{4+} to confirm its completeness, adequate implementation and effectiveness. Auditing is a core component of WSP^{4+} verification. Auditing can be internal, external, formal and informal. Audit should be carried out by a person or persons not directly involved in the development and implementation of the WSP^{4+}in order to provide independent verification of the WSP^{4+}.

Properly implemented and maintained WSP^{4+} bring many benefits to water suppliers/utilities and consumers, and WSP^{4+} auditing supports the realization of these benefits by ensuring that WSP^{4+} are robust and implemented effectively. WSP^{4+} audit benefits include:

- *Safe, adequate, and reliable drinking-water supply;*
- *Actual and potential climate and environment risks managed sustainably;*
- *potential health gains through better understanding and control of hazards and hazardous events and the risks they represent including climate and environment related risks;*
- *reduced number of incidents and near misses;*
- *demonstration of due diligence;*
- *increased consumer confidence in the drinking-water supply;*
- *cost savings through better ways of working, such as preventive maintenance procedures rather than replacements, resulting in fewer breakdowns;*
- *better stakeholder communication; and*
- *a better trained and more focused workforce.*

Type of CR-WSP audit

WSP^{4+} audits can take a number of forms, from a simple, informal, internal audit to a rigorous, external, formal audit required by a regulatory regime.

Table 11: Summary of types of audits (Source: Practical WSP audit guideline, WHO, 2016)

Type of audit	Reason for audit	Who undertakes the audit
Internal Informal	Mainly to give advice and support, particularly during the early stages of WSP^{4+} implementation	One or more persons employed by the water supplier (e.g. from operations or quality assurance) or contracted by the water supplier, but not directly involved with WSP^{4+} implementation
Internal formal	Usually for organizational verification of WSP^{4+} implementation; it may be initiated by senior management of the water supplier or by the WSP^{4+} team	One or more persons employed by the water supplier (e.g. from operations or quality assurance) or contracted by the water supplier, but not directly involved with WSP^{4+} implementation; they may be appointed by senior management within the water supplier
External informal	Mainly to give advice and support, particularly during the early stages of WSP^{4+} implementation and/or for small supplies where there is insufficient staff or expertise to undertake internal audits and where formal external audits are not appropriate	National, district or local government agencies (e.g. from environment or health), consultants or staff from neighboring water supplies (peer-to-peer advice)
External formal	Usually, to fulfil the legal or surveillance requirements of a regulatory body	Regulatory agency, health authority or other organization as specified by a regulatory requirement

Note that WSP^{4+} always be carried out by **independent** of WSP^{4+} (i.e. not part of WSP^{4+}team),

INTERNAL (informal or formal): someone employed or contracted by the water supplier. The internal audit team assesses whether hazardous events are fully removed, risks are averted, whether appropriate control measures are identified for each risk, and appropriate operational monitoring procedures are put in place, critical limits are set to monitor proper implementation of the control measures, and whether verification monitoring is conducted regularly

EXTERNAL (informal or formal): government body or other entity external to the water supplier. The public health authorities (regulatory unit of government) will undertake sanitary inspection and water quality testing to verify/assess whether or not CR-WSP as a whole are effectively implemented, hazardous events are removed and associated risks are averted adequately. It collects water samples from a representative point (source, outlet of the reservoir, public stand posts and from the consumer water storage containers) and conducts water quality testing and verify whether it meets the compulsory standard drinking water specification (ESA, 2021), and provide feedback to the WASHCO/WASH Board/WSP^{4+} team.

For detail on WSP^{4+} auditing, please refer reference 23 in this manual (***A practical guide to Auditing Water Safety Plans, WHO, 2016***).

2.3. Consumer Satisfaction

Consumer use of, and satisfaction with, the water supply and sanitation services are also an important indicator of WSP[4+] effectiveness. Water users might have compliant on taste, color or odor of the water and they may divert to alternative unsafe water sources if their voice is not heard. Consumer's satisfaction surveys should be conducted on a regular basis to confirm the quality/safety, quantity/adequacy, reliability, continuity, and cost of the drinking water and also sanitation services. When WSP[4+] team conduct consumer satisfaction, it should investigate accessibility and equitably of WASH services taking into account all different user groups including all vulnerable groups.

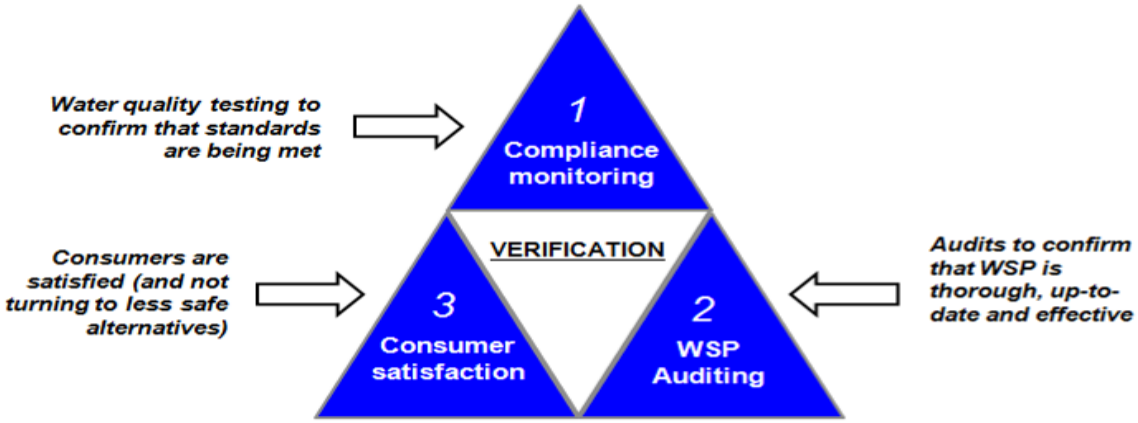


Fig. 4. Verification monitoring (adapted from CR-WSP training manual for community managed water supply system, MoWIE, 2015).

The WSP[4+] team should disaggregate survey responses by gender and other vulnerable groups and analyses the data to look for areas of difference in user perceptions. For this purpose, WSP[4+] team should use consumer satisfaction template included in this manual under annex 7 of this manual.

Task 5.2. Documentation and sharing of the monitoring results

For the purpose of learning and decision making, all operational and verification monitoring data should be documented and shared with relevant stakeholders such as WWT, Woreda town utility, the community, water offices, and health authorities. Monitoring information to be documented and shared among stakeholders include: *findings of the sanitary surveys, water quality testing/monitoring results, actions taken to remove/eliminate or control hazardous events from catchment to point of consumption during normal and incident situations*, etc.

Tips:

- Where the community/WASHCO/WSP^{4+} teams/local government offices have insufficient resources and/or capacity to conduct water quality testing for operational and verification monitoring purposes, they should collaborate and get assistance from appropriate authorities and stakeholders like zonal/regional laboratories and universities.
- The WSP^{4+} teams must continually review the needs of the monitoring program in light of newly identified risks that may contaminate drinking-water supplies. For example, new risks could come from industries, following flood situation, agricultural activities or human settlements established around the drinking-water source that were not present or identified when the WSP^{4+} or monitoring program was originally designed.
- Changes to monitoring results outside of normal ranges from regular inspections and/or monitoring are an indication that risks may have changed. The WSP^{4+} team may then need to review the situation, modify the WSP^{4+} and implement improvements.
- Small supplies may find it helpful to partner with another community water supply or water utility to audit each other's WSP^{4+}, to help ensure that each WSP^{4+} is comprehensive and effective.

TASK 6: Document, Review and Improve all Aspects of the WSP^{4+} Implementation

The purpose of Task 6 is to document the status and the level of operation and management of the water supply and sanitation system and to ensure that the WSP^{4+} approach is embedded in operations and that the WSP^{4+} remains up to date and effective.

How to do it

Task 6.1 Document management procedures

Management procedures: Written instructions describing steps or actions to be taken during normal operating conditions and for corrective actions when operational monitoring parameters reach or breach operational limits. These are often called ***Standard Operating Procedures (SOPs)***. Additionally, ***emergency management procedures*** should be developed for any unforeseen events or deviations that may occur.

WSP^{4+} includes establishment of clear management procedures to document actions taken when the water supply and sanitation system is operating under normal condition (SOPs) and when the system is operating in incident situation (*corrective actions*) when *critical limits* are surpassed. Sometimes, incident situation such as flood and/or drought or any other environmental degradation (land slide, gullies, etc) may occur and create loss of control of the system, and could result in damage of the water supply and sanitation infrastructure, drying and/or gross contamination.

Considering different user groups including vulnerable groups is critical when developing management procedures and emergency response plans. For example, plans to advise consumers to boil water during a contamination event should consider how to effectively communicate with people who speak a different language, have lower literacy levels or have a hearing or seeing disability. Without due consideration of diversity among users, critical safety messages may fail to reach everyone.

Communication and education program development more broadly should also take into account the specific needs and interests of different stakeholder groups. For example, the content and method of delivering education materials on catchment protection or safe household water practices must be accessible to all relevant stakeholders to ensure effectiveness and equitable benefit.

The following are examples of standard operation procedures (working manuals) important for community managed rural water supply systems.

Operational Procedures under normal conditions

- Procedures and forms to monitor/inspect activities in the catchment area (e.g. agricultural practices, such as use of agrochemicals, watershed management practices);
- Maintenance, cleaning and inspection schedules and procedures for abstraction infrastructure (spring box, HDW, SW and BH);
- Operation and maintenance schedules and procedures for all aspects of the treatment cycle of the system (e.g. aeration, filtration, chlorination). It may be useful to post these procedures on the wall of the treatment plant for easy access;

- Operational monitoring procedures to confirm the effectiveness of water treatment processes (e.g. for turbidity and chlorine levels);
- Maintenance, cleaning and inspection schedules and procedures for storage tanks and pipelines;
- Procedures for responding to and investigating consumer complaints about water quality including taste or odour;
- Procedure for operational monitoring of sanitation system including waste management practices (including hazardous and infectious wastes at health care facilities and schools);
- Public information and education plans;
- Schedules and procedures for drinking water quality monitoring and surveillance (including compliance monitoring);
- Operational manual that is used for operation and maintenance of rural water supply schemes, disinfection, and household water treatment and safe storage practices, WASHCO and board management guidelines;
- Procedure for record keeping and reporting (list of reportable key parameters, failure reporting forms, etc.);
- System of communication between WASHCO/rural WASH boards and health sector/regulator particularly on sharing of compliance monitoring results.

Management procedures to deal with incidents

- ✓ The climate induced disasters and repairs activities need to be documented for future precautions and planning purpose;
- ✓ The threats from other external factors such as pesticide use in agriculture, landslides, floods, natural calamities and impact on the water supply and sanitation structures need to be documented; and
- ✓ Prepare/update clear description of actions required in the events of deviations from the critical limits.

Depending on the type and complexity of the emergency situation, develop/update the response action which could vary from:

- Modification of treatment of existing sources, or temporary use of alternative sources with appropriate water treatment, or water tracking during worst water scarcity,
- Use of alternative water sources with household water treatment and safe storage practices in cases of gross damage and contamination with existing water supply schemes; and
- Proper documentation of these emergency response actions in the emergency management procedures;

***Note**: Management procedure can be **short** and **simple** and **utilize photographs or drawings** so they are clear and easy to use.*

Task 6.2 Development of the WSP^{4+} supporting activities

Supporting Programs: Are activities that contribute to drinking water and sanitation safety but do not directly affect water quality and sanitation services (like operational activities).

Development and availing of the SOPs (user manuals) for implementation of WSP^{4+} under normal condition and during incident condition is not sufficient by itself. Thus, there should be activities that support the WSP^{4+} team, WASHCOs, rural WASH boards, and local artisans

and scheme caretakers develop necessary knowledge, skills, and commitment to develop and implement WSP^{4+} approach, and capacity to manage water supply and sanitation systems to deliver safe and equitable water supply and sanitation services. Therefore, support programs include ensuring availability of the standard operational manuals, equipment, and in-service trainings and operational researches.

Therefore, start supporting programs from simple actions:

- Organize in-service training for laboratory professionals/analysts on quality control/calibration of testing equipment, and on water quality testing and sanitary inspection;
- Train existing local artisans and caretakers (in-service training programs) on O&M manual by employing cascaded training;
- Organize in-service/refresher training for local artisans, scheme caretakers, and sanitarians on management of small community water supplies and on-site sanitation systems, operation and maintenance, and on preventive maintenance of the rural water supply schemes and on-site sanitation facilities;
- Strengthen hygiene and sanitation promotion interventions to reduce contamination risk at source, in the distribution systems and at household level;
- Awareness to community and institutions on the risk of poor on-site sanitation and waste management system/practices to the public health, and water safety especially for the shallow aquifer sources;
- Awareness raising to community and WASH implementors specially at woreda and kebele level on the importance of all aspects of inclusion in the WASH service delivery;
- Training on assessment and management of climate and environmental change induced risks that directly and indirectly affect safe and sustainable provision of WASH services. These may include: infrastructure damage due to flood, drought, flood related contamination of water supply system, land slide, gully, and yield decrease due to wider catchment degradation and climate extremes;
- Strengthen watershed management interventions conducted by agriculture sector and by the communities to improve ground water storage/recharge through development of recharge ponds and contour trenches; and to protect the water facilities from damage due to flood and flood loaded contamination of water supply system;
- Provision of the woreda water and health offices with rapid water quality testing kits;
- Furthermore, identify researchable issues to generate evidences for informed decision making including:
    - *Testing/adoption of the best practices,*
    - *Changes in the concentration of chemical hazards due to climate change, and other economic activities in the watershed such as use of agrochemicals,*
    - *Level of customer/water users' satisfaction,*
    - *Changes in the pattern of WASH borne diseases (under-five diarrhea), and*
    - *Changes in water sources resilience to climate change (increase in ground water recharge and reduced impacts of extreme weather events on the water sources).*

Task 6.3 Regularly review the WSP^{4+}

As factors affecting the water supply and sanitation system change, the plan will have to be revisited to ensure that it continues to identify and respond to emerging risks and hazards. ***Periodically with plan***, and ***as needed***, the WSP^{4+} teams should meet to review and update the WSP^{4+} plan to make certain that it is being implemented and remains effective, and to understand and maximize the benefits arising from its preparation and implementation. WSP^{4+} review and update processes start from Task-1 and stepwise go through all tasks of the WSP^{4+}. The review and update in each task should take into account all aspects of the WSP^{4+}

i.e., Climate Resilient and DRR, O&M needs, sanitation and inclusion. For review of inclusion related issues, use checklist under annex 8 of this manual.

During the review, it may be helpful to do the following:

- ✓ Review and include any new activities or changes in the water supply chain (catchment to point of use), as well as the sanitation and waste management practices (at household, institutions and other public on-site sanitation) as applicable. This task includes reviewing and updating the water supply and sanitation system description and the system map or schematics as needed.
- ✓ Incorporate new hazardous events and hazards and associated risks in the WSP^{4+}, and update previously identified risks with additional or new information. A hazardous event not found in the plan should be added to the plan, a full risk assessment made, and recommended actions included. The WSP^{4+} should then be updated to incorporate any changes made after one of these events. The following questions can guide this updating process:
  - Was this hazardous event or hazard already in the plan?
  - If it was, what mitigation measures were used to deal with it?
  - Were those measures successful or not? Did they achieve the desired results?
  - Was the risk score correct? (If not, the risk score should be reviewed.)
- ✓ Require the responsible stakeholders to manage the actions and targets in the improvement plan. When these actions are completed, the risks identified in the WSP^{4+} should be changed to reflect the improvements.
- ✓ Review roles and responsibilities and SOPs:
  - Have the roles and responsibilities of management or staff changed since the last review?
  - Have there been personnel changes since the last review?
  - Have there been any changes in system operation, maintenance, inspection, and monitoring processes and procedures?

In addition to periodic programmed reviews, the WSP^{4+} should also be assessed under the following special circumstances:

- ✓ after an incident (such as flooding, contamination, droughts, and other environmental damage including gully, landslides), emergency, water quality incidents, or near accident;
- ✓ after improvements or significant changes in the system that may be threat to the source quality and quantity;
- ✓ after an audit or evaluation, to incorporate its findings and recommendations in the plan;
- ✓ WSP^{4+} team members changes;
- ✓ Change in management procedures.

The need for review of the WSP^{4+} depends on the following situations:

Urgent: when critical changes or problems occurred in the water supply and sanitation systems (e.g. contamination exceeding critical limits) and to make operational/physical audits and take corrective measures,

Annually: to identify successes, challenges and learn from experiences and update the WSP^{4+}, and

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Technical annexes

Annex 1: Mapping/documenting WSP^{4+} members

Form 1.1: Mapping/documentation of Woreda WSP^{4+} team members

Region:……; Zone:……; Woreda……

S.No	Name	Organization	Role and responsibilities	Address/mobile #	Signature
1					

Form 1.2: Mapping/documentation of Kebele WSP^{4+} team members (if it is kebele WSP^{4+} team)

Region:……; Zone:……; Woreda……; Kebele……

S.No	Name	Role and responsibilities at kebele level	Address/mobile #	Signature
1				

Form 1.3: Mapping/documentation of scheme WSP^{4+} team members

Region:……; Zone:……; Woreda……; Kebele……, Scheme name:……

S.No	Name	Role and responsibilities at community level	Address/mobile #	Signature
1				

Form 1.4: Mapping/documentation of health care facilities WSP^{4+} team members Region:……; Zone:……; Woreda……; Kebele……, name of health care facility:……

S.No	Name	Role and responsibilities	Address/mobile #	Signature
1				

Form 1.5: Mapping/documentation of school WSP^{4+} team members Region:……; Zone:……; Woreda……; Kebele……, name of health care facility:……

S.No	Name	Role and responsibilities at community level	Address/mobile #	Signature
1				

Annex 2: Ethiopian Water Quality Standards

Ethiopia's Drinking Water Quality Standard Specification (2021) ***(Adopted from Compulsory Ethiopian standard of drinking water specifications, 2021)***

Table 1. Physical characteristics of drinking water

Characteristic	Maximum Permissible level	Test method
Odour	Unobjectionable	ES 605
Taste	Unobjectionable	
Turbidity, NTU, Max	5	ES ISO 7027
Colour, TCU, Max	15	ES ISO 7887
pH	6.5 – 8.5	ES ISO 10523

Table 2. Characteristics that affect the palatability of drinking water

Substance or Characteristic	Maximum Permissible level	Test method
Total hardness (as $CaCO_3$)	300	ES 607
Total dissolved solids mg/l, Max	1200	ES 609
Total Iron (as Fe) mg/l, Max	0.3	ES ISO 6332
Residual, free chlorine mg/l, Max	0.2 - 0.5	ES ISO 7393
Magnesium (as Mg) mg/l, Max	100	ES ISO 7980
Calcium (as Ca), mg/l, Max	150	
Zinc (as Zn) mg/l, Max	5	ES ISO 8288
Sulfate (as SO_4) mg/l, Max	400	ES ISO 9280
Chloride (as Cl) mg/l, Max	250	ES ISO 9297
Total alkalinity (as $CaCO_3$) mg/l,Max	600	ES ISO 9963-1
Sodium (as Na) mg/l, Max	200	ES ISO 9964-1 ES ISO 9964-2
Potassium (as K) mg/l, Max	1.5	ES ISO 9964-2
Aluminium (as Al) mg/l, Max	0.2	ES ISO 12020

Table 3. Content of toxic and or/disease causing substances of drinking water

Substance or Characteristic	Maximum Permissible level	Test method
Barium (as Ba) mg/l, Max	0.7	ES 606
Total Mercury (as Hg) mg/l, Max	0.001	ES ISO 5666-3
Manganese (as Mn) mg/l, Max	0.4	ES ISO 6333
Copper (as Cu) mg/l, Max	1	ES ISO 8288
Cadmium (as Cd) mg/l, Max	0.003	ES ISO 5961
Ammonia (NH_3+ NH_4^+) mg/l, Max	0.5	ES ISO 6778
Total Arsenic (as As) mg/l, Max	0.01	ES ISO 6595
Total Cyanide (as CN) mg/l, Max	0.01	ES ISO 6703-1
Nitrite (as NO_2) mg/l, Max	0.5	ES ISO 6777
Nitrate (as NO_3) mg/l, Max	50	ES ISO 7890-3

Substance or Characteristic	Maximum Permissible level	Test method
Anionic surfactans, as mass concentration of MBAS mg/l, Max	0.2	ES ISO 7875-1
Phenolic compound as phenols, mg/l,	0.002	ES ISO 8165-1
Lead (as Pb) mg/l, Max	0.01	ES ISO 8288
Nickel, mg/l	0.02	
Boron (as B), mg/l, Max	0.3	ES ISO 9390
Selenium (as Se) mg/l, Max	0.01	ES ISO 9965
Fluoride (as F) mg/l, Max	1.5	ES ISO 10359-1
Chromium (as Cr) mg/l, Max	0.05	ES ISO 11083
Pesticides and Organic constituents,		
a. DDT	1	ES ISO 6468
b. Heptachlor and heptachlor epoxide	0.03	
c. Hexachlorobenzene	1	
d. Lindane (Gamma-BHC)	2	
e. Methoxychlor	20	
f. Aldrin/Dieldrine	0.03	
g. 1,2 Dichloro ethane	30	ES ISO 10301
h. 1,1,1- Trichloro ethane	2001	
i. - trichloroethane	20	
J. Trichlorobenzenes(total)	20	
k. Hexachlorobutadiene	0.6	
l. Tetrachloroethane	40	

Table 4. Bacteriological levels

Organism	Maximum Permissible level	Test method
Coliform organisms, number per 100ml	Nil	ES ISO 9308-1 ES ISO 9308-2
E.coli, number per 100ml	Nil	
Total viable organisms, colonies per ml	100	ES ISO 4833
Faecal streptococci per 100ml	Nil	ES ISO 7899-1 ES ISO 7899-2
Staphylococcus aureus per 100ml	Nil	ES ISO 6888-1 ES ISO 6888-2
Pseudomonas aeruginosa per 100ml	Nil	ES ISO 16266-2
Shigella per 100ml	Nil	ES ISO 21567
Salmonella per 100ml	Nil	ES ISO 6579-1
Yeast and Mould	Nil	ES ISO 7954
Clostridium perfrengents (Sulphate reducing anaerobes)	Nil	ES ISO 6461-2
Cryptosporidium spp. and Giardia spp.	Nil	US EBA method 1623
Coliphages	Nil	US EBA method 1602
Vibro Cholerae	Nil	ES ISO 21872-1

NB.

- ***Cryptosporidium spp. and Giardia spp. and Vibro Cholerae***: shall be tested during rainy season or when there is an outbreak of water born disease.
- ***Clostridium perfrengents (Sulphate reducing anaerobes***): shall be tested initially then monthly.
- ***Coliphages***: shall be tested annually.

For detail of the water quality standards, test methods, sampling methods and sampling frequency, refer the ***Compulsory Ethiopian Standard of drinking water specifications (ESA, 2021).***

Annex 3. Data Collection Templates for System Description

I. General Information

1. Date .....
2. Region:……;Zone:……..;Woreda:……;Kebele:……;
   Village/Gote;……..; Water scheme name:……
3. How many people the scheme serves?

If community water supply scheme

- Household number (Male/Female): .....;
- Total population (Male/Female) …….
- Person with Disabilities (Male/Female) ……..

If school supply scheme

- Student number (Male/Female): .....;
- Teachers and other admin staffs (Male/Female) …….
- Person with Disabilities (Male/Female) ……..

If health care facility water supply scheme

- Patient number (Male/Female): .....;
- Health professionals and other admin staffs (Male/Female) …….
- Person with Disabilities (Male/Female) ……..

4. If PwD are living in the community, what are their experience and challenges in accessing and transporting safe water in equitable manner?.....
   .....
5. Barriers for vulnerable groups (including women, PwD, poor and others) to participation in ensuring water safety and how they can overcome…….
   ……
6. Water supply scheme type (Tick all that apply):
   - HDW with hand pump……
   - On spot spring……
   - Spring with reservoir…….
   - Spring with reservoir and public taps……
   - Bore Hole (BH) with reservoir and public taps……..
   - Other source (please specify) …….
7. If the source is HDW/BH, what is depth of the water: ……..; and depth of casing……
8. What is the discharge rate of the scheme?.....L/S;
   - ✓ What is the demand of the community? (m^3/day) ……..
   - ✓ Is the quantity available for your supply sufficient? ☐ always sufficient? ☐ seasonally insufficient? ☐ always insufficient?
   - ✓ Does your water supply provide water to consumers... ☐ continually? ☐ intermittently?
   - ✓ If insufficient and intermittent, describe the reasons (population growth, climate change, demand change/increase) ……
     ……
     ……..

II. O&M and water fee collection related information

1. Functionality of the scheme:
   - ✓ Is the scheme functioning? Yes ☐ No☐
   - ✓ If no, what is the main reasons for this?
     - System breakdown (please specify) …….
     - Contamination (specify the type and source of contamination)
       ……
       …….

2. Is WASHCO (or similar committee established at school and health care facilities) established to manage the water supply system of the community? Yes ☐ No☐
   - If yes, is the committee/WASHCO legalized? Yes ☐ No
   - If yes, are PwD delegated in the committee/WASHCO? Yes ☐ No. If yes, how many in number……..(M/F)
   - If no, why not?.....
3. Who is responsible for the overall operation and maintenance of the Water supply system?
   - WASHCO/committee member (scheme care taker);……..; Kebele Water Technician…….; Woreda expert……..
4. Education and training (knowledge and skills) of operation and maintenance workers (technicians and artisans, care takers), ……..
5. Are human power, materials (tools and spare parts), and finance available for operation and maintenance (resource management practices of committee/WASHCOs and Boards)?.....
   .....
6. Is there documented schedule/plan for O&M?.....
7. Do WASHCO/committee collect fees from the community members for the water supply services? Yes☐ No☐
   - If yes, how much per month/HH? .....; Is it sufficient for the O&M? Yes ☐ No☐
   - Do all beneficiaries have the financial capacity to pay? Yes ☐ No☐
   - If no, who are those? (The poor, PWD, others). Give detail information on the capacity of these vulnerable groups in affording the water fee ……..
     ……
   - Information on legal status of the WASHCO, procedure for tariff setting, amount of money collected, accounting and auditing procedures, operation and maintenance cost, etc……
     ……
     ……..

III. Information on <u>drinking-water catchment, water source and abstraction</u> (for both community and institutional water supply system)

1. What potentially contaminating activities are present around your drinking-water source (i.e. in your drinking-water catchment)? Use ***sanitary Inspection Form*** under ***annex 4*** of this manual for each respective technology type.
2. Do seasonal climate extreme events (such as flood, drought) cause any known or observable water quality problems?
   - Yes ☐ No☐
   - If yes, please include details here (i.e. what type of problems).
     .....
     .....
3. Is there evidence of naturally occurring chemicals in the area? Tick all that apply.
   - Iron ☐ Manganese ☐ Sulphate ☐ Arsenic ☐ Fluoride ☐ Other (please specify) .....
4. Are there environmental and climate factors that directly and indirectly affect the water and sanitation safety and infrastructures? At what distance they are located from the infrastructures (Please tick all that apply)
   - Catchment degradation: deforestation……: soil erosion……..
   - Gully (at what distance from the scheme) ……..
   - Land slide (at what distance from the scheme) ……..
   - Flood rout (at what distance from the scheme) ……..
5. Describe existing affirmative action such as natural resource management activities in the catchment to adapt environmental and climate change impacts:……

……
……

6. Describe catchment size (marginal, small, adequate) in relation to the estimated recharge needed to meet the projected demand for water across seasons and between wet and dry years……..
7. Describe changes of the source discharge rate (yield/quantity) during design phase versus current rate and reliability of the source taking in to consideration of population growth rate (water demand), and climate change……
   ……
8. Visit nearby traditional/improved water point sources and identify its existing characteristics (quality, quantity, seasonality, reliability)……
   ……
9. Describe the geological condition to assess whether geological conditions are likely to provide reliable groundwater with a reasonable yield, and its resilience in the face climate change and environmental degradation……
   ……..
10. Describe supported with figures the land uses of the catchment of the source (Crop production, grazing land, settlement, forest, bushes, gorges, sloppy, plain/flat, gullies, rivers, etc)……
    ……..
11. Land ownership where the scheme is located? Is this private or government land?.....
    - If the land ownership is private, is the land is secured following the national legal requirements. Yes ☐ No☐
12. Check for proper construction of the head works of the water source (spring, HDW, SW, DW, water harvesting) and its accessories on the head works (***use the SIF*** for each respective water source to assess risks on each of the water source/scheme) ……

IV. Water Treatment

1. Do you treat the source water? ☐ Yes ☐ No
   If no, why not?.....
2. Please include details of the kind of treatment. (Please tick all that apply.)
   ☐Filtration (e.g. sand filtration)
   ☐ Disinfection (e.g. with chlorine)
   ☐Other treatment (please specify)……..
   Please include information on the equipment and water treatment chemicals used……..
   ……
   .....
3. If you disinfect drinking-water with chlorine, how often is the treatment?.....
   .....

V. Information on the storage reservoir, distribution lines and public stand posts (gravity spring and motorized scheme), including:

Storage/service reservoir (if any)

1. Capacity (volume), location (site), service age, design and structure of the reservoirs, materials used, and their position of inlet and outlet valves, overflows, manhole cover, shape of top cover slab, vent pipe, etc. ……
   ……
   ……

2. Is there any problem at the storage/service reservoirs? For this purpose, please use the ***Sanitary Inspection Form*** (**annex 4**) to assess the risks on the reservoirs and identify and plan control measures. ……..
3. Are you able to do O&M work for the identified problems? ☐Yes ☐ No
   If no, why not? ……
   .....
   If yes, how fast the repairs were done?.....

4. Are gullies/landslide/flood rout uphill/around the treated water storage reservoir (estimated depth, width and length of the gully)……..
   ……..
5. Are there flood/gully/landslide protection structures (diversion ditch, masonry/concrete structure, check dam, retaining wall, gabion, etc) constructed?.....
   ……
6. Is there installation of an overflow pipe to convey excess water to be released without damage to the structure or erosion of the soils surrounding the foundations. ☐Yes ☐ No

Distribution lines (if any) and Public Stand Posts (Use respective SIF to assess risk – annex 4)

7. Type, size, length, and age of pipe materials and accessories used (GIP, uPVC, HDPE, etc. if any)……
   ……
8. Check location where pipe laid and valves are sited like points where pipe crosses the flood drainage ditches, ponds, river, exposed parts, etc., ……
   ……
9. Are you aware of any of the following problems with the distribution system? (Please tick all that apply.)
   ☐Breaks
   ☐Pressure losses
   ☐Cross-connections with non-drinking-water pipes
   ☐Pipe exposure above ground
   ☐Corrosion of pipes
   ☐Other (please specify)……
   Please include details here (e.g. frequency, reasons). ……
   .....
10. Are you able to repair the identified deficiencies? ☐Yes ☐ No
    If no, why not? ……..
    ……
11. Check the susceptibility of the BONO to landslide/gullies; and also, the presence of protection structures if there are landslide and gully around the BONO……..
    ……
12. Check the accessibility of public taps/BONO to vulnerable groups (women, children, elderly and PwD)?.....
13. Check how often the public taps inspected? (Note. Check documentation of ***sanitary inspection form*** for this purpose) ……
14. Are public taps being accessible and comfortable to vulnerable groups (women, children, elderly and PWD)?.....
15. How often do you carry out maintenance work on the piped distribution?……..

VI. Information on rain water harvesting:

1. Check for type of roofing material, birds and rodent nest and droppings, insects, and dust/debris on the rain water contact surfaces such as in the gutter, dropdown pipes, and on the roof surface,……
   ……..
2. Check for presence of filtration and disinfection/chlorination practices, ……
   ……
3. Check for practices/knowledge of flashing away the first 10-15 minutes' rain before collecting rain water, ……
4. Check for cleanliness and proper cover of collection reservoir (cistern) and pumps used to rise water to overhead tanker……
5. Check for water withdrawal practices of the households……..
6. *Is the water collection infrastructure at the headwork accessible and comfortable to use by vulnerable groups (women, children, elderly, and **(PwD)?*** ☐Yes ☐ No
   If no, why not? ……..
   …….

VII. Information on transportation, household water treatment, storage, and sanitation practices

1. Is water typically stored at the household level? ☐Yes ☐ No
   If yes, please include details on types of storage containers typically used and its cleanness.
   .....
2. Is water typically treated at the household level? ☐Yes ☐ No
   If yes, please include details on type of treatment (e.g. boiling, filter, disinfection).
   .....
3. How do you usually withdraw (get) drinking water from the container/storage including cleanness of the utensils? – Interview
   - Tilt and pour into a cup/jog
   - Using exclusive water scooper
   - Dip the hand with any available cup/jog
   - Tap
   - Other (specify): _____
4. Water withdrawing mechanisms including cleanliness of utensils……
   ……
5. Human and animal waste disposal practices including child faeces (do all households have latrines? what are the conditions of latrines, do households use the latrines, is soup and water available for handwashing, do household practices handwashing at critical moments, how they are managing their animal wastes?),……
   ……
6. What type of latrine the household has and its condition?.....
   .....
7. Is the latrine accessible, affordable and comfortable to use by PwD? ☐Yes ☐ No
   If no, why not?.....
8. Are the siting, design and construction of the household latrine vulnerable to flood, land slide? ☐Yes ☐ No
   If yes, were there latrines affected so far by these events? ☐Yes ☐ No
9. Are hygiene education and awareness-raising programmes conducted in your community (e.g. regarding drinking-water quality, hygiene and sanitation issues in households)? ☐Yes ☐ No
   If yes, please include details (e.g. programme providers, population reached, contents of programmes, educational materials available)……
   ……
   .....

10. Mention **common diseases** prevailing in your community/area? [Multiple response]

1. Diarrhea
2. Cholera
3. Bacillary Dysentery
4. Typhoid
5. Intestinal parasites
6. Eye condition
7. Skin conditions (scabies, etc)
8. Malaria

Other (specify

11. What do you think can be **Causes of DIARRHEA**? [Multiple Response]

1. Do not know
2. Dirty water
3. Dirty hand
4. Dirty food
5. Flies
6. Poor hygiene
7. Vermin (cockroaches, rats)
8. Curse
9. Other (specify):_____

***Note*: Use the SIF for the household water management and sanitation practices to assess risks.**

VIII. Water quality

1. Has water quality test been conducted for the water supplied? Yes ☐ No☐
   If yes, at which points (source, reservoir, distribution line, public tap, household) samples taken and tested?.....
   .....
2. If test is done, who did?.....
   - What was the result? (Check and document the water quality test result)……..
3. If test has been done so far, how often is the quality of your drinking-water monitored?.....
4. Which microbial, chemical and physical parameters tested?.....
   .....
5. Were the water quality results shared with the community/school/health care facilities? ☐Always ☐ Sometimes ☐ Never
6. Has the test result found any problems with water quality? ☐ Yes ☐ No
   If yes, please provide details (e.g. what was the problem, where and when did it occur, what was done to correct it)……
   .....
7. Have community members/students and staffs from school/patients and staffs from health care facilities reported any problems regarding drinking-water quality? ☐Yes ☐ No
   If yes, please include details (e.g. which problems, how often reported)……..
   .....
8. Are the community members/students and staffs at school/patients and staffs at health care facilities aware of any waterborne health problems? ☐Yes ☐ No
   If yes, please include details (e.g. which diseases, how often, how many people, problematic geographic areas, affected groups)……
   .....
   .....
9. Please provide a summary of drinking-water quality data for the past two years, if possible.
   .....
   .....
10. If secondary data on water quality test along the water supply chain is not available, consult health office/other mandated institutions to collect water samples and make quality testing and analysis from outlets of the sources, reservoirs, distribution points, and household taps and household storage containers. And document the result with the WSP^{++++} file.
11. How vulnerable groups including PwD and the poor experience water quality problem differently?.....

Information on sanitation and waste management at school and health care facilities

General Information

1. Date .....
2. Region:……;Zone:……..;Woreda:……..;Kebele:……..; Village/Gote;……..; School/health care facility Name:……
3. Are there a number of available and usable toilets or improved latrines in the school for students and staffs where it should be available? ☐Yes ☐ No
   If no, why?.....
4. Are there a number of available and usable toilets or improved latrines in the health care facilities for patients, staffs where it should be available? ☐Yes ☐ No
   If no, why?.....
5. Is there at least one toilet or improved latrine provides the means to manage menstrual hygiene needs where it should be available? ☐Yes ☐ No
   If no, why?.....
6. Is there at least one toilet that meets the needs of PwD where it should be available? ☐Yes ☐ No If no, why?.....
7. What is the conditions of the sanitation system with respect to vulnerability of the system to climate extremes like flooding, and land slide, and the design and construction conditions to adapt these hazards…….
   ……
   ……
8. How are these sanitation facilities are managed? Are there committees established for this purpose? What is the source money to maintain the sanitation service like for the O&M of the sanitation infrastructures?.....
   .....
   .....
9. Does the school/health care facility have water for drinking, hand washing, and handwashing? ☐Yes ☐ No. If no, why?.....
10. Are the sanitation facilities accessible, affordable and comfortable to use by ***PwD*****.....**
11. Are there functioning hand hygiene washing facilities being available at all points of care/services areas at health care institutions, and also at sanitation places (including toilets and waste management places) both at health care facilities and school? ☐Yes ☐ No. If no, why?.....
12. Are hand hygiene promotion materials clearly visible and understandable at key places? ☐Yes ☐ No
13. Is there a functional waste collection containers in close proximity to all waste generation points for:
    - non-infectious (general) waste
    - infectious and hazardous wastes
    - sharps waste

    ☐Yes ☐ No.
    If no, why?.....
14. Is waste correctly segregated at all waste generation points using color coding system? ☐Yes ☐ No.
    If no, why?.....
15. Is there functional burial pit/fenced waste dump or municipal pick-up available for disposal of non-infectious (non- hazardous/general waste) ☐Yes ☐ No.
    If no, why?.....

16. Is there an incinerator or alternative treatment technology for the treatment of infectious and sharp waste is functional and of a sufficient capacity? ☐Yes ☐ No.
    If no, why?.....
17. Is there sufficient energy available for incineration or alternative treatment technologies? ☐Yes ☐ No.
    If no, why?.....
18. Are hazardous and non-hazardous waste stored separately before being treated/disposed of or moved of site? ☐Yes ☐ No.
19. Is all infectious waste in health care facilities stored in a protected area before treatment, for no longer than the default and safe time? ☐Yes ☐ No.
    If no, why?.....
20. Is anatomical/pathological waste is put in a dedicated pathological waste/placenta pit, burnt in a crematory or buried in a cemetery (only for health care facilities)? ☐Yes ☐ No.
    If no, why?.....
21. Are dedicated ash pits available for disposal of incineration ash at health care facilities? ☐Yes ☐ No.
    If no, why?.....
22. Is protocol or standard operating procedure (SOP) for safe management of health care waste and chemistry laboratory at school clearly visible and legible? ☐Yes ☐ No.
    If no, why?.....
23. Is appropriate protective equipment for all staff in charge of waste treatment and disposal? ☐Yes ☐ No.
    If no, why?.....

Annex 4: Sanitary Inspection Form (SIF) for Different Water Supply and Sanitation Technologies

I. Sanitary Inspection Form for DUG WELL WITH HAND PUMP

Region: _____Woreda: _____, Kebele: _____

- Number of HHs using the water source: _____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source:_____, Year source developed:_____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity ……..
  - ✓ pH……
  - ✓ residual chlorin……..

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be taken
1	Is the pump damaged or loose at the point of attachment to the cover slab so that contaminants could enter the well?			
2	Is the cover slab absent or inadequate to prevent contaminants entering the well?			
3	If there is an inspection port, is the lid missing or inadequate to prevent contaminants from entering the well?			
4	Are there any visible deficiencies at any point in the well wall?			
5	Is the apron around the well absent or inadequate to prevent contaminants from entering the well?			
6	Is the drainage inadequate, which may result in stagnant water in the well area?			
7	Is the fencing or barrier around the well absent or inadequate to prevent animals entering the well area?			
8	Is there sanitation infrastructure/latrine within 30 meters of the well?			
9	Can signs of other sources of pollution be seen within 15 meters of the well (e.g. animals, rubbish, human settlement, open defecation, fuel storage)?			
10	Is there any point of entry to the aquifer that is unprotected within 100 meters of the well?			
11	Is the well-cover unsanitary?			

Risk score: 9-11 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list 1-11)

Name and signature of sanitary Inspector/Assessor:……..

Comments:

I. Sanitary Inspection Form for SHALLOW WELL WITH HAND PUMP

Region: _____Woreda: _____, Kebele: _____

- Number of HHs using the water source: _____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source: _____, Year source developed:_____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity ……..
  - ✓ pH……
  - ✓ residual chlorin……..

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be taken
1	Is the pump damaged or loose at the point of attachment to the cover slab so that contaminants could enter the well?			
2	Is the cover slab absent or inadequate to prevent contaminants entering the well?			
3	If there is an inspection port, is the lid missing or inadequate to prevent contaminants from entering the well?			
4	Are there any visible deficiencies at any point in the well wall?			
5	Is the apron around the well absent or inadequate to prevent contaminants from entering the well?			
6	Is the drainage inadequate, which may result in stagnant water in the well area?			
7	Is the fencing or barrier around the well absent or inadequate to prevent animals entering the well area?			
8	Is there sanitation infrastructure/latrine within 30 meters of the well?			
9	Can signs of other sources of pollution be seen within 15 meters of the well (e.g. animals, rubbish, human settlement, open defecation, fuel storage)?			
10	Is there any point of entry to the aquifer that is unprotected within 100 meters of the well?			

Total Score of Risks___/10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-10)

Name and signature of sanitary Inspector/Assessor:……..

Comments:

I. Sanitary Inspection Form for DEEP BOREHOLE WITH MECHANIZED PUMPING

Region: _____Woreda: _____, Kebele: _____

- Number of HHs using the water source:_____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source: _____, Year source developed: _____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity …….
  - ✓ pH……
  - ✓ residual chlorin……..

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be taken
1	Is there a latrine within 100m of the pump house/pumping mechanism?			
2	Is the nearest latrine uphill of the bole hole within 30m distance?			
3	Is there any other source of pollution within 50m of well? (e.g. animal breeding, cultivation, roads, industry etc)			
4	Is there an uncapped well within 100m of the borehole?			
5	Is the drainage around pump house/pumping mechanism faulty?			
6	Is there any stagnant water ponding within 2m of the pumping mechanism?			
7	Is the fence missing or faulty?			
8	Is the floor of the pump house permeable to water?			
9	Is the well seal insanitary?			
10	Is the borehole cap cracked?			

Total Score of Risks___/10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-10)

Name and signature of sanitary Inspector/Assessor:……..

Comments:

I. Sanitary Inspection Form for Protected Spring

Region: _____Woreda: _____, Kebele: _____

- Number of HHs using the water source: _____ _____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source: _____, Year source developed: _____
- Water quality information (test result if conducted):
  - ✓ E.coli…… pH……
  - ✓ Fecal Coliform …… Residual chlorin……
  - ✓ Turbidity …….

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information /Observation	Yes	No	Action to be taken
1	Is the source/spring located in flood zone?			
2	Is a protective wall or spring box structure missing or inadequate to prevent contaminants entering the spring? Check for damaged, eroded or with deep cracks and/or leakage)			
3	Is the outlet pipe unclean or inadequately positioned to prevent contaminants entering the spring? Check for if the outlet pipe is **positioned too close to the ground,** and allow contaminants entering the spring via backflow of surface water or entry of vermin			
4	Is the ***backfill area eroded or prone to erosion*** due to the absence of vegetation? Check for **runoff/flood pathways** leading to the spring source			
5	Is a runoff/ flood diversion ditch above the spring missing or inadequate to prevent contaminants entering the spring? Check for presence of flood diversion ditch ***above the spring protection box/source- that can prevent ponding/stagnation*** of water around the spring box			
6	Is the fencing or barrier around the spring missing or inadequate to prevent animals and unauthorized person entering the spring area? Check if fencing is ***missing, broken, or poorly constructed***			
7	Is the land around the spring source protected /delineated to prevent economic activities and animal grazing?			
8	Is there latrine within 15 meters of the spring source?			
9	Is there latrine on higher ground within 30 meters **uphill** of the spring source? – if ground water flows towards the spring faecal mater/pathogens may flow in to /enter the spring source during wet seasons			

	Specific Diagnostic Information /Observation	Yes	No	Action to be taken
10	Are there animal /human faeces, waste disposal sites, settlement within 15 meters of the spring source?			
11	Is there any open well/ponding/swamp within 100 meters of the spring source?			
12	Are there any visible contaminants inside the spring protection box (e.g. animals and/or their waste, sediment accumulation, leaves, garbage, etc)?			
13	If there is an inspection port (man hole), is the lid (man-hole cover) missing or inadequate (not sealed) to prevent contaminants entering the spring box?			
14	Is the overflow pipe inadequately covered with mesh screen to prevent vermins (insects/reptiles) entering the spring?			
15	If there are air vents, are they improperly installed or not covered with mesh to prevent dust, vermins entering the spring box?			

Total Score of Risks___/15
Risk score: 10-15 = Very high; 6-9 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-15)

Name and signature of sanitary Inspector/Assessor:……..

Comments:

I. Sanitary Inspection Form for RAIN WATER COLLECTING AND STORAGE

Region: _____Woreda: _____, Kebele: _____

- Number of HHs using the water source: _____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source: _____, Year source developed: _____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity ……..
  - ✓ pH……
  - ✓ residual chlorin……..

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be taken
1	Are there any visible contaminants (e.g. vegetative material, animal waste) on the roof or guttering channels?			
2	Are the roof or guttering channels inadequately sloped, which may result in the ponding of stagnant water?			
3	Is there any vegetation or structures overhanging the roof?			
4	Is a filter box missing or inadequate to prevent debris entering the storage tank?			
5	Is the first flush system missing or inadequate to prevent contaminants entering the storage tank?			
6	Does the inside of the storage tank contain any visible signs of contaminants (e.g. animals and/or their waste, sediment accumulation)?			
7	Is there any point of entry to the storage tank that is inadequately covered or sealed?			
8	Is the storage tank tap leaking or otherwise defective?			
9	Is the overflow pipe inadequately covered to prevent contaminants entering the storage tank?			
10	Is there stagnant water in the water collection area?			
11	Is the fencing or barrier around the storage tank missing or inadequate to prevent animals entering the collection area?			
12	Can signs of other sources of pollution be seen within 15 metersb of the storage tank or water collection area (e.g. animals, rubbish, human settlement, open defecation, fuel storage)?			
13	Is there local activity (e.g. industry or agriculture) that could contaminate the roof?			

Total Score of Risks___/13

Risk score: 9-13 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-12)

Name and signature of sanitary inspector/assessor:……..

Comments:

I. Sanitary Inspection Form for Storage/Service Reservoirs

Region: _____Woreda: _____, Kebele: _____

- Number of HHs using from the reservoir:_____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source: _____, Year source developed: _____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity ……..
  - ✓ pH……
  - ✓ residual chlorin……..

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be taken
1	Is there any point of leakage of the pipe between source and storage reservoir?			
2	Is the physical infrastructure of the storage reservoir cracked or leaking?			
3	Is the inspection cover of the storage reservoir absent or open?			
4	Is the inspection cover faulty, corroded or is the concrete around the cover damaged?			
5	Is the inspection cover insanitary?			
6	Are screens protecting the air vents on the storage reservoir missing or damaged?			
7	If there is an overflow pipe, is the screen protecting it missing or damaged?			
8	Is there any scum or foreign objects in the storage reservoir?			
9	Is the diversion ditch above the storage reservoir absent or non-functional?			
10	Is a sewer or latrine or other source of pollution (human excreta, animal manure, fertilizing with manure and chemicals, waste damping site) within 30m of the reservoir?			
11	Is the area around the storage reservoir unfenced or is the fence damaged, allowing animals to access the area?			

Total Score of Risks___/11

Risk score: 9-11 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-11)

Name and signature of sanitary inspector/assessor:……..

Comments:

I. Sanitary Inspection Form: Distribution Pipe System

Region: _____, Town/Woreda: _____

Kebele: _____

Name of the Water Supply System: _____

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information	**Risk**		**Additional Notes**
1	Do any fixtures, chamber boxes, and pipes leak at any point in the water distribution system?	Yes	No	
2	Is there pooling of water around water distribution point?	Yes	No	
3	Is the area around the water distribution point insanitary/filthy?	Yes	No	
4	Is there a latrine within 30 m of the water distribution point?	Yes	No	
5	Is there animal waste/garbage disposed with in30m of the water distribution point?	Yes	No	
6	Is the distribution pipeline exposed (laid above the ground) at any site/visited sites?	Yes	No	
7	Inspection box/valve chamber box are not covered/not tightly covered?	Yes	No	
8	Is Inspection box/valve chamber box being below the flood level?	Yes	No	
10	Are there gullies and landslides nearby the water distribution and service reservoir?			
11	Waste or dirt is accumulated /found in the Inspection box/valve chamber boxes?	Yes	No	

Total Score of Risks___/11

Risk score: 9-11 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-11)

Name and signature of sanitary inspector/assessor:……..

Comments:

I. Sanitary Inspection Form for Public Tap of Piped Water

1. Region: _____Woreda: _____, Kebele: _____

- Number of HHs using the water:_____(M, F, PWD)
- Number of HHs with Latrine: _____
- Name of the water source: _____, Year source developed: _____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity ……..
  - ✓ pH……
  - ✓ residual chlorin……..

2. Location and/or name of water source(s) feeding the distribution system: .....
.....

3. Location and/or name of storage reservoir feeding the distribution system (if any): .....
.....

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	**Y**	**N**	**Action to be taken**
	Public or yard tap			
1	Does any tap stand leak?			
2	Is the tap or are attachments (such as hoses) insanitary?			
3	Does spilt water accumulate around the tap stand?			
4	Is the area around the tap stand insanitary?			
5	Is the area around the tap stand unfenced, allowing animals to access the area?			
	Piped distribution			
6	Are there any signs of leaks in the inspection area (for example, accumulating water)?			
7	Are any of the pipes exposed above ground in the inspection area?			
8	Do users report any pipe breaks within the last week?			
9	Has there been discontinuity in the last 10 days?			
10	Is there a sewer or a latrine within 30 metres of the tap stand?			

Total Score of Risks___/10
Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-10)

Name and signature of sanitary inspector/assessor:……..

Comments:

I. Sanitary Inspection Form for Household Practices: Collection, storage, treatment and handling

1. Region: _____Woreda: _____, Kebele: _____Village_____

- Number of HHs using the water:_____(M, F, PWD)
- Name of the water source: _____, Year source developed: _____
- Water quality information (test result if conducted):
  - ✓ E.coli……
  - ✓ Fecal Coliform ……
  - ✓ Turbidity …….
  - ✓ pH……
  - ✓ residual chlorin……..
- Water treatment – household level:
  1. Boiling
  2. Chlorine products (water-guard, aqua tab, Bishan gari, _____)
  3. Solar disinfection
  4. Pasteurization
  5. Filter with cloth
  6. Membrane filtration
  7. Biosand filtration
  8. Ceramic flirtation
  9. Fluoride removal filter
  10. Arsenic removal filter
  11. Sedimentation (standing)
  12. Other method (specify

III. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be taken
1	Is drinking-water collected from more than one source?			
	Collection container			
2	Is the collection container cracked, leaking or unclean?			
3	Is the collection container used to store any liquids other than drinking water?			
4	When not in use, is the collection container kept in a place where it may become contaminated?			
5	Is the collection container inadequately covered to prevent the entry of contaminants?			
	Bulk storage container			
6	Is the bulk storage container cracked, leaking or unclean?			
7	Is the storage container narrow necked? [3 inch]			
8	Is the storage Container Kept Covered with its lid?			
9	Is the storage container Kept Clean (inside/outside)?			
10	Is the storage container placed off floor?			
11	Is the storage container cracked/ leaking?			
12	Is the bulk storage container used to store any liquids other than drinking-water?			
13	Is the bulk storage container located in a place where it may become contaminated?			
14	When not being filled, is the bulk storage container inadequately covered to prevent the entry of contaminants?			
15	Are there any visible signs of contaminants inside the bulk storage container (e.g. animals and/or their waste, sediment accumulation)?			
16	Is the tap or utensil used to draw/collect water from the bulk storage container inadequate or unclean?			

17	Is the water from the bulk storage container directly used for purposes other than drinking-water (e.g. washing or bathing)?			
	Final storage			
18	Is the final storage container cracked, leaking or unclean?			
19	Is the final storage container used to store any liquids other than drinking-water?			
20	Is the final storage container kept in a place where it may become contaminated?			
21	When not being filled, is the final storage container inadequately covered to prevent entry of contaminants?			
22	Is the tap or utensil used to draw/collect water from the final storage container inadequate or unclean?			
23	Is the water from the final storage container directly used for purposes other than drinking-water (e.g. washing or bathing)?			
	Household treatment			
24	If household-level treatment is practiced, is there evidence that it is being carried out ineffectively?			

Total Score of Risks___/24

Risk score: 10-24 = Very high; 6-9 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-24)

Name and signature of sanitary inspector/assessor:……..

Comments:

I. Sanitary Inspection Form for Household/School/health facilities/public toilet (such as market place toilet)

1. Village: ……..
2. Name of the school or health facilities or public toilet (such as market place toilet)…**……**
3. Type of toilet:
   - Flushed toilet & sewerage
   - Flushed toilet & septic tank
   - Pit latrine
   - Any other toilet (please specify:
4. Date of visit: ……

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Actions to be taken
1	Are all toilets/urinals rooms not fully functional?			
2	Are surfaces of walls and floors not smooth and easy to clean? Are these areas/structures not clean?			
3	Is there evidence of excreta or urine on the ground around the latrine, seat slab, room floor, pedestal?			
4	Are garbage bins not present in the toilets?			
5	Does the latrine fail to provide privacy? (Is the door or screen missing, or can the door not be closed securely?)			
6	Does the vent-pipe incorrectly placed, lack a fly screen, or is the fly-screen torn and damaged?			
7	Are facilities for handwashing (with soap) not available within or close to the latrine?			
8	Is there bad smell which could discourage use of the latrine?			
9	Are there no flies?			
10	Is there evidence that the pit is full, overflowing or allowing wastes to leak onto the ground?			
11	Is there no management system in place to maintain the latrine including cleaning of the latrine/toilet?			

Total Score of Risks___/11
Risk score: 9-11 = Very high; 6-8 = High; 3-5 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-11)

Name and signature of sanitary inspector/assessor…….

Comments:

I. Sanitary Inspection Form for Hand wash facilities in the household/school/health facilities/public toilet

1. Village:……
2. Name of the school/health facility/public toilet and location:……
   ……
3. Type of hand wash facility:
   - Piped water
   - Hand wash stand
   - Others (please mention)……
4. Date of visit: ……

II. Specific Diagnostic Information for Assessment of Risk

	Specific Diagnostic Information for Assessment of Risk	Y	N	Action to be action
1	Is there no hand wash facility close to the toilet?			
2	Are all or some of hand wash facilities not functional?			
3	Is there no sufficient water quantity available?			
4	Is the water quality not suitable for hand washing?			
5	Is soap not available either liquid or bars?			
6	Are there leakages from pipes?			
7	Is the facility not clean and free of litter?			
8	Are there flies?			

Total Score of Risks___/8
Risk score: 7-8 = Very high; 5-6 = High; 3-4 = Medium; 0-2 = Low

III. Results and Recommendations:

The following important points of risk were noted: (lists. 1-8)

Name and signature of sanitary inspector/assessor:……..

Comments:

Annex 5: Incremental Improvement Plan template

S. No	Relevant hazardous event	Hazard type	Specific improvement action	Responsible person/ organization	Implementation due date/timeline	Implementation cost (In BIRR)	Implementation status

Operation and Maintenance (O&M) plan form

Water Supply Scheme Operation, Maintenance and Management					
Scheme Name:					
Total scheme cost:			**If no,**		
	Status of WS scheme Operation and Management	**Yes/No /data**	**How to Manage**	**By whom?**	**When?**
1	WASHCO Registration				
2	WASHCO bank account				
3	WASHCO regular meeting				
4	Financial and stock management				
5	Proper management and storage of tools and components				
6	Public Auditing				
7	Annual general assembly				
8	Mobilization of community care taker and kebele water technician				
9	Implementation of O&M directive of WASHCO, if any.				
10	Regular minor maintenance & repair work				
11	Operation and maintenance fund				
12	Regular collection of water tariff				

Annex 6: Risk Assessment Matrix

				Are controls effective?				Risk assessment				Additional Control measures		
Process step	**Hazardous events**	**Hazard type**	**Existing control measures**	**Yes**	**No**	**Some what**	**Validation notes**	**Likelihood**	**Consequences**	**Risk score**	**Risk level**	**Yes**	**No**	**If yes, proposed controls**
Catchment														
Catchment														
Storage/ treatment														
Storage/ treatment														
Distribution														
Distribution														
Consumer														
Consumer														

Annex 7: Consumer Satisfaction Questionnaire

Name of the head member of the household: ……..Date: ……..

1	Is there regular daily water supply in your tap (around the day)?	Regular	Satisfactory	Irregular	Never	
2	Is the quantity of water available to you adequate for household use?	Yes	No			
3	How many months in a year water is available (through this scheme)?	12 months	9-11 months	6-8 months	Less than 6 months	
4	How much time do you need for a round trip of water fetching?	< 15 min	15 to 30 min	30 to 45 min	> 45	
5	Do you think water is safe from its source to the tap?	Totally safe	Satisfactory	Unsafe	Too much unsafe	
6	Are you satisfied with the rate of water tariff?	Yes	No, it´s too high	No, it´s too low	No water tariff	
	Is the water supply accessible for vulnerable group especially for PWD?	Yes	NO. (why?)…….. ……			
7	How the repair and maintenance is carried out in your water supply scheme?	Regular	Sometime	According to the necessity	Never	
8	Does WASHCO provide enough information to the users on O&M fund (balance, tariffs collected, how it is used)	Yes	No			
9	Does the WASHCO listen and take action to your complaints?	Yes	No			
10	Who mostly takes care of the water supply system?	WASHCO	Community care taker	Consumer	Nobody	
11	How satisfied are you with the activities and services of the WASHCO?	Very good	Good	Satisfactory	Bad	
12	How often is your community tap monitored by the Community care taker or WASHCO?	Regular	Satisfactory	Irregular	Never	
13	What do you think about the cleanliness of taps/platforms of water supply?	Very clean	Clean	Satisfactory	Dirty	
14	Is there always clean water in your tap?	Always	Most of the time	Sometime	Never	
15	What do you think in general the quality of the water which you are using?	Very good	Good	Satisfactory	Bad	
16	What main improvement measures do you think that the WASHCO should make in this water supply scheme?..... ……					
17	What kind of purification technique do you use for purifying the drinking water in your home?					
	Nothing	Boiling	Chlorination	Filter	SODIS technique	Sedimentation	Others (mention it) ……
18	Data collected within the last six months related to the water borne diseases (selected households)?					
	cholera	Typhoid	Diarrhea	Dysentery	Intestinal worms	Jaundice	Others
	Yes/NO	Yes/NO	Yes/NO	Yes/NO	Yes/NO	Yes/NO	Yes/NO

Source: adapted from WSP for Gravity DWS (Nepal, 2015), and modified by COWASH.

Note: this same form should be used for household level consumer satisfaction assessment, and also at school and health care facilities. Note also that the assessor should interview repetitive sample from vulnerable groups: PWD, the poorest, elderly, women.

Annex 8: Inclusion checklist used when WSP^{4+} team review and update WSP^{4+}

WSP4^{+} step	GUIDANCE ON INCLUDING EQUITY
Building WSP^{4+} team	• Include representatives of men and women on the WSP4+ team. • Include representatives of disadvantaged groups on the WSP team. • Include representatives of different wards on the WSP4+ team. • Where representation of disadvantaged groups on the WSP4+ team is not possible, ensure that decision-making processes include needs and interests of all groups, especially the most disadvantaged.

Describing the system	• Prepare a community map which includes both the technical and social aspects of the water supply system:
	  ○ *Different types of tap infrastructure (public, private, government, commercial) and private piping in wards/households.*
	  ○ *Different types of water use practices – source of drinking-water (tap or traditional source), collection/transport practices, storage and treatment of drinking-water.*
	  ○ *Types of participation/non-participation by different water user groups.*
	  ○ *Types of communication from water providers to users.*
	• Record results of water quality testing at different parts of the system.

Identifying hazard	• For each hazard, identify "which place/who experiences". • Check all different types of user groups (disadvantaged groups/wards/households). Are there any groups not already recorded which do experience hazards? • If yes, add additional hazard and "which place/who experiences". If no, go to next step.
Improvement implementation	• Where possible, prioritize control measures where hazards are most experienced by disadvantaged groups. • Ensure that control measures are effectively communicated to different types of user groups, especially the most disadvantaged. • Promote participation of different user groups in carrying out the control measures, especially the most disadvantaged. • Identify barriers to participation for any groups and address to ensure active participation.
Operational Monitoring	• Ensure that implementation of control measures is across all different types of water user groups, especially the most disadvantaged (especially for control measures for "water use practices"). • Promote participation of different user groups in carrying out monitoring, especially the most disadvantaged. • Identify barriers to participation for any groups and address to ensure active participation.
Verifying effectiveness	• Ensure that water quality testing is representative of all different water users, especially the most disadvantaged groups.
Management and communication	• Ensure water quality testing results are communicated and accessible to all different user groups.
Reviewing the WSP^{4+}	• Ensure appropriate equity integration during ongoing reviews of the WSP and consider outcomes. • Include an assessment of equity integration in regular WSP reports to WSP^{4+} coordinators.

Source: Adapted from WHO, 2019 (reference 17).

Annex 9: Definition of Terms

Catchment (drainage basin/watershed): A discrete area of land that has a common drainage system. A catchment includes both water bodies that convey the water and the land surface from which water drains into these bodies.

Climate Change: It is the persistent change in climate, including the mean state and/or expected variability, over decades or longer

Climate Resilience: It is the capacity of a system (community, water resource, ecosystem, etc.) to "anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.

Climate Variability: It is variations in climate, including the normal highs and lows, wet and dry periods, hot and cool periods, and extreme values. It can refer to day-to-day variability (e.g., heat wave), year-to-year variability (e.g., long-term dry or wet period), or decadal scale variability. But, variability over a multi-decadal scale can be thought of as climate change

Control Measures (also referred to as barriers or mitigation measures): are any activities and/or processes put in place to prevent/reduce/eliminate hazardous events from the occurrence of water supply and sanitation safety hazards.

Control Point – A step at which control can be applied to prevent, eliminate or reduce the risks of a water and sanitation safety hazard.

Critical Limit: is cutoff point that signifies when a control measure has failed or is working ineffectively and therefore emergency action is required.

Disaster Risk Reduction (DRR): Measures taken to curb losses from a disaster (such as flood, drought, land slide, etc.), ie reducing exposure to hazards, reducing vulnerability of the community/system and increasing their/its capacity.

Environmental Degradation: The deterioration of the environment through depletion of resources such as quality of air, water and soil; the destruction of ecosystems; habitat destruction; the extinction of wildlife; and pollution.

Inclusion: It is not just about improving access to services for those who are vulnerable but also supporting them to engage in wider processes of decision making to ensure that their rights and needs are recognized.

Kebele: Local administration next to Woreda.

Hazard: A chemical, physical or microbial agent that can cause harm to public health. It also includes flooding and damage to WASH infrastructures, and lack/shortage of water.

Hazardous Event: An event or situation that introduces hazards to, or fails to remove them from, the water supply and sanitation system.

Management procedures: Written instructions describing steps or actions to be taken during normal operating conditions and for corrective actions when operational monitoring parameters reach or breach operational limits.

Monitoring: the act of conducting a planned sequence of observations or measurements of control parameters to assess whether the control point is under control or whether the water meets quality criteria

Multiple-barrier approach is an activities or processes that can be used to prevent, eliminate or reduce the occurrence of a water and sanitation safety hazard.

Operational Monitoring: Routine monitoring of control measures along the water supply and sanitation chain to confirm ongoing effectiveness. Carried out by the WASHCO/Board (responsible for management of the water supply system) and involves defining **critical limits** for relevant parameters and **corrective actions** to take when critical limits are breached

Risk: The *likelihood* of a hazard causing harm to exposed populations/water supply and sanitation system in a specific time frame and the magnitude of its *consequences* of that harm.

Risk Assessment involves identifying the ***threats*** to human health/water supply and sanitation system posed by each hazard, in relation to both the *likelihood* and the *severity* of occurrence of the hazard.

Sanitary Survey/Inspection: is an on-site inspection of rural water supply and sanitation system to identify actual and potential sources of hazards and hazardous events such as physical structure, operation of the system, point of consumption and external environmental factors, are being evaluated and select appropriate remedial actions to improve or protect the water supply and sanitation services.

Scheme Specific WSP^{4+}: In a situation where different water schemes in the same Kebele are located in the different micro-watersheds, formation of scheme specific WSP^{4+} sub-team is important

Sub-kebele: local government administration next to kebele

Validation: refers to reviewing evidence to determine whether or not the existing control measures can effectively control the hazardous event/hazard. This must be done prior to risk assessment so that the risk assessment considers how well controlled the hazardous event/hazard is currently.

Verification: Monitoring to confirm the effectiveness of the WSP^{4+} as a whole and involving three elements: 1) compliance monitoring (generally by health authorities to confirm final water compliance with drinking water quality standards); 2) consumer satisfaction survey; and 3) internal/external WSP^{4+}auditing.

Village: the lowest local administration next to sub kebele.

Vulnerability: The degree to which a system is susceptible to, or unable to cope with, adverse effects of environmental degradation, climate change, including climate variability and extremes.

Vulnerable groups: It applies to groups of people including women, children, elderly, the poor, Person with Disability (PwD), and socially excluded people due to their occupational specialist (such as potters, blacksmiths, etc).

Water Safety Plan (WSP): It is a comprehensive risk assessment and risk management approach that encompasses all steps in the water supply, from catchment to consumer.

WSP^{4+}: WSP with special consideration to the current and anticipated impacts of climate change on the quality and quantity of the rural water supply systems, impact of sanitation system on the drinking water supply and public health, O&M and Water Fee Collection, and Inclusion.

WSP^{4+} audit: A review and evaluation of WSP^{4+} practices.