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Water and Health to the Convention on
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Working Group on Water and Health

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Small-scale water supplies and sanitation

INFORMAL DOCUMENT

Water safety plan field guide for small community water supplies
(draft publication)

Programme area 4 on small-scale water supplies and sanitation aims to support Parties and other States in policy uptake and practical application of approaches to safe management of small-scale systems at the national and local levels.

As mandated by the current programme of work for 2020-2022, the publication *Water safety plan: a field guide to improving drinking-water safety in small communities* (WHO Regional Office for Europe, 2014) was updated, based on recent developments and experiences collated in field application of the water safety plan (WSP) approach across the pan-European region and beyond.

The updated field guide is targeted to community members, local service providers who share responsibility for operation and management of the community drinking-water supply and to the local government authorities, nongovernmental organization or other community-based organizations that support drinking-water safety in rural communities. The draft document introduces the WSP approach, provides step-by-step guidance and ready-to-use templates to support practical implementation of this approach in small systems.

The draft has undergone external expert review, and the Working Group on Water and Health is requested to review the draft version and provide comments and feedback to Oliver Schmolli (schmolli@who.int) by **10 June 2022**.

Note: The draft document is for review by the Working Group on Water and Health only and not for wider distribution at this stage.

Water safety plan: a field guide to improving drinking-water safety in small communities

How to use this field guide

This field guide is a practical tool for improving and maintaining small community-managed drinking-water supplies in rural areas. It is designed to be used by YOU as a community member or staff of a local service provider who shares responsibility for operation and management of the drinking-water supply in your community. It can also be used by YOU as a staff member of the local health or water supply office, local government authority, nongovernmental organization (NGO) or other community-based organization that supports drinking-water safety in rural communities. Ensuring the safety of the community water supply is a daily job, and community members and other stakeholders have to work jointly to achieve this goal.

This field guide explains what a water safety plan (WSP) is and how it can help you improve the safety of your drinking-water supply, showing how you can improve your water supply little by little, step by step, every day. It provides you with a range of ready-to-use templates to support you in developing your own WSP. The guidance and templates will help you see that WSP implementation is easy and can help you achieve improvements quickly.

It is important to remember that the templates provided in this publication are intended to help to guide you through important planning steps, but they do not represent the only way to develop your WSP. The WSP approach is very flexible, and you are free to change the templates in any way you choose to offer the best fit for your local situation.

As you go through the WSP process you will find that some of these templates are easier to complete than others. If you find any of the templates too difficult, even with the help of local experts, you can revise them to make them clearer or come back to them later if necessary. Remember that water safety planning is neither an all-or-nothing process nor a pass/fail exercise. Every activity you undertake and each template you complete is an important step towards improving water safety.

While developing your WSP you will no doubt find that during discussions on one task you will also discover issues that are important for the next steps. This is normal: you can note these ideas and deal with them later in the process.

How can a WSP help you?

Acceptable and safe drinking-water in sufficient quantity, available when needed, is essential to sustain a healthy life – for yourself, your family and your whole community. “Safe” means that your water does not contain harmful microorganisms or substances in concentrations that may make you sick with so-called waterborne diseases, such as diarrhoea. “Sufficient” means that the amount of water on hand is enough for your daily needs for drinking, food preparation and personal and domestic hygiene. If the available quantity of water is insufficient (because you need to collect it from distant sources or because of challenging climate conditions that cause drought spells, for example), good hygiene practices, such as hand washing, may be compromised. This may also cause disease. While the focus in such situations will be on obtaining a sufficient quantity of water, you should not forget to pay good attention to water quality.

Ensuring continuous provision of safe and sufficient drinking-water should always be among the top priorities of your community. This prevents the occurrence of waterborne diseases and significantly contributes to your community’s economic and social development and sustainable family livelihoods. Households whose members do not have to travel to collect water have more time to earn money, care for children and go to school. Safe water is crucial for the sustainable development of your community.

A local service provider or a group of community members (such as a water association or water user committee/ group) who collectively share responsibility for delivering safe drinking-water is typically best placed to manage the community water supply. The WSP approach – explained step by step in the following chapters – is the most effective way this group can manage the supply. It supports your community in dealing with the everyday challenges of maintaining a reliable, safe water supply.

The WSP approach clearly emphasizes prevention. It helps you to identify, prioritize and manage risks that could threaten your water supply, thereby protecting your drinking-water before it is too late and problems occur. Remember that even if your water looks clear and fine it may contain hazards and harm your health. A WSP also helps you to take necessary steps, over time, to improve your water supply using the available resources in the community. Implementation of WSP doesn't mean, water doesn't need to treat any more. But all the recommended treatment or barriers need to be implemented to protect the contamination. In WSP we believe input monitoring is more important and crucial, rather than depending only on the output monitoring like sampling point tests.

Please do not perceive the WSP as “something extra” that puts an added burden on you. In fact, experience has shown that the WSP process is most effective if it becomes an integral part of the ongoing day-to-day operation, maintenance and management of your water supply. Provided you and your community are fully committed to the continuous provision of safe drinking-water, you will see that a WSP is an effective supporting tool that makes it easier to achieve this goal.

Communities that have already gained experience of WSPs reported a number of benefits that your community may also achieve. Here are some of the key advantages they discovered.

- A WSP gives you a better understanding of your water supply system. In particular, you will better understand the risks that may affect water quality and health in your community.
- A WSP improves the day-to-day management and operation of your water supply. Over time, the WSP process will lead to consistently safer water.
- A WSP encourages a team-based approach. It brings together those who share responsibility for, interest in, and knowledge of the community water supply, including authorities such as the local health or water supply office. This increases local cooperation and communication among community members.
- The WSP process involves community members, leading to improved hygiene awareness within the community and triggering positive changes in sanitary behaviour and increased attention to managing local sanitation facilities safely.
- A WSP helps you to identify improvement needs and opportunities for “quick wins” – potential improvements that can be achieved with your community’s own resources and efforts. A WSP recognizes that even small and simple improvements are better than none.
- As part of the WSP, you will develop an incremental improvement plan. Particularly when community resources to fund water supply development are limited, this plan supports you in providing the evidence for the improvements required. With a clear and sound community WSP in hand, government entities, NGOs and other financial supporters may be more inclined to consider supportive funding.
- WSP helps in developing idea of WQ parameters need to be monitored with appropriate frequencies (when), and location (where).

How can you develop a WSP for your water supply?

Water safety planning is about managing your water supply in an organized way. Following the sequence of the seven WSP tasks (set out in the figure below) will help to ensure that water from your supply is safe to drink and does not harm human health.

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As you can see in the figure above, water safety planning is a continuous cycle of improvement, not a one-off exercise. Every small step towards this approach of improving your water supply makes a difference. The most important thing is to get started, and you will see that a WSP is not a complicated procedure but rather a different way of looking at things and managing them, following the WSP tasks described on the next pages.

I am already monitoring drinking-water quality, how will a WSP make a difference?

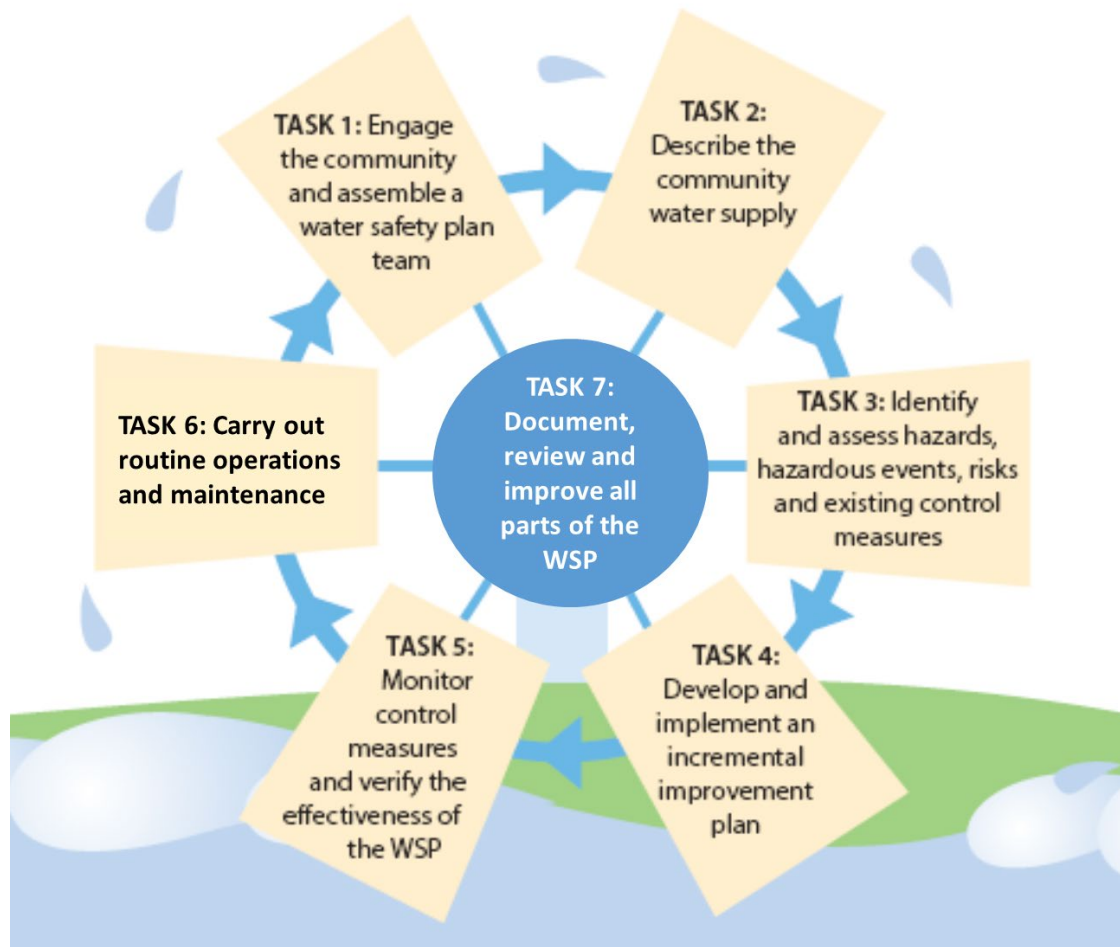
With a WSP, you take a proactive approach. You identify and address risks to drinking-water safety and take preventive action before problems occur, rather than waiting until they happen.

Does it only work for boreholes and other wells?

No matter what type of water supply you have, what type of source water you use, whether or not you treat your water, the size of your water supply or how many households you supply, the WSP principles you apply are always the same.

The seven tasks to develop and implement a WSP

Source: adapted from WHO (2012)



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TIP

If you are interested in more detailed information, the following WHO publications provide useful background reading.

- *Water safety planning for small community water supplies: step-by-step risk management guidance for drinking-water supplies in small communities* (WHO, 2012);
- *Water safety plan manual: step-by-step risk management for drinking-water suppliers* (WHO, 2009);
- fourth edition, incorporating the 1st addendum, of the *Guidelines for drinking-water quality* (WHO, 2017);
- volume 3 of the second edition of the *Guidelines for drinking-water quality: surveillance and control of community supplies* (WHO, 1997);
- *Healthy villages: a guide for communities and community health workers* (WHO, 2002);
- *Water Safety Plans in eastern Europe, the Caucasus and central Asia* (WHO Regional Office for Europe, 2014);
- *Climate-resilient water safety plans. Managing health risks associated with climate variability and change* (WHO, 2017);
- *A guide to equitable water safety planning. Ensuring no one is left behind* (WHO, 2019).

Web addresses of these publications are provided in the references section of this field guide. The reference section also includes additional background reading on WSPs and safely managed sanitation.

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What can YOU do to improve drinking-water safety in your community?

In the following sections you will learn, step by step, about the WSP approach and the use of complementary templates that help with the practical side of implementing YOUR community's WSP. Each section provides further information on the seven WSP tasks, offers advice and directs you to the appropriate templates for the recommended activities, and concludes with useful tips to help you achieve the aims of the task.

What are you waiting for? Let's get started!

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WSP TASK 1. Engage the community and assemble a WSP team

You do not have to develop the WSP all by yourself: it should always be a team effort involving those who share responsibility and have an interest in the community water supply, who can take action to improve it and who have knowledge and experience of the water supply and quality. The first task is therefore to form a WSP team.

If there is already an established group in charge of managing the community water supply – for example, a water association, a water user group or an operation and management committee – you do not need to create a new team solely for the WSP: you can incorporate the WSP tasks into the roles and responsibilities of the existing group. This will help you to integrate the WSP into existing management structures right from the start and will be a great basis for making your WSP successful and sustainable.

In addition to the person or group responsible for water supply operation and maintenance, consider involving:

- a community leader or executive member of the users committee who can make financial decisions;
- a religious leader from the community who can promote drinking-water hygiene in the temple, church or mosque;
- a teacher or a nurse who can promote drinking-water hygiene in the school or health facility;
- community members responsible for or looking after sanitation systems in your community;
- community members who bring their animals to graze near the water source and/or who collect their water with animals;
- community members who are responsible for special buildings using the community water supply, such as health care centres or schools;
- a technical person from the service provider team who knows better the system and can support to prepare, review and update the WSP document
- Representatives of disadvantaged groups (e.g., people living with disability, ethnic minorities, informal settlement dwellers).

Make sure that women! They are represented on your WSP team! If they are not already included among the persons or groups listed above, remember that they are often the ones who collect and handle water, and who are typically responsible for safe water in their homes. You may need external support for some aspects: do not hesitate to ask, for example, your local health office, offices responsible for water supply and sanitation or NGOs for help. Local water, sanitation and hygiene experts also have a strong interest in the safety of your water supply and can support you.

You should document who is on the WSP team, using **Template 1-A. WSP team list**. One person should be chosen as the WSP team leader who drives the water safety planning process with authority and motivation.

It is important that your WSP team meets regularly. As the WSP is about the day-to-day operation and management of your supply, you should regularly communicate about what you have been doing, any challenges you are facing and what you need to do next. You will typically have more meetings at the beginning of the WSP process, but do not forget to continue meeting after you have gone through the WSP tasks for the first time. A WSP is never finished but is a continuous process. For each meeting use and file a copy of **Template 1-B. WSP team meeting notes**.

TIP

Have neighbouring communities already implemented a WSP? Try to arrange a meeting with them as external supporters and ask about their experience. They can tell you about factors that made their WSP a success and the challenges they faced. You can also ask for their views on the situation with your water supply. If no neighbouring community has WSP experience, you could develop your WSP with a neighbouring community that is developing theirs at the same time. Exchanging information with people and institutions outside your own community can help you greatly.

WSP TASK 2. Describe the community water supply System

A WSP covers all steps of the water supply system from the area where the source water originates all the way through to the point of water consumption. You should describe this whole system as this forms the basis for your next WSP tasks. You will see that a thorough and accurate system description will be of great help as you carry out WSP tasks 3 and 5.

In day-to-day operations you will regularly see the installations for water abstraction (including wellheads, spring boxes and stream intakes) and treatment (if in place), central storage reservoirs and public taps. To complete the WSP system description, however, you will also need to visit the catchment area from which your water comes and to look at the storage, handling and treatment practices for drinking-water in homes. Contamination may be introduced to the drinking-water supply system in both these areas and they therefore need to be considered.

Apart from this, system description also need to address the questions like; who use the water and what propose (intended users and use of water), and the standards needed for those proposes.

Do you have several water sources, several water abstraction points or several water storage reservoirs? Make sure that your system description includes all of them and that you do not overlook any part of your water supply system.

To complete this WSP task you should draw an overview map of your entire supply system, using **Template 2-A. Map of water supply system**. You should also describe your system in more detail, using **Template 2-B. Description of water supply**. Please note that this is not a task you can complete sitting at a table. The WSP team needs to walk along all parts of the water supply and visit, for example, all water abstraction facilities and collection points, treatment and storage facilities and public taps, in order to describe the system accurately. The WSP team also needs to visit the catchment area to observe any activities that may pollute the water.

In case you need to explain something about your system to somebody who has not seen it, or if you want to re-check something after the site visit, it is helpful to take pictures if you have a mobile phone or camera available. If there is any information you do not have, it is worth asking for external support. Your local health office or water supply office may have information on the quality of your water, for example.

TIP

The site visit of your system – walking along all supply steps following the flow of water – is very important for preparing an accurate and up-to-date system description. Note that the site visit is equally important for implementing WSP task 3. If you combine your site visit to serve both WSP tasks 2 and 3, this may save time and resources.

TIP

You may use the opportunity of the site visit to promote safe behaviours among community members you meet, including how good practices can prevent water-related disease. This could address, for example, safe operation of on-site sanitation, safe water collection practices, cleanliness of collection containers or safe handling and storage practices in the home.

Also do not forget hygiene behaviour! It is important that community members have handwashing facilities and soap available and are using them, especially before handling drinking-water and before eating or drinking, in order to prevent their health. The WSP team should make sure that handwashing stations are available in key public places of the community, such as schools or healthcare facilities.

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WSP TASK 3. Identify and assess hazards, hazardous events, existing control measures and risks

This task is at the heart of the WSP. To complete it, you need to ask yourself the following questions for each step of your water supply system.

- What can go wrong?
- How and why might it go wrong?
- At what times and where might it go wrong?
- With going the wrong, what level of consequence/ impact in the public health/ safety of water supply?
- Is anything being done to prevent it from going wrong?

The various terms used here may sound very theoretical to you when reading this for the first time, but don't worry, it is not rocket-science.

For this WSP task, the first job of the WSP team is to identify what dangers (so-called "hazards") might threaten the safety of your water supply, and how and at what supply steps these hazards might be introduced (so-called "hazardous events").

Hazards include harmful pathogenic microorganisms (for example, from human or animal faeces), chemicals (for example, from agriculture or manufacturing or natural occurrence), physical constituents (for example, turbidity, which is caused by very fine particles suspended in water) or simply a lack of water.

Examples of hazardous events include heavy rainfall, snow-melt, drought spells, pipe breaks, malfunction of a disinfection unit or power cuts. Often a hazardous event is a combination of several events and unfavourable conditions: for example, heavy rainfall causing surface runoff, which collects animal faeces from the ground and then enters a damaged wellhead.

Different kinds of hazardous events can introduce hazards at every step of your water supply system; however, hazardous events after the treatment / disinfection are more serious need to be controlled with utmost attention. For instance, the same hazard (for example, pathogenic microorganisms derived from faeces) may be introduced to the water supply by defecating animals at the water collection point, by faecal contamination from a latrine, or by consumers who handle water in their homes with dirty hands, is more serious than the similar events at source, before treatment unit.

"Control measures" are barriers preventing contamination. Examples of control measures are:

- Fencing off animals from your well,

- a screen at your reservoir air vents preventing insects from entering,
- disinfecting the water,
- and promoting hygiene behaviour including handwashing with soap before handling drinking-water.

With control measures you can reduce the risk of a hazard causing harm to your community. Make sure that these control measures work effectively: a fence with an open gate or inadequate disinfection procedures may not reduce the risk and will give you a false feeling of safety. You should always maintain several control measures as multi barriers system to prevent contamination at different steps along your water supply for the best results. Using this approach, you can greatly reduce the risk of contamination reaching the consumers of your water supply.

The risk to health from the various issues identified will depend on how often the hazardous event could happen and how severe the consequences of the hazard could be considering the effectiveness of any control measures that are already in place. In a WSP, you should always consider hazards and hazardous events in pairs and assess the risk for each pair (see the table on the next page). To complete this assessment of risk, you will need to have detailed discussions within the WSP team about which risks you consider more important than others. The relative importance of individual risks is different for every water supply system and for every community. Also consider that the importance may change over time, for example when certain events (such as heavy rain, drought spells) happen more and more often due to climate change. Always remember that the focus of a WSP is the protection of community members' health. Other issues may also be important to your community but should not be the basis of your WSP risk assessment. As a result of this WSP task you have a list of risks to your water supply system, which you rank according to how important you think they are.

TIP

In this WSP step, you will already consider the impact of weather events such as rainfall, snowmelt, or periods of hot temperatures which may lead to drought. Such weather conditions may change over time, in particular because of climate change. In order to be prepared for future effects of climate change, discuss in the WSP team if changes in the intensity and frequency of these events have been observed in your community. This could give you an indication what you should prepare for in the future.

Potential hazards and hazardous events

Hazard <i>What dangers threaten the safety of your water supply?</i>	Examples of hazardous events <i>How could the hazards reach your water supply?</i>
	Latrine leaking to groundwater and contaminating the well

Harmful organisms (pathogens)	Animal waste entering stream, well or spring box during heavy rain or snowmelt
	Animals grazing near the water supply or drinking in the stream, upstream of the abstraction point
	Improper use of sewage sludge in agriculture in the catchment area
	Ingress of insects or vermin through unscreened vents at storage reservoirs
	Unhygienic handling of water in the home
	Insufficient disinfection practices
	Reduced dilution of pathogens from wastewater discharges in streams during times of reduced rainfall
Harmful chemicals	Leaching of naturally occurring chemicals into groundwater (such as arsenic or fluoride)
	Improper use of chemicals in agriculture in the catchment area (such as nitrate or pesticides)
	Accidental spillage at upstream filling station, garage or local production site (such as diesel)
	Overdosing of treatment- and disinfection-chemicals (such as chlorine)
Quantity	Insufficient quantity during drought periods
	Reduced quantity available for drinking-water purposes due to increased competition between different water uses (e.g. agriculture) in times of reduced rainfall

Template 3-A. Hazard analysis and risk assessment helps you with this WSP task.

Sanitary inspection is a powerful on-site tool for identifying risk factors, and thereby can strongly support WSP implementation. The various checklists provided in **Template 3-B. Sanitary inspection forms** particularly support you in identifying potential hazards, hazardous events and problematic conditions related to your water abstraction facilities, distribution system, storage reservoirs, water handling and storage at the household level, and wastewater systems. The outcomes of sanitary inspections can not only inform the risk assessment of your WSP but also help to identify improvement needs in your system. You should carry out sanitary inspections on a regular basis in order to document changing conditions over time.

TIP

Start with hazards and hazardous events that you can easily describe and assess. Once you have become more skilled in this, and when more information is available, you can tackle the more complicated risk assessments. As with the whole WSP this task can be taken step by step, and every step counts on the way to completing the WSP.

TIP

Regular site visits and sanitary inspections of all elements of your water supply system are very important for identification of hazards, hazardous events, assessment of risks, existing control measures (Task 3) and monitoring of control measures and verification of the effectiveness of the WSP (Task 5).

TIP

It is important to consider what happens with the water after it has been used – wastewater and human waste may be a significant source of contamination if not disposed off safely. Poorly managed sanitation systems are among the main causes of contamination of drinking-water sources. Therefore, your WSP should also cover sanitation systems in the vicinity of your water supply by documenting and assessing infrastructure and practices related to:

- Collection, storage and/or treatment of faeces, such as pits or septic tanks
- Conveyance, such sewers, or emptying and transport of human waste by vehicles
- Disposal of human waste in the environment, for example in water bodies or on land
- If applied, use of (treated) wastewater in agriculture or horticulture
- If practiced, open defecation

Unsafe sanitation practices can be a source of pathogens introduced to the water. Wastewater may also increase the concentration of nutrients in water, supporting eutrophication and the growth of algae and cyanobacteria. Pathogens and nutrients often reach water sources during heavy rainfall or flooding, which may cause latrines or sewerage systems to overflow. Poor maintenance and insufficient removal of waste from latrines and septic tanks can also contribute to these problems, and groundwater may be contaminated directly from such facilities. The negative effects may also be made worse in settings where re-use of wastewater is practiced.

When trying to make your drinking-water safer, it is important to identify the location and condition of sanitation systems in the community near and upstream the water source and find out how wastewater and faecal matter from such systems are being handled in the community.

This also means that control measures may already be taken in the wastewater systems to prevent raw water contamination in the first place! Such control measures may include making sure that the systems are regularly maintained, encouraging use of safe systems rather than unsafe ones, incentivizing connection to wastewater disposal where possible, constructing new or improved systems, or changing practices and location of disposal and / or re-use.

WSP TASK 4. Develop and implement an incremental improvement plan

As a result of the previous WSP task, you identified whether you are already doing enough to prevent hazardous events from happening or whether improvements are needed to protect water safety every day.

You can now develop a detailed action plan describing what you will do to address important risks and thereby improve the condition and operation of your water supply. You will typically achieve these improvements either by adding new control measures or by enhancing existing controls.

Your improvement plan should always explicitly state who is responsible for the improvement action, when it will be done and with which resources. Be specific when defining these details: the more clearly you describe the actions needed, the more likely it is that they will be done. This principle also holds true for other WSP tasks.

Typically, the plan includes simple but important improvements you can make straight away with limited resources: for example, cleaning faeces or garbage from the cover of a spring box and its surroundings, or putting up a poster with pictures and diagrams describing basic hygienic water collection principles. Other actions or system upgrades may take more time and financial resources: for example, improving wastewater collection and disposal in the catchment of your water supply, or installing and maintaining a chlorination unit to address microbial contamination in your system.

Note that sometimes the biggest gains can be made by addressing activities beyond your water supply, such as improving the sanitation situation or reducing the use of manure and agrochemicals upstream of the well or spring.

Some actions may take a longer time if they are outside your own responsibility. Do not be discouraged if more complex and time-consuming improvements take more time to fundraise and implement – there will always be things you can readily do with the resources you have.

To document your improvement plan you can use the attached **Template 4. Improvement plan**. This plan should be associated with the hazardous events listed in the template 3-A, and all very/ important; requires attention and action should be included and reflect all the steps you intend to take, including both small steps you are taking straight away as immediate actions and larger steps you have identified as important, as long-term plan even though you may lack the required resources at the moment. With a detailed improvement plan you can show that you have thoroughly assessed what needs to be done in your system. You can also use the improvement plan as a basis for seeking financial or other

support for larger upgrades and improvements you need, for example, from relevant government offices, donors or NGOs.

TIP

Be aware that new control measures may sometimes introduce new risks that need to be addressed by the WSP team. For example, if you put in chlorination, some consumers may not like the new taste of chlorine and may start taking water from alternative, potentially unsafe, sources. In order to prevent such behaviour, accompanying community education addressing the perception of taste will be vital.

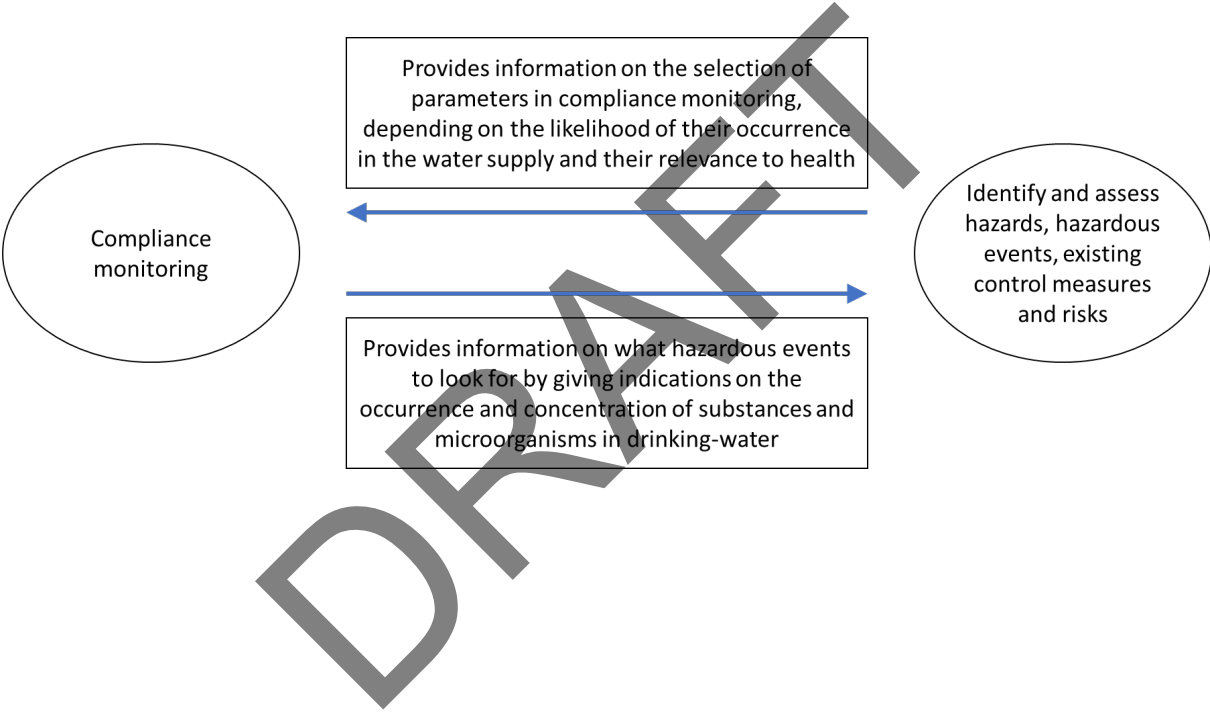
Also, fencing a wellhead may require thought to be given to providing an alternative source for watering livestock and other animals, which are brought close to the collection point carrying drinking-water collection containers. The alternative source should preferably not be located on a slope above the wellhead.

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WSP TASK 5. Monitor control measures and verify the effectiveness of the WSP

Two types of monitoring are integral parts of the WSP: “compliance monitoring” and “operational monitoring”.

Compliance monitoring is the testing of drinking-water quality to confirm that it complies with water quality standards. Such testing is typically done by the local health office on a regular basis in line with national regulations. Regular testing of your drinking-water is very important. It confirms the safety of your drinking-water at certain points in time, and alerts you if your WSP is not working properly.. To document your compliance monitoring plan in collaboration with your local health office, you can use **Template 5-A. Compliance monitoring plan**.



TIP

In compliance monitoring, it is not necessary to test a wide range of parameters at high frequency. Testing just a few priority parameters is generally enough to confirm that the water supply is safe. Parameters typically prioritized by the local health office include:

- **Microbiological indicator parameters:** Contamination with faecal matter may introduce various pathogens into your drinking-water. Because it is not feasible to analyse for all possible pathogens, the water can instead be analysed for *Escherichia coli* (also called *E. coli*) or “thermotolerant coliforms” that both indicate recent faecal contamination. For both parameters, laboratory and field tests are widely available.
- **Chemical parameters:** Where possible, additional parameters may be measured if they are relevant in your supply and health-relevant, particularly chemical parameters that are
 - known or expected to be present, either naturally occurring (for example, arsenic and fluoride) or resulting from human activity in the catchment area (for example, nitrate from agricultural activity or sanitation), and
 - expected at concentrations that are of health concern.

Other parameters that may also be part of compliance monitoring, such as turbidity, residual chlorine and parameters that affect the appearance and taste of the water, are addressed in the TIP box on operational monitoring.

Although compliance monitoring is an important part of your WSP, always remember that this testing alone cannot assure you that your water supply system continuously delivers safe drinking-water for three reasons. First, compliance monitoring is typically done only once or twice a year, sometimes even less often. It will therefore not reflect drinking-water quality between testing dates. Second, test results will be available to you only after people have already drunk the water. The results will always come too late to prevent people from drinking contaminated water. Third, drinking-water is typically only tested for a limited number of parameters and may not cover testing for other hazards that may be present in your drinking-water supply.

Consequently, in addition to compliance monitoring by the health office, the WSP team should conduct its own “operational monitoring” on a regular basis. Operational monitoring checks and confirms that the control measures you have in place are working properly to prevent contamination from occurring.

Operational monitoring involves quick and easy measurements (e.g turbidity, pH, FRC, TDS etc) and observations by operator/ technician of the system or any member of the the WSP team on a frequent and regular basis. Examples include visual observations during weekly on-site inspections (for example, checking the condition of sanitation and wastewater systems, the integrity of a fence or wellhead, or practices during water collection) and daily water quality testing for simple indicator parameters (such as turbidity in raw water or

chlorine residual in storage reservoirs). To carry out the inspections you can use the forms provided in **Template 3-B as reference form**.

Operational monitoring complements compliance monitoring. For example, rather than relying solely on compliance monitoring to detect faecal contamination of the water supply, you can regularly check the integrity of your sanitation and wastewater facilities to spot any conditions that may favour faecal contamination from them, and integrity of your fence to confirm that they prevent animals from accessing the well area and contaminating your water.

If inspection or test results indicate problems, this should always trigger action to correct the faults in a timely manner. These so-called “corrective actions” aim to quickly bring your system back into proper operation – before unsafe water is actually supplied to consumers. For example, such an action could be repairing a damaged fence or vent screen, before animals actually gain access and contaminate the water, thus ensuring that the respective control measure is again functioning as planned.

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TIP

In operational monitoring, the water quality parameters listed below are particularly important to ensure microbiological safety and acceptability of the water. They can all be analysed much faster than the analysis for microbial parameters. Frequent monitoring, preferably not less than once a day, helps to identify and respond to problems in a timely fashion.

- **Turbidity** is a measure of the cloudiness of the water caused by suspended particles. Although it is not a direct threat to health, high turbidity levels might signal the presence of harmful microorganisms in your drinking-water. Also, community members may not want to drink the water if it appears cloudy or dirty. Your aim should be to keep turbidity below 5 nephelometric turbidity units (NTU). If you disinfect your water, it is best to keep turbidity below 1 NTU as high turbidity can reduce the efficacy of disinfection.

Turbidity is a powerful operational monitoring parameter and you should make sure that the caretaker or operator measures it regularly. Changes in turbidity may indicate water quality problems caused by rainfall and runoff (shallow groundwater sources and springs in particular can show a very rapid response), polluted water entering storage tanks or distribution pipes, or treatment malfunctions. Unexpected increases in turbidity should always trigger increased vigilance and investigation by the WSP team and, if required, corrective action.

- **Residual chlorine and pH:** If your supply is chlorinated, there should be a certain concentration of chlorine remaining throughout the supply system, preferably not less than 0.2 mg/L at the point of consumption. Such residual concentration ensures that disinfection works effectively and inactivates any harmful microorganisms that may be present in your system. Also make sure to measure pH on a regular basis. It should be below pH 8.0 to ensure that your chlorination works well.
- The **appearance, odour and taste** are important characteristics of water. It should always be clean and pleasant to drink. Bad looking, smelling or tasting water can lead to rejection of the water, but is also an indication that something is wrong with your water supply.

To make sure that operational monitoring and inspection is undertaken in an organized manner, you should set up a plan using **Template 5-B. Operational monitoring and inspection plan**. As you can see, you also need to set up detailed descriptions of the corrective actions to be taken if operational monitoring results indicate problems.

TIP

The water quality experts at your local health or water supply office can support you with locally available testing equipment and techniques, as well as defining suitable operational monitoring parameters, sites and schedules.

In addition to the regular schedules you define in the operational monitoring and inspection plan you should also perform monitoring during periods of rain, snow-melt and drought, and immediately after events such as heavy rainfall and flooding, to show whether controls continue to be effective under extreme or unusual conditions. For example, turbidity should be tested more often when water quality is most variable – for example, during periods of rainfall (the wet season) and snow-melt.

TIP

If your water testing results clearly change over time, this indicates that conditions may have changed and you should follow up, review the situation and try to find out the reasons for the change.

DRAFT

WSP TASK 6. Carry out routine operations and maintenance

Regular and diligent maintenance of water supply infrastructure and ongoing attention to important operational tasks are essential to ensuring a continuous supply of safe drinking-water in your community. Your next task is therefore to make sure that the caretaker or operator responsible for running the water supply has a good understanding of important operational and maintenance tasks that require his or her regular attention. The following Table XYZ gives some examples of such tasks.

Supply step	Example
Abstraction	<ul style="list-style-type: none">• Service the pump according to the manufacturer's instructions
Treatment and disinfection	<ul style="list-style-type: none">• Back wash the sand filter according to the manufacturer's instructions• Service the disinfection unit according to the manufacturer's instructions
Storage	<ul style="list-style-type: none">• Periodically empty, clean and disinfect the reservoir
Distribution	<ul style="list-style-type: none">• Carry out regular maintenance of public taps
Monitoring	<ul style="list-style-type: none">• Purchase consumables before they run out.

It is very useful to develop step-by-step instructions (often referred to as “standard operating procedures”) for carrying out operational and maintenance tasks. These instructions will give the caretaker confidence that he or she always knows what to do and when. The instructions will also be useful when new caretakers need to be trained, or when the caretaker happens to be ill or on vacation and someone else needs to fill in.

If you already have a caretaker manual for your water supply system, you should review it to make sure it is up to date and covers all important operational and maintenance tasks. The results of the hazard analysis and risk assessment help you identifying important tasks that require the caretaker’s attention. If you do not already have clear instructions, you can create these using **Template 6-A. Instructions for operations and maintenance.**

In addition to these regular tasks, it is also important to consider and document what you would do in the event of a water supply emergency. An example of an emergency could be that your water supply becomes contaminated and you need to inform the local health office and consumers that the water is not safe at the moment and that consumers should boil it to avoid ingesting microbially contaminated water.

Remember that not all emergencies are sudden – some build up slowly over time. For example, when the water supply fails during periods of drought, so that a

sufficient amount cannot be abstracted and the community has to be temporarily supplied with water from other sources.

To document your actions in response to an emergency situation, you can use the attached **Template 6-B. Emergency response plan**.

Once you have completed **Template 6-A** and **Template 6-B** you have successfully worked through your first WSP cycle and all templates. Congratulations!

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WSP TASK 6. Document, review and improve all aspects of WSP implementation

As you have seen, you generate documentation when you work through the WSP process. All your completed templates represent your WSP documentation, which should be kept in a folder – the “WSP documentation binder” – either electronically or physically. You should also keep any useful additional information in this folder: for example, results of water quality monitoring, reports from your local health or water supply office and information on hygiene education programmes you have conducted.

The full WSP documentation helps you to manage your water supply effectively and to show its status and changes over time to others who are not as familiar with the system as you are. In this way, even when you are ill or on vacation the person filling in for you will have the basic information needed at hand.

As part of your WSP team meetings, you should periodically review your WSP to check whether it still reflects the actual situation. To do so, go through all the WSP tasks and templates described above again and ask yourself the following questions.

- Is this still the case?
- Has my supply system changed or have the weather patterns altered?
- Are there any new risks that I need to consider?
- Do my control measures work?
- Do we carry out operational monitoring and inspection as planned?
- Are the water quality test results satisfactory?
- Do we implement our operations and maintenance activities regularly?
- What improvement actions have I already completed and which still require attention?

During these reviews, you should go through all the changes that have occurred to the system and check how far along you are already with your step-by-step development of the WSP and your improvements. At the same time, the review is also a good moment to confirm that all operational routines are being implemented in practice and are adequate.

If you find that your WSP is out of date or not working well, or if new information has become available, updates and adjustments should be made to the WSP. Do not worry – this will not take as long as doing it the first time! And each improvement cycle will make your WSP stronger.

TIP

Always note the date on the documents you develop for your WSP: conditions change over time, and by keeping older versions and comparing them with more recent ones you can see development and improvement of your system over time. Document any new constructions and improvements when you install them. It will be much harder to try to remember the details later.

TIP

If you partner with a neighbouring community, you may review each other's WSPs and give each other input from your own experience. For example, risks that have been overlooked in one supply can thus be added to the other WSP, and the know-how of one community can support the other community.

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https://www.who.int/water_sanitation_health/water-quality/safety-planning/wsp-publications/en/

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Templates to support you in developing your WSP

Template 1-A. WSP team list
Template 1-B. WSP team meeting notes
Template 2-A. Map of water supply system
Template 2-B. Description of water supply
Template 3-A. Hazard analysis and risk assessment
Template 3-B. Sanitary inspections
Template 4. Improvement plan
Template 5-A. Compliance monitoring plan
Template 5-B. Operational monitoring and inspection plan
Template 6-A. Instructions for operations and maintenance
Template 6-B. Emergency response plan

The templates provided on the following pages will assist you in developing and upkeeping your WSP. As the WSP is not a one-off exercise but requires ongoing implementation, review and updating, you will need to revise the completed templates over time.

Most of the templates need to be updated after some time, and some will need to be used more frequently (for example, templates 1-B and 3-B). In addition, some require multiple copies each time they are used (for example, templates 3-A, 5-B and 6-A). So don't forget to make an adequate number of copies of all templates before you start. If you work directly on the templates in this booklet, it will be difficult to reproduce them later.

If you have internet access, you can download and print this field guide and the templates from the following web address: XYZ.

WSP task 1. Engage the community and assemble a WSP team

Template 1-A

WSP team list

Template 1-A supports you in implementing and documenting WSP task 1. Once completed, this template becomes part of your WSP documentation binder.

Create a the WSP team list and make sure that each team member knows their responsibilities and that every person on the team knows how to contact all the other team members. This is particularly important in the case of an incident or emergency and for communication with the local authorities. Some team members may withdraw their membership, or change contact information, therefore the list with members should be occasionally reviewed and amended if needed. Record the **roles and responsibilities** of individual WSP team members in the team list (e.g. team leader). You could, for example, include the leader of the WSP team, the person responsible for operation of the water supply, the community member responsible for operating the sanitation system, a member in charge of monitoring and testing operations of water, a representative of the women's association or the school teacher in charge of hygiene education, and community health service providers.

Include relevant **external contacts**, such as the water quality expert at your local health office, water supply office, local administration or government entities, land users, climate experts or locally active NGOs. They may not participate in every WSP team meeting, but are nevertheless an important resource for the development of your WSP. They can also support the community with filling in the templates.

If you have not yet read through WSP tasks 2– 7, you may be wondering about specific WSP team responsibilities. If so, it will be helpful for you to keep the following **general duties of the WSP team** in mind as you convene the WSP team and complete this template. The WSP team should:

- understand and map your whole water system from the source to the point of water use;
- identify and evaluate risks to your water supply and existing control measures,
- develop an improvement plan and implement improvements;
- plan for regular water system monitoring, inspection, maintenance and emergency response;
- implement and maintain the WSP and meet regularly (for example, quarterly) to discuss routine WSP implementation and any necessary updates to the WSP documentation;
- meet regularly (for example, annually) to review and, if necessary, revise all parts of the WSP documentation.

To complete WSP task 1, also use **Template 1-B**.

Water Community System:

Town/Village/Site

District

Region

.....
.....

Date:

Name	Role and responsibility on the WSP team	Affiliation or organization and position (e.g. local health office)	Contact details (e.g. phone number)	

WSP task 1. Engage the community and assemble a WSP team

Template 1-B

WSP team meeting notes

Template 1-B supports you in implementing and documenting WSP task 1. Simple notes from each team meeting become part of your WSP documentation binder.

In the beginning, WSP team members should meet frequently to complete the templates that make up the WSP documentation.

It is envisaged that the development of the entire WSP process is preliminarily planned (e.g. through a period of 6-9 months) including timelines for the WSP tasks. This will inform the schedule and agenda of meetings, and stimulate preparation of the team leader and members for each meeting.

As implementation progresses over time, the WSP team should continue to meet regularly to review the WSP. You should check whether or not the WSP is being implemented as planned, that water quality test results are as expected and that WSP documentation (including templates 1-A to 6-B) is still up to date. If the WSP is out of date or not working well, or if new information has become available, the team should agree on necessary updates and adjustments to the WSP.

For each WSP team meeting you hold you should make a copy of the reporting template on the reverse and fill in the information. You do not have to document every detail of everything said at the meeting, but write down the **main decisions and outcomes**, including important follow-up actions to take and who is responsible. In this way, you can always look up again what you have agreed on, and team members or external supporters who were not able to join the meeting can have a quick overview. This also helps to accountability to ensure that important tasks are completed as required.

While you are all together at the team meeting, you should agree on a date, time and location for the next meeting.

To complete WSP task 1, also use **Template 1-A**.

Date of WSP team meeting:

.....

Names of WSP team members participating and external supporters present:

.....

.....

.....

.....

.....

Main decisions and outcomes of meeting:

(decisions requiring forthcoming actions would be defined as “what” is planned, “who” is in charge/main responsible, “when” the goal is estimated):

.....

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Date, time and location of next WSP team meeting:

.....

WSP task 2. Describe the community water supply

Template 2-A

Map of water supply system







Template 2-A on the next page supports you in implementing and documenting WSP task 2. Once completed, this template becomes part of your WSP documentation binder.

Draw a map of your water supply system, including the zone surrounding the abstraction and the water distribution area. The map should show the **layout and location** of the main features using basic graphic elements (see examples below) but also contain additional descriptive text where relevant to water safety. You can also prepare an overall map and additional maps with more details of certain aspects of your system.

Uses surrounding the water source or abstraction points which may pollute the source water:

Sanitation facility 	Livestock keeping 	Farming and gardening 
---	---	---

Water supply infrastructure:

Abstraction point 	Treatment facility 	Storage reservoir 
Main distribution pipe 	Public tap or collection point 	Community area supplied 

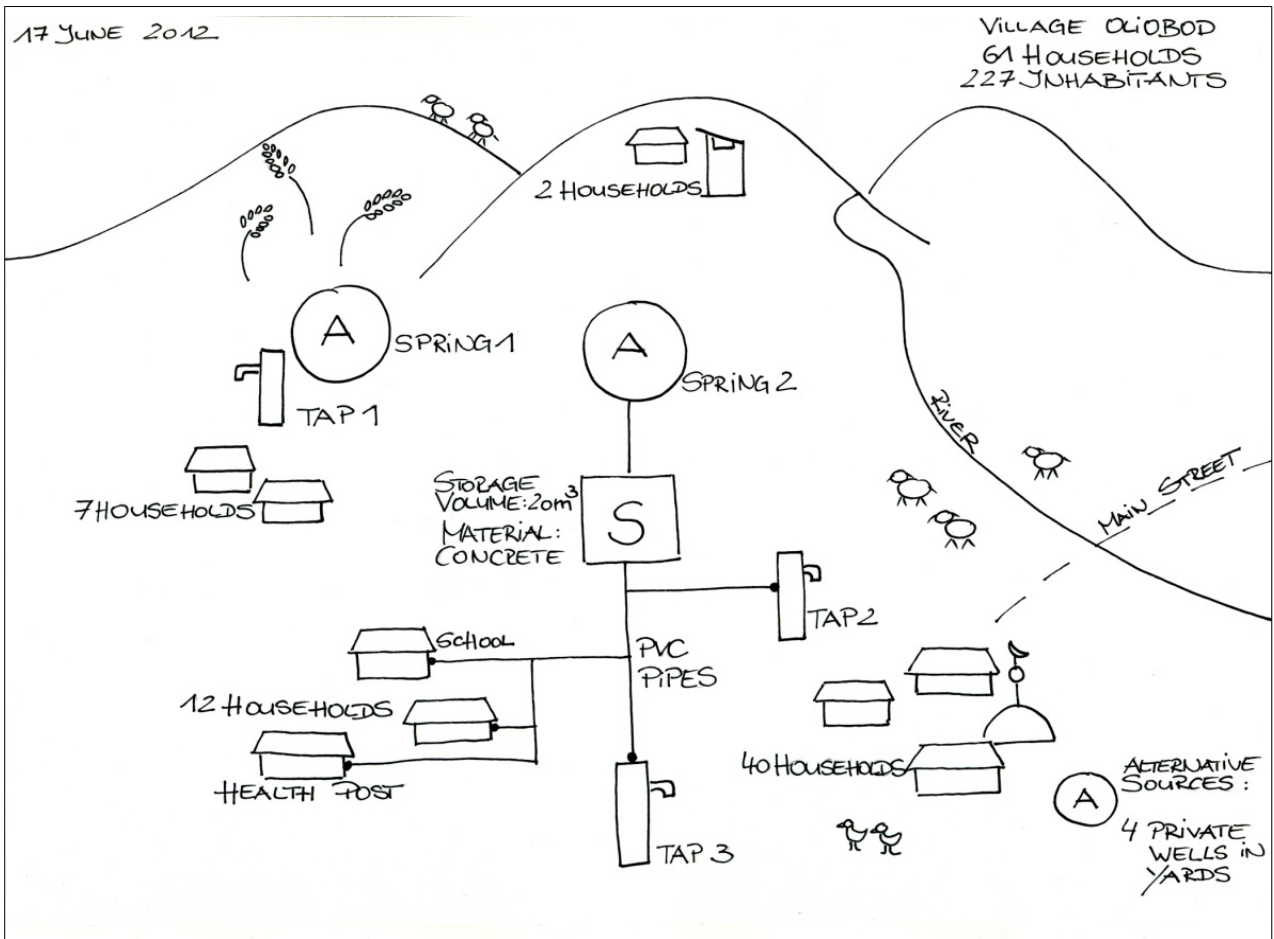
Draw the map on the next page. If one page is not enough to show sufficient detail, please use more. For example, if a treatment facility is present, a separate page can be used to show the facility at a higher-level of detail if required. You may depict any available relevant information, such as recharge areas, potentially contaminating land uses, and physical protection areas.

To complete WSP task 2, also use **Template 2-B**. Compare the information you enter into **Template 2-B** with the information on your map to be sure that you cover all the main components of your water supply system in the description.

The **example** drawing on the reverse illustrates the type of map and typical level of detail required to complete **Template 2-A**. This is for illustration purposes only.

17 JUNE 2012

VILLAGE OUIOBOD
61 HOUSEHOLDS
227 INHABITANTS



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Name of community or water supply:

Date:

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WSP task 2. Describe the community water supply

Template 2-B

Description of water supply

Template 2-B supports you in implementing and documenting WSP task 2, and complements the map of the water supply system in **Template 2-A**. Once completed, this template becomes part of your WSP documentation binder.

Carefully go through all questions in the template. They address **key features and components** of your water supply system, including all catchment areas, sources water, abstraction points, transmission lines, treatment, storage, water distribution, water collection and household handling, treatment and storage.

Take your time to **discuss all the questions within the WSP team** and to decide which questions apply to your system. You may need more than one WSP team meeting to fill in all the relevant sections of the template. Sometimes you may not be able to answer a question immediately because your community will not have the information. In this case you have to wait until you have collected the required information (such as the results of drinking-water quality testing) with the support of the local health office or water supply office if necessary.

It may seem that there is a lot of information to collect and document. However, the better the overview of your system's characteristics, the easier it will be for you to carry out the WSP tasks that will follow, such as identifying possible hazards and hazardous events and specifying monitoring needs.

Confirm the information on site – you cannot describe your system adequately without having a thorough look at it. Make sure that you do not miss any parts of the system. For example, if you have several points of water abstraction, make sure you visit and describe each of them. You should also always look at the drainage area/basin/catchment area your water is coming from and the water distribution system. Speak to the caretakers and operators in the field, as they will have the most experience and knowledge of the system's strengths and challenges.

Include pictures to support the description of your water supply!

To complete WSP task 2, also use **Template 2-A**. Compare the information on your map with the information you enter into this template to be sure that you cover all the main components of your water supply system in the description.

I. General information

- 1. Date of this document:
- 2. What is the name of your community, village or town?
What is the name of your district?
What is the name of your province or region?
- 3. How many people live in your community?
- 4. What is the type of organization managing the water supply?
.....
- 5. What is the source of the primary water supply? *(Please tick all that apply.)*
 - Groundwater
 - Spring water
 - Surface water, i.e. river lake reservoir dam
 - Other type of primary source *(please specify)*
- 6. Since when is the current primary water supply is in use (year)?
- 7. What is the population served by your supply?
number of people.....number of households.....
- 8. What is the volume of water supplied [m³/year]?
- 9. Are there any vulnerable or marginalized population groups served in your community?
 Yes No
If yes, please provide details.
.....
- 10. Are any of the following served by your supply (please tick all that apply)
 - Healthcare facilities
 - Aged care facilities
 - Schools, kindergartens or day care centres

If any of these are served by your supply, please include details here (e.g. how many schools and/or health centres; any additional onsite water treatment/storage).

.....

.....
- 11. Are any alternative drinking-water sources used by community members (e.g. private wells, unauthorized sources)?

Yes No

If yes, please include details here (e.g. types of sources, how often and why they are used, numbers).

.....
.....

12. Briefly summarise the main regulations / laws applying to your water supply

.....
.....

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II. Management of the supply

1. Is your water supply managed by the community?

Yes No

If no, who or which entity is responsible for management and operation of the water supply?

.....

If yes, has your community formally established a group of people (e.g. a water association, water operation group or, water user group) responsible for this?

Yes No

2. What is the total number of staff or community members involved in the operation, maintenance and management of the water supply?

.....

3. Who is responsible for the overall operation, maintenance and management of the supply?

Name:

Profession:

Skill on water management and quality:

4. What other staff are involved in the operation, maintenance and management of the supply?

Name:

Specific responsibilities:

Profession:

Skill on water management and quality:

Name:

Specific responsibilities:

Profession:

Skill on water management and quality:

5. Who is/are the contact(s) at your local health office and/or water supply office?

Name:

Contact details:

Name:

Contact details:

6. Do you collect fees from the community members for the water supply services?

Yes No

If yes, what is the total fee collected per month?

If no, are there any resources made available to support water supply services? If so, by whom and how much per month?.....

7. Is the staff operating the water system trained and certified?

Yes No

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III. Information on drinking-water catchment, water source location and abstraction¹

1. Do you or the local health office or local water supply office have information on the microbial and/or chemical quality of your source water?

Yes No

If yes, please include details here (e.g. who has the information, details on quality, changes over time).

.....
.....

You can also attach copies of the laboratory reports

2. Do severe weather or other events, or seasonal weather patterns, cause any known or observable water quantity or water quality problems?

Yes No

If yes, please tick all that apply and include further details below on previous experiences (i.e. what type of problems, frequency, typical severity, (gradual) effect on water quality / quantity).

- Heavy rainfall or flooding events
- Drought spells
- Storms
- Landslides
- Bush/forest fires
- Saline intrusion
- Extreme cold
- Other (please specify):

.....

3. Does your community use groundwater? (if no, skip this question and go to question number 4)

Yes No

If yes, do you have information on recharge area of the aquifer?

Yes No

Do you have information on groundwater flow direction in the area?

Yes No

If yes, please indicate whether groundwater flow is towards the ...

North South West East

4. How many abstraction points does your water supply have?

.....

Briefly describe them, e.g.
location

.....

¹ If you are using several water sources, please complete this section for each one

water source type used

- Groundwater
- Spring water
- Surface water, i.e. river lake reservoir dam
- Other type of primary source (*please specify*)

Since when is the current primary water supply is in use (year)?

55. Are abstraction points located in a floodplain area?

- Yes No

6. Are abstraction points affected by drought?

- Yes No

7. How is water abstracted?

- Manually Hand pump Motorized pump Gravity flow

8. Is there evidence of naturally occurring chemicals / contamination in the area?

- Iron Manganese Sulphate Arsenic Fluoride Algal blooms Other (*please specify*)

9. What potentially contaminating activities are present around your drinking-water source (i.e. in your drinking-water catchment)?

Please tick all that apply. For each of the activities selected, please provide further details of the approximate distance to the abstraction point

- On-site sanitation facilities
 - pit latrines Distance from abstraction point [m].....
 - dehydration vaults Distance from abstraction point [m].....
 - composting chambers Distance from abstraction point [m].....
 - septic tanks Distance from abstraction point [m].....
- Centralized wastewater facilities
 - pre-treatment Distance from abstraction point [m].....
 - settler Distance from abstraction point [m].....
 - Imhoff tank Distance from abstraction point [m].....
 - anaerobic baffled reactor Distance from abstraction point [m].....
 - anaerobic filter Distance from abstraction point [m].....
 - treatment ponds (e.g. oxidation ponds - anaerobic, aerobic and maturation ponds) Distance from abstraction point [m].....
 - constructed wetland Distance from abstraction point [m].....
 - trickling filter Distance from abstraction point [m].....
 - upflow anaerobic sludge blanket reactor Distance from abstraction point [m].....
 - activated sludge Distance from abstraction point [m].....

- drying beds Distance from abstraction point [m].....
- co-composting Distance from abstraction point [m].....
- biogas reactor Distance from abstraction point [m].....
- Laggons: aerated, facultative
- Open solid waste disposal without any management

Is open defecation practiced in your community, or are some areas unserved by sanitation facilities?

- Yes No

If yes, please include details here.

Agricultural and horticultural activities, including professional gardening and sport facilities (e.g. golf courts)

- Animal keeping (including e.g. feedlots)
- Use of animal waste in farming (e.g. manure)
- Use of human waste in farming (e.g. wastewater or sewage sludge)
- Use of fertilizers
- Use of pesticides
- Irrigation and/or drainage

Commercial activities

- fuel stations
- manufacturing
- laundries
- workshops
- paintshops
- slaughterhouses

Extractive industries (e.g. mining)

Chemical industries

Fuel storage

Oil refining

Waste disposal and landfill sites

Aquaculture

Cemeteries, graves

Other human activity (e.g. roads, household washing, bathing, swimming, recreation; please specify)

Wildlife or animals have access to water source

No information available

10. Do you regularly meet with people living and/or working in the drinking-water catchment to discuss the impact of their activities on the community drinking-water supply?

- Yes No

If yes, please include details here (i.e. how often, with whom).

11. Do you or others (e.g. the local health office and / or water supply office) regularly inspect the area around your water source and abstraction to identify potential pollution sources?

Yes No

If yes, please include details here (i.e. how often, who inspects).

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IV. Technical information

A. QUANTITY AND CONTINUITY OF SUPPLY

1. How much water is supplied in litres / person/ day?

2. Does your water supply provide water to consumers ...

continually? with interruptions?

If with interruptions, please provide details or reasons and whether it affects all consumers.

3. For supplies with interruptions, water is supplied hours per day for days per week.

4. Is the quantity of water available for your needs ...

always sufficient? seasonally / temporarily insufficient? always insufficient?

If seasonally /temporarily or always insufficient, please provide details or reasons (including e.g. also climate conditions, if and how supply is prioritised).....

Do consumers use other water sources and for which purposes during these times?.....

B. TREATMENT

1. Do you treat the water?

Yes No

If no, continue with section IV. C.

2. Please include details of the kind of treatment. *(Please tick all that apply.)*

Pre-treatment (e.g. roughing filter, screen).....

Sedimentation

Filtration (e.g. sand filtration, rapid sand filtration).....

Disinfection (e.g. with chlorine, chloramine, ozonation).....

Membrane filtration.....

Other treatment *(please specify)*

Please include information on the equipment and water treatment chemicals you use.

3. If you disinfect drinking-water e.g. with chlorine, please provide details of how chlorination is done (e.g. dosage procedures, target level of free residual chlorine in drinking-water, and if chlorination is dosed continuously or only under certain conditions.).

4. When was the treatment equipment initially installed (year)?

Have you upgraded the treatment equipment since it was initially installed?

Yes No

If yes, please include details (e.g. year, type of upgrade).

5. Is the equipment in working condition?

Yes No

If no, please provide details (e.g. reasons).

6. Do you regularly maintain the treatment equipment?

Yes No

If yes, please include details (e.g. how often, which equipment).

.....

7. Are you aware of any of the following problems? *(Please tick all that apply.)*

Inefficient treatment capacity or design

Power cuts

Treatment inadequate for general source water quality

Varying source water quality

Malfunctioning or breakdown of equipment

Lack of access to treatment chemicals

Difficulties in adequately dosing treatment chemicals

Difficulty to maintain the FRC in all taps

Lack of personal protective equipment for those dealing with treatment chemicals

Limited trained staff to operate treatment

Other *(please specify)*

For each of the problems selected, please provide further details (e.g. frequency, reasons).

8. Do you monitor treatment processes (operational monitoring of e.g. turbidity, pH, chlorine dosage)?

Yes No

If yes, please include details (e.g. on monitoring parameters, target levels, frequencies and locations).

If no, please provide details why.

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C. STORAGE

1. Do you store drinking-water in storage reservoirs?

Yes No

If no, continue with section IV. D.

2. How many storage reservoirs are operated?

3. What are their storage volumes (m³)? *(If there are several reservoirs, please number them.)*

4. What is the age of the storage reservoirs? *(If there are several reservoirs, please number them.)*

5. Are the storage reservoirs located above or below ground? *(If there are several reservoirs, please number them.)*

6. Are the storage reservoirs fenced?

Yes No

7. What materials are the storage reservoirs constructed from? *(If there are several reservoirs, please number them.) (Please tick all that apply)*

- Ductile iron (DI)
- High density polyethylene (HDPE)
- Polyvinylchloride (PVC)
- Ferrocement
- Lead
- Other (please provide details)

8. How often do you inspect the storage reservoirs' infrastructure?
Is there a specific procedure in place?

Yes No

9. How often do you clean and maintain the storage reservoirs?
Is there a specific procedure in place?

Yes No

10. Are you aware of any of the following problems at the storage reservoirs? *(Please tick all that apply).*

- Damaged reservoir infrastructure (e.g. deep cracks, leaking, corrosion of water towers)
- Absent or damaged or corroded inspection covers
- Damaged or non-covered air vents
- Unsanitary conditions of the reservoirs (e.g. sediment accumulation, presence of animals/insects within the tank)
- Overhanging vegetation
- Lack of effective cleaning or maintenance practices
- Uncontrolled access or uses of the site for other purposes (e.g. storage of materials, installation of antennas for telephones)

11. Are you able to repair the identified deficiencies?

Yes No

If no, explain why?

9. Do you conduct monitoring at the reservoir (e.g. turbidity, residual chlorine)?

Yes No

If yes, please include details (e.g. on monitoring parameters, target levels).

If no, please provide details why.

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D. PIPED DISTRIBUTION

1. Do you have a piped distribution system in place?

Yes No

If no, continue with section V.

2. What types of connection do you have in your distribution system? (*Please tick all that apply.*)

Public taps/water kiosks

If ticked, how many taps/kiosks are present in the community?

Household connections

If ticked, what percentage of community households have such a connection?

3. How many metres of pipelines do you operate?

4. What is the age of the piped distribution (year of first installation)?

5. Have you significantly refurbished the distribution system?

Yes No

If yes, please include details here (i.e. when, replacements, expansions).

6. What materials are used in the piped distribution? (*Please tick all that apply*)

Ductile iron (DI)

High density polyethylene (HDPE)

Polyvinylchloride (PVC)

Ferrocement

Lead

Other (please provide details)

...

7. How often do you inspect the public taps and distribution system?

...

8. How often do you carry out maintenance work on the piped distribution?

Is there a specific procedure in place?

Yes No

...

9. Are you aware of any of the following problems with the distribution system? (*Please tick all that apply.*)

Breaks, water loss

Pressure losses

Backflow

Dirty pipes (i.e. sediment accumulation, slimes)

- Cross-connections with non-drinking-water pipes
- Illegal connections
- Pipe exposure above ground
- Corrosion of pipes
- Dead-ends
- Other (*please specify*)

Please include details here (e.g. frequency, reasons).

Yes No

If no, explain why

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V. Collection points, water use and household treatment

1. For what purposes do households primarily use the water? *(Please tick all that apply.)*

- Drinking
- Personal hygiene
- Food preparation (e.g. washing, cooking)
- Household cleaning (e.g. cleaning of surfaces, washing of clothes)
- Water for animals
- Other purposes *(please specify)*

2. How many water collection points do you have in your community / are water meters in place?

3. Do caretakers oversee the collection points?

- Yes No

If yes, what are their duties?

4. How far do community members typically have to go, and how long does it take them to collect water every day? *(Please provide average estimates.)*

Number of collection trips per household per day

Distance per return trip (metres)

Time required per return trip (minutes)

Amount of water collected per trip (litres)

5. Do households also use alternative water sources?

- Yes No

If yes, please specify types of water sources (e.g. tankers, lakes, rainwater) their uses, the reason the alternative sources are needed, and whether they are used regularly or only in unusual / seasonal circumstances.

6. Is water typically stored at the household level?

- Yes No

If yes, please include details on types of storage containers / tanks / cisterns typically used.

7. -Is water typically treated at the household level?

- Yes No

If yes, please include details on type of treatment (e.g. boiling, filter, disinfection).

.....

8. 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).

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VI. Water quality – verification monitoring

NOTE. In many settings the local health office is responsible for ensuring the monitoring of drinking-water from your supply, so as to verifying its quality from a health perspective. It will have detailed knowledge of drinking-water quality parameters. You should therefore fill in this section of the template in conjunction with your local health office or others who are involved in water testing, and ask its staff to support you.

1. Who is monitoring the drinking-water quality? *(Please list all that are involved)*
2. How often is your drinking-water monitored to verify its quality in practice?
3. Which microbial, chemical and physical parameters are tested and how frequently?
4. At which location(s) are verification samples drinking-water for testing (e.g. storage reservoirs, public taps)? Specify the type of parameter tested
5. Are drinking-water quality samples collected at the household level?
 Yes No
If yes, please include details here (e.g. how often, how many).
6. Are the verification test results shared with community members who take care of the water supply or water supplier?
 Always Sometimes Never
7. Has verification testing 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).
8. In addition to drinking-water quality testing by the local health office, do you or does someone in the community also undertake water quality testing?
 Yes No
If yes, please include details (e.g. which parameters, how often, locations).

9. Have community members reported any problems regarding water provision and drinking-water quality?

Yes No

If yes, please include details (e.g. which problems, how often reported) (Please tick all that apply.)

Turbidity

High temperature

Pressure losses

Anomalous odour, colour, taste

Other (please specify)

Please include details here (e.g. frequency, sites, reasons).

Have these problems been addressed?

Yes No

If no, please describe why.

10. Are you aware of any waterborne health problems in your community?

Yes No

If yes, please include details (e.g. which diseases, how often, how many people, problematic geographic areas, affected groups).

11. Please provide a summary of drinking-water quality data for the past five years, if possible. Begin by listing the various parameters that have been tested, and beside each parameter, write:

A. The drinking-water standard value according to national legislation.

B. The number of samples tested for each parameter over the 5-year period.

C. The number of samples that complied with the standard

D. The compliance rate (the number of samples that complied with the standard divided by the total number of samples tested).

WSP task 3. Identify and assess hazards, hazardous events, existing control measures and risks

Template 3

Hazard analysis and risk assessment

Template 3 supports you in implementing and documenting WSP task 3. Once completed, this template becomes part of your WSP documentation binder.

Complete a **separate form for each step of your water supply**, and consider all the elements of your system as described in Template 2B in order to identify, assess and document problems and existing control measures, including:

- source water catchment area
- abstraction of water / intake
- treatment of water (if applied)
- storage reservoirs and piped distribution (if present)
- water collection, household storage and handling.

When completing the forms, consider the following **tips**.

- **Sanitary inspections** support hazard analysis and risk assessment. They provide useful information from the field and help you to identify both problems with your water supply and areas that need more attention in your system. Forms for sanitary inspections are provided online at [www....](http://www...) You should perform sanitary inspections regularly.
- **Water quality experts at your local health office or water supply office** can help you to find out what can make your drinking-water unsafe, tell you why this is important and help you to find out what you can do about it.
- This template asks you to list **control measures already in place** to prevent things from going wrong. It also provides a place for you to consider **additional control measures or improvements needed** if existing controls are not sufficient. In WSP task 4 you will develop a more detailed action plan to address the most important improvement needs identified.

If the form does not give you sufficient space, please make additional copies.

The following **example** illustrates the type of information required to complete **Template 3**. This is for illustration purposes only.

What can go wrong?	If the event happens, what hazard(s) may make the water unsafe?	Is this event under control?	How important is this event?	Is additional control needed?
Animals accessing the well and the immediate area around it and defecating in this area; heavy rainfall introduces faecal matter to the well water	Pathogenic microorganisms	No control measures in place Wellhead protection is poor	Very important: requires urgent attention Access of animals to well surroundings is frequently observed; animal faeces are visible Pathogenic microorganisms can cause illness; cases of diarrhoea are regularly noticed	More control is needed Should build a fence to keep animals away from the well surroundings The wellhead protection should be improved

This table is for the following step of the water supply:

Date of assessment:

<p>What can go wrong?</p> <p><i>List what hazardous events could happen that might introduce hazards to your system and might make your drinking-water unsafe.</i></p>	<p>If the event happens, what hazard(s) might make the water unsafe?</p> <p><i>M = Microorganisms C = Chemicals P = Physical constituents A = Acceptability Q = Loss of sufficient quantity</i></p>	<p>Is this event under control?</p> <p><i>List all control measures that are already in place and explain whether they are working effectively. <u>Note.</u> Control measures are anything that is a barrier preventing contamination reaching the consumer.</i></p>	<p>How important is this event?</p> <p><i>Describe how often the event could happen in your supply and how severe the consequences would be for the health of the community.</i></p> <p><i>Judge to what extent this needs attention and improvement, depending on the risk level. Urgent attention is needed for events that happen a lot and/or can cause significant illness.</i></p> <p>Importance of risk: <i>Very important: requires urgent attention and action Important: requires attention and action may be taken Less important: no action required at this time</i></p>	<p>Is additional control needed?</p> <p><i>For important events that are not already under control, consider additional control measures needed. <u>Note.</u> You will use this information to make a detailed improvement plan in WSP task 4 ahead (Template 4).</i></p>

<p>What can go wrong?</p> <p>List what hazardous events could happen that might introduce hazards to your system and might make your drinking-water unsafe.</p>	<p>If the event happens, what hazard(s) might make the water unsafe?</p> <p>M = Microorganisms C = Chemicals P = Physical constituents A = Acceptability Q = Loss of sufficient quantity</p>	<p>Is this event under control?</p> <p>List all control measures that are already in place and explain whether they are working effectively. <u>Note</u>. Control measures are anything that is a barrier preventing contamination reaching the consumer.</p>	<p>How important is this event?</p> <p>Describe how often the event could happen in your supply and how severe the consequences would be for the health of the community.</p> <p>Judge to what extent this needs attention and improvement, depending on the risk level. Urgent attention is needed for events that happen a lot and/or can cause significant illness.</p> <p>Importance of risk: Very important: requires urgent attention and action Important: requires attention and action may be taken Less important: no action required at this time</p>	<p>Is additional control needed?</p> <p>For important events that are not already under control, consider additional control measures needed. <u>Note</u>. You will use this information to make a detailed improvement plan in WSP task 4 ahead (Template 4).</p>

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WSP task 4. Develop and implement an incremental improvement plan

Template 4

Improvement plan

Template 4 supports you in implementing and documenting WSP task 4. Once completed, this template becomes part of your WSP documentation binder.

In WSP task 3 you decided which risks to your water supply are the most important and require additional control measures or improvements. Now you need to further prioritize and **detail the improvements and develop an action plan**. Be specific about what should be done, how, by whom, when and with which resources.

The **improvement actions** you take will always be **incremental**: some things you can do quickly, others may need more time and resources. For important risks for which larger scale improvement is needed (such as installation of a disinfection unit), and which are likely to take some time owing to limited availability of resources, you should define **interim solutions** (for example, applying water treatment at the household level). Remember, a WSP is a continuous process in which improvement takes place step by step.

Also keep a record of completed improvement activities in your plan, including the actual date of completion. These notes should not be thrown away or deleted so that you **maintain a record of actions** you have taken towards increased safety of your water supply.

If the form does not give you sufficient space, please make additional copies.

The following **example** illustrates the type of information required to complete **Template 4**. This is for illustration purposes only.

What needs further attention?	What specific improvement action will be taken?	Who will do it?	Until when will it be completed?	What resources are needed to do it	Status / actual date of completion
Animals accessing the well and the immediate area around it, and defecating in this area; cracked concrete apron around the wellhead creates a path for animal faeces to enter with well during rains	Install metal fence (around 1.2 metres high) with lockable gate to prevent animal access to well site	Mr Fahridin and Ms Leyla	November 2021	50 US\$ in materials and 2 days of work time per person	12 October 2021
	Repair concrete apron around the wellhead, and increase to 2.5 metres in diameter	Mr Fahridin and craftspeople from neighbouring village	September 2021	80 US\$ in materials and 4 days of work time	25 September 2021
	Provide water outside fenced area for animals to drink	Mr Fahridin together with local farmers	October 2021	25 US\$ in materials and 2 days of work time	30 September 2021

Date:

<p>What needs further attention?</p> <p><i>List the hazardous events from the first column of Template 3-A for which you identified additional control measures in the last column of Template 3-A.</i></p>	<p>What specific improvement action will be taken?</p> <p><i>Improvement can aim to remove, reduce or remedy the problem. For major upgrades for which resources may only be available in the long term, also list interim solutions.</i></p>	<p>Who will do it?</p> <p><i>List people responsible for implementing improvement action.</i></p>	<p>Until when will it be completed?</p> <p><i>Indicate target date.</i></p>	<p>What resources are needed to do it?</p> <p><i>The term “resources” refers to personnel, technical and financial means. (based on realistic source and estimation). Also state the source of funding here.</i></p>	<p>Status / actual date of completion</p> <p><i>When the improvement has been completed and is operational, indicate the date here.</i></p>	<p>Additional Information</p>

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<p>What needs further attention?</p> <p><i>List the hazardous events from the first column of Template 3-A for which you identified additional control measures in the last column of Template 3-A.</i></p>	<p>What specific improvement action will be taken?</p> <p><i>Improvement can aim to remove, reduce or remedy the problem.</i></p> <p><i>For major upgrades for which resources may only be available in the long term, also list interim solutions.</i></p>	<p>Who will do it?</p> <p><i>List people responsible for implementing improvement action.</i></p>	<p>Until when will it be completed?</p> <p><i>Indicate target date.</i></p>	<p>What resources are needed to do it?</p> <p><i>The term “resources” refers to personnel, technical and financial means. (based on realistic source and estimation). Also state the source of funding here.</i></p>	<p>Status / actual date of completion</p> <p><i>When the improvement has been completed and is operational, indicate the date here.</i></p>	<p>Additional Information</p>

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WSP task 5. Monitor control measures and verify the effectiveness of the WSP

Template 5-A

Verification monitoring plan

Template 5-A supports you in implementing and documenting WSP task 5. Once completed, this template becomes part of your WSP documentation binder.

Testing your drinking-water quality from time to time to confirm that it complies with standards is an important way to verify that the WSP is achieving the desired outputs. Your local health office staff are likely to be responsible for carrying out this verification monitoring, so **your local health office should be able to help you** document an appropriate compliance monitoring plan for your system.

Your plan should describe the **sampling frequency, locations, parameters and target values** e.g. based on the requirements stipulated in national regulations. It should also identify someone from within the community who will receive the test results e.g. from the local health office. Compliance monitoring is of limited value to you if you are not informed of the results, so it is very important to establish good communications with the local health office and a reporting system which includes mechanisms for follow-up.

If you become aware that any test result is not compliant with the water quality standard, contact your local health office to discuss the situation and the remedial action that needs to be taken.

The following **example** illustrates the type of information required to complete **Template 5-A**. This is for illustration purposes only.

Sampling frequency	6-monthly
Parameter(s) tested and target value(s)	<i>E. coli</i> (or alternatively thermotolerant [faecal] coliforms): 0 colony forming units per 100 millilitres Turbidity: lower than 5 nephelometric turbidity units (NTU)
Sampler	Responsible individual
Sampling locations	Community tapstands (5 randomly selected on a rolling basis)
Laboratory at which samples are tested / method	Field test kit, district health laboratory and /or other accredited laboratory
Quality assurance/quality control	Measures put in place to ensure quality assurance and quality control e.g. training, known samples/blanks, if using a field kit, % sent to an accredited laboratory
WSP team member to whom the results are reported	Mr Fahridin, village head and WSP team member

Date:

Sampling frequency	
Parameter(s) tested and target value(s)	
Sampler	
Sampling locations	
Laboratory at which samples are tested / method	
WSP team member to whom the results are reported	

DRAFT

WSP task 5. Monitor control measures and verify the effectiveness of the WSP

Template 5-A

Operational monitoring and inspection plan

Template 5-B on the reverse supports you in implementing and documenting WSP task 5. Once completed, this template becomes part of your WSP documentation binder.

For each **major component** of your water supply system, complete **Template 5-B** by documenting operational monitoring and inspection activities. These activities should be assigned to the existing control measures present, as identified in column 3 of Template 3-A. You will need a separate sheet for every system component. Remember, regular **operational monitoring and inspection** helps you to maintain the safety of your water supply.

The purpose of operational monitoring and inspection is to confirm that all water supply system components and control measures (the things you are doing for keeping your water safe) are working effectively. Operational monitoring and inspection are **your responsibility as caretaker or operator** of the water supply. They are complementary to compliance monitoring by the local health office, which you addressed in **Template 5-A**.

By regularly testing simple water quality parameters (such as turbidity) and inspecting easily observable features of your water supply (for example, intact spring covers) you will quickly know whether something is wrong and you need to correct it. When you clearly define what needs to be done, how, when, where and by whom, you make sure that monitoring and corrective action are done in the right way to ensure water safety.

You need to prepare a sufficient number of copies of this template for each major system component before you start.

The following **example** illustrates the type of information required to complete **Template 5-B**. This is for illustration purposes only.

System component and control measure	Monitoring or inspection activity		Limit value or critical condition	Corrective action required
Spring box: fence to keep away animals, intact and closed inspection cover, banning sanitation from the direct vicinity	What?	<ul style="list-style-type: none"> – Fence – Inspection cover – Spring box structure – Raw water turbidity – Sanitation facilities in vicinity 	<ul style="list-style-type: none"> – Fence broken – Poor seal or poor fit on inspection cover – Spring box structure cracked or damaged – Turbidity above 5 turbidity units (based on historical data a lower value maybe established as “abnormal” change) – Sanitation facility located within 15 metres from spring 	Caretaker immediately to: <ul style="list-style-type: none"> – repair fence – repair inspection cover – contact WSP team leader to discuss spring box structure repair options – close valve to prevent any further water from entering system until turbidity drops below 5 turbidity units – contact owner of sanitation facility to consider relocation and/or repair
	How?	<ul style="list-style-type: none"> – Visual inspection of fence, cover, spring box and sanitation facilities using the sanitary inspection form – Turbidity tube 		
	When?	<ul style="list-style-type: none"> – Monthly for all visual inspections – Daily for routine turbidity testing 		

		– After heavy rains and during snow-melt for turbidity testing	box or its structure damaged	
	Where?	On site at spring box		
	Who?	Caretaker, Ms Leyla		

DRAFT

Date:

System component <i>List one system component here (e.g. intake and upstream drainage area, sand filter, storage reservoir, tap stand)</i>	Monitoring or inspection activity <i>List everything to be monitored for this system component, including all important control measures that are keeping your water safe (e.g. fence around the wellhead, chlorine disinfection).</i>		Limit value or critical condition <i>If this limit or condition is reached, your water may become unsafe and immediate corrective action should be taken.</i>	Corrective action required <i>Describe what corrective action should be taken if the limit value or critical condition is reached.</i>
	What?		<p style="font-size: 48px; opacity: 0.5; transform: rotate(-45deg);">DRAFT</p>	
	How?			
	When?			
	Where?			
	Who?			

WSP task 6. Carry out operations and maintenance

Template 6-A

Instructions for operations and maintenance

Template 6-A on the reverse supports you in implementing and documenting WSP task 6. Once completed, this template becomes part of your WSP documentation binder.

For each important operations or maintenance task, complete **Template 6-A** by documenting step-by-step instructions for carrying out the task. You will need a separate sheet for every task. These instructions will give the caretaker or operator confidence that they always knows what to do and when. The instructions will also be very useful when new caretakers/operators need to be trained.

As you develop your instructions for operations and maintenance you should bear in mind the following **tips**.

- It is valuable to **post copies of the instructions on site** for easy reference by the caretaker or operator. For example, detailed instructions on chlorine mixing should be posted at the treatment site.
- It can be very helpful to **include drawings or photographs in the instructions** to ensure that the steps are clear and easy to understand. If you decide to use drawings or photographs you may wish to modify this template.

The following **example** illustrates the type of information required to complete **Template 6-A**. This is for illustration purposes only.

Operational or maintenance task	Step-by-step instructions	Who?	When?
Cleaning of water storage tank	<p>Advise consumers of water shut-off</p> <ol style="list-style-type: none">1) One week before tank cleaning, ask the WSP team leader to notify consumers of a two-day water shut-off. <p>Clean tank</p> <ol style="list-style-type: none">1) Open drain valve, close inlet and outlet valves, and drain tank completely.2) Dry tank for 1 day.3) Check for cracks and repair, if necessary.4) Clean walls with brush and remove silt manually. If entering the tank, ensure footwear and tools are clean.5) Disinfect the walls and bottom..6) Close drain valve and open inlet valve (keeping outlet valve closed) to fill tank for about 1 hour.7) Close inlet valve, open drain valve, and drain tank.8) Repeat tank filling and draining process until draining water runs clean (usually 1–2 more times).9) Close drain valve and open inlet and outlet valves to resume service.	Caretaker/ operator, Ms Leyla	Annually (every spring)

Date:

Operational or maintenance task <i>List one important task here (e.g. tank cleaning, filter cleaning, chlorination).</i>	Step-by-step instructions <i>List all steps involved in completing this task.</i>	Who? <i>Who should do the task?</i>	When? <i>When and how often should the task be done?</i>
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WSP task 6. Carry out routine operations and maintenance

Template 6-B

Emergency response plan

Template 6-B on the reverse supports you in implementing and documenting WSP task 6. Once completed, this template becomes part of your WSP documentation binder.

By thinking in advance about what you should do if your water supply becomes contaminated or stops working you will be ready to take immediate action to **keep the people in your community safe and healthy** if things go wrong.

When developing your emergency response plan you will need to consider what could go wrong and decide who should be contacted first to help to manage the situation. You will also need to decide how to deliver important messages to the community quickly: for example, the need to boil water. It is also helpful to identify alternative water sources that can be used if needed during the emergency.

The following **example** illustrates the type of information required to complete **Template 6-B**. This is for illustration purposes only.

Possible emergency situations	<ul style="list-style-type: none">– Landslide damages supply line and pipes go dry– Faecal contamination of the water supply– Waterborne disease outbreak– Water supply fails during periods of drought
Persons to be notified	<ul style="list-style-type: none">– Ms Leyla, caretaker and WSP team leader (phone: 123456789)– Ms Black, health officer (phone: 123456788)– Mr Fahridin, village head (phone: 123456787)
Method of alerting the community	<ul style="list-style-type: none">– Mr Fahridin (village head) will send runners to each household to warn them about the water and convene a public meeting– Ms Black (health officer) will deliver important health messages (e.g. advice to boil water) at the public meeting and through the local radio station
Alternative water supply	<ul style="list-style-type: none">– Water from the Deep Creek can be used during emergencies, but must be boiled before drinking

Date:

<p>Possible emergency situations <i>What events have occurred in the past or might occur in the future to cause the water supply to become contaminated or stop working?</i></p>	
<p>Persons to be notified <i>Who should be told about the emergency? List the names and contact details of responsible people from within the community and outside the community (e.g. local health office).</i></p>	
<p>Method of alerting the community <i>If the water becomes unsafe to drink, how will all community members be warned immediately? List the names and contact details of the responsible people and describe how the message will be delivered. You may also consider drafting generic responses to be sent e.g. via SMS.</i></p>	
<p>Alternative water supply <i>Is there a different water source that can be used if there is a problem with the normal supply? Describe the other source and whether it is safe for drinking or whether treatment (e.g. boiling) is required.</i></p>	