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DRAFT ONSE WATER QUALITY ASSURANCE PLAN



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Water Quality Assurance Plan (WQAP) for Organized Network of Services for Everyone's Health (ONSE), Malawi

Partner Details

Organization	Management Sciences for Health (MSH)	Parent grant or project and parent IEE (ECD URL)	Organized Network of Services for Everyone's (ONSE) Health Activity; IEE: USAID/Malawi Health, Population and Nutrition Program (2013-2018) (http://gemini.info.usaid.gov/egat/envcomp/repository/pdf/39384.pdf)
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Proposed subproject /subgrant (brief description)	WASH Component of the overall ONSE Health Activity. WASH activities will focus on small-scale water supply and sanitation, including: promotion of point-of-use water treatment, rehab and construction of small-scale WASH facilities, O&M capacity building, social marketing and education on handwashing, safe water treatment and CLTS, and support to access for financing for WASH improvements.	Amount of funding requested (grants in-kind which include reception ceremony)	WASH sub-grants estimated at 1.5M USD over the life of the project.
		Period of performance	November 15, 2016 – November 15, 2021
		Location(s) of proposed activities	Eleven ONSE targeted WASH districts (Balaka, Chitipa, Dowa, Karonga, Kasungu, Lilongwe, Machinga, Mulanje, Nkhosakota, Salima, Zomba)

ACTIVITY: Organized Network of Services for Everyone's (ONSE) Health

Certification:

I, the undersigned, certify that:

1. The information on this form and accompanying WQAP is correct and complete.
2. Implementation of these activities will not go forward until specific approval is received from the C/AOR.
3. All mitigation and monitoring measures specified in the WQAP will be implemented in their entirety, and that staff charged with this implementation will have the authority, capacity and knowledge for successful implementation.

(Signature) _____

(Date) _____

(Print name) _____

(Title) _____

BELOW THIS LINE FOR USAID USE ONLY -- WQAP

Notes:

1. For clearance to be granted, the activity **MUST** be within the scope of the activities for which use of the WQAP is authorized in the governing IEE. **Review IEE before signature.** If activities are outside this scope, deny clearance and provide explanation in comments section. The Partner, C/AOR, MEO and REA must then confer regarding next steps: activity re-design, an IEE or EA.

2. Clearing a WQAP containing one or more findings that **significant adverse impacts are possible** indicates agreement with the analysis and findings. It does NOT authorize activities for which "significant adverse impacts are possible" to go forward. It DOES authorize other activities to go forward. The Partner, C/AOR, MEO and REA must then confer regarding next steps: activity re-design, an IEE or EA.

CLEARANCE RECORD

C/AOR, USAID <input type="checkbox"/> Clearance given <input type="checkbox"/> Clearance denied	(print name)	(signature)	(date)
USAID/Mission MEO <input type="checkbox"/> Clearance given <input type="checkbox"/> Clearance denied	(print name)	(signature)	(date)
Regional Env. Advisor (REA) <input type="checkbox"/> Clearance given <input type="checkbox"/> Clearance denied	(print name)	(signature)	(date)
Bureau Env. Officer (BEO)* <input type="checkbox"/> Clearance given <input type="checkbox"/> Clearance denied	(print name)	(signature)	(date)

* C/AOR, MEO and REA clearance is required. BEO clearance is required for all "high risk" screening results and for findings of "significant adverse impacts possible."

Note: if clearance is denied, comments must be provided to applicant (attach sheets if necessary)

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I. INTRODUCTION

This document outlines the Water Quality Assurance Plan (WQAP) for the USAID-funded Organized Network of Services for Everyone's (ONSE) Health Activity. MSH is leading the five-year (November 2016 - November 2021), USD 92.9 million ONSE initiative with the support of five sub-contractors.¹ The overall purpose of the Activity is to support the Government of Malawi's efforts to improve the health of its citizens through the delivery of integrated health services. Specifically, the ONSE Activity aims to reduce maternal, newborn and child morbidity and mortality. The Activity focuses on: improving access to and quality of priority health services; strengthening district health systems; and increasing community demand for priority services. Water, sanitation, and hygiene (WASH) is a core component of the program. WASH activities will aim to increase access to water and sanitation services, improve the quality of drinking water and the delivery of sanitation services; and strengthen service providers' capacity to deliver services (respectively supporting USAID Intermediate Results 1, 2 and 3). WASH activities will include promotion of point-of-use water treatment, rehabilitation and construction of small-scale water and sanitation facilities, capacity building to service providers on operations and maintenance, social marketing and education on handwashing, safe water treatment and community-led total sanitation (CLTS) and technical support to households, communities and utilities to access financing for WASH sector improvements.

The purpose of the Water Quality Assurance Plan is to ensure that all new and rehabilitated USAID-funded water supplies under the ONSE Activity provide safe drinking water that meet the water quality standards and guidelines of the Malawi Bureau of Standards, World Health Organization, and USAID. This plan provides a framework to ensure the quality of the drinking water supply, in a sustainable manner, by identifying potential water quality issues, determining practical measures to prevent adverse impacts, and establishing corrective measures should water quality issues arise.

ONSE partners and/or subcontractors will be constructing or rehabilitating small-scale water and sanitation facilities in the following 11 districts: Chitipa and Karonga (Northern Region); Nkhosakota, Salima, Kasungu, Dowa and Lilongwe (Central Region); and Balaka, Machinga, Zomba and Mulanje (Southern Region). Construction will not take place until the Regional Environmental Advisor has approved this Water Quality Assurance Plan.

As a USAID-funded activity, all ONSE construction and rehabilitation of drinking water facilities is subject to Title 22, Code of Federal Regulations, Part 216 (22 CFR 216) environmental impact assessment procedures. These procedures are governed by the Initial Environmental Examination (IEE) for USAID/Malawi Health, Population and Nutrition Program (612-088). This Water Quality Assurance Plan is prepared in conformance with the governing IEE, which specifies that such a plan must be in place to ensure that new and rehabilitated USAID-funded water supplies provide safe drinking water, defined as meeting Government of Malawi and World Health Organization (WHO) water quality standards. In addition, this plan must:

¹ The five MSH sub-contractors under the ONSE Health activity are: Development Innovations Group; Dimagi; Village Reach; Overseas Strategic Consulting; and BLM.

1. Be approved by the Mission Environmental Officer prior to the initiation of these activities;
2. Assign responsibility to MSH for initial water quality testing. When feasible, MSH must also set in place responsibilities to provide reasonable assurance that ongoing monitoring occurs;
3. Follow applicable USAID and local regulations in regards to the standards for initial and ongoing water quality testing;
4. Include a response protocol in the event that water does not meet water quality standards;
5. Include testing for arsenic in accordance with the standards and testing procedures described in “Guidelines for Determining the Arsenic Content of Ground Water in USAID-Sponsored Well Programs in Sub-Saharan Africa” (<http://www.encapafrika.org/docs.htm#specificwater>); and
6. Specify that at a minimum, fecal coliform must be tested concurrently with arsenic.

II. ASSESSMENT OF APPLICABLE WATER QUALITY STANDARDS AND CRITERIA

This section of the Water Quality Assurance Plan presents the recommended USAID, and relevant Malawi and WHO water quality standards to be adhered to under the ONSE Activity.

A. REGULATORY REQUIREMENTS

USAID RECOMMENDED WATER QUALITY PARAMETERS:

There are eight key drinking water quality parameters recommended by USAID for the general assessment of water quality. These guidance values are based on USAID staff experience, and the review of USEPA and WHO guidance documents. Additional parameters should be evaluated and included based on site-specific conditions and nearby activities. Performance of the site sanitary survey should yield data on site-specific issues. (See Annex B for the sanitary survey checklist):

Health-Related Parameters:

- 1) Arsenic
- 2) Fecal Coliform
- 3) Fluoride
- 4) Nitrate (as NO₃)

Operational-Related Parameters:

- 5) Electrical conductivity (EC)
- 6) Total Dissolved Solids (TDS)
- 7) pH
- 8) Turbidity

HOST COUNTRY REGULATIONS

The government of Malawi has made deliberate efforts to ensure its citizens have access to safe drinking water. The Malawi Bureau of Standards’ (MBS) has set forth a series of standards that govern drinking water quality in public water supply systems. The MBS’s *Malawi Standard 214: Drinking Water – Specification (2005)* specifies the physical, chemical and biological requirements for drinking water and provides the overall framework for drinking water quality. Several supporting documents (e.g., MS 675, 676, 677, 678, 733) provide additional guidance on proper surveillance of public water supply networks and borehole systems, including sampling frequency and testing methodologies to be followed for

physical, chemical and biological constituents. The Environment Management Act of 1996 established the framework for regulating effluent and pollution discharge to ensure that surface and groundwater sources remain viable. This Act will also be relevant to some of the small-scale water and sanitation activities under the ONSE Activity.

WHO GUIDANCE

The World Health Organization has set forth global water quality standards in their *Guidelines for Drinking Water Quality, 4th Edition (2011)*. This document provides the overall framework for ensuring safe drinking water management with a focus on health-based targets and water safety plans. While WHO does provide specific guideline values for many essential water quality parameters (e.g., arsenic), on many other important parameters (e.g., fecal coliform) they provide only recommended best operational practices to reduce or eliminate contaminants and not specific guideline values.

B. INVENTORY OF SELECTED WATER QUALITY STANDARDS AND CRITERIA

The drinking water quality parameters summarized in the Tables II-A and II-B are the basis of water quality monitoring for the ONSE Activity. The USEPA guidance values have been selected from the USEPA *National Primary Drinking Water Regulations*;² the Malawi Bureau of Standards limits are taken from the MBS Malawi Standards governing drinking water, including MS 214, 675, 676, 677, 678, & 733; and the WHO guidance values and limits are selected from the WHO *Guidelines for Drinking-Water Quality, 4th Edition (2011)*. Where standards and sampling intervals vary from the three different sources, MSH and its subcontractors will conform to the strictest and most conservative limits in the tables. For those contaminants where sampling frequencies are listed as “Not Specified (N.S.)” in the tables below, initial testing will be completed and a recommendation for annual sampling will be made to the operator.

The health-related water quality parameters listed in the table below are drinking water contaminants that if consumed, represent a risk to human health. USEPA has established mandatory, enforceable maximum contaminant levels (MCL) for these contaminants. The MCL represents the maximum allowable amount of a contaminant in drinking water that is delivered to the consumer. In a similar way, the MBS and WHO have established their respective guidelines for these key contaminants.

For the operational-based guidelines, USEPA has established non-mandatory secondary maximum contaminant levels (SMCL) for these parameters. These guidelines provide general guidance to water system operators but these contaminants are not considered a present risk to human health at the SMCL. Similarly, MBS and WHO have presented their respective guidelines for these contaminants.

Initial Testing: For all ONSE funded construction or rehabilitation of water facilities, MSH will inform the subcontractor responsible for the construction or rehabilitation of the requirement to perform initial water quality testing for all eight of the parameters listed in tables II-A and II-B. Given that all ONSE funded projects will be public water supply systems, the Ministry of Agriculture, Irrigation and Water Development, and therefore by extension the District Water Office will be the official entity to determine if the water is safe for public consumption. Prior to commissioning the works, MSH, in tandem with the District Water Office, will ensure that testing is completed and that the results meet the standards in the tables below. Only after MSH and District Water Office approval of the results will the water facility be open to public consumption.

² USEPA National Primary Drinking Water Regulations: <https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants#Inorganic>

Ongoing Water Quality Monitoring: The parameters listed in the tables below require ongoing monitoring. This responsibility will be delegated to the operating entity, whether it be the community, a water services board or any other delegated entity. The ONSE team will provide technical support and operational guidance to these operators to promote ongoing monitoring. Per USAID guidance in the specific case of arsenic, MSH will place additional emphasis and take all necessary steps, including informing the District Water Office of the strict requirements for arsenic, to ensure that quarterly testing for arsenic is done during the first 4 quarters after commissioning.

Table III-A: Applicable Human Health-Related Drinking Water Quality Parameters of Concern

USEPA GUIDANCE			MALAWI BUREAU OF STANDARDS		WORLD HEALTH ORGANIZATION	
Parameter	Limit	Frequency	Limit	Frequency	Limit	Frequency
Arsenic	0.01 mg/l	Quarterly	0.01-0.05 mg/l	N.S.	0.01 mg/l	N.S.
Fecal Coliform ¹	0.0/100 ml	Biannually	0.0/100 ml	3x/year ² ; 6x/year ³ ; or monthly ⁴	0.0/100ml	N.S.
Fluoride	4.0 mg/l	N.S.	0.70-1.0 mg/l	N.S.	1.5 mg/l	N.S.
Nitrate (as NO ₃)	10 mg/l	N.S.	10 mg/l	N.S.	50 mg/l	N.S.

Notes:

¹Analysis for thermotolerant coliforms (TtC) bacteria, or Escherichia coli.

²For untreated groundwater sources, according to MS 678.

³For untreated surface water sources, according to MS 678.

⁴For distribution systems serving 5,001-20,000 inhabitants, according to MS 678.

N.S. Not specified in the guidance. The default recommendation for operators is to sample annually if all 3 sources list the frequency as N.S. for a specific contaminant.

Table II-B: Applicable Operational-Based Drinking Water Quality Parameters of Concern

USEPA GUIDANCE			MALAWI BUREAU OF STANDARDS		WHO GUIDANCE	
Parameter	Limit	Frequency	Limit	Frequency	Limit	Frequency
Electrical Conductivity (EC) ¹	160 mS/m	N.S.	70-150mS/m	Annually ³ ; quarterly ⁴ ; monthly ⁵	N.S.	N.S.
TDS	500 mg/l	N.S.	450-1000mg/l	N.S.	1000 mg/l	N.S.
pH	6.5-8.5.	N.S.	5.0-9.5	3x/year ³ ; 6x/year ⁴ ; or monthly ⁵	N.S.	N.S.
Turbidity ²	5 NTU	N.S.	0.1-1 NTU	3x/year ³ ; 6x/year ⁴ ; or monthly ⁵	N.S.	N.S.

Notes:

¹Based on State of California secondary MCL for drinking water. (California State Water Resources Control Board, 2010)

²USEPA has not promulgated guidance values for turbidity; however, per the USEPA Surface Treatment Rule, in drinking water systems, turbidity must not exceed 5 NTU; systems that filter must ensure that the turbidity go no higher than 1 NTU (0.5 NTU for conventional or direct filtration) in at least 95% of the daily samples for any two consecutive months.

³For untreated groundwater sources, according to MS 678.

⁴For untreated surface water sources, according to MS 678.

⁵For distribution systems serving 5,001-20,000 inhabitants, according to MS 678.

N.S. Not specified in the guidance. The default recommendation for operators is to sample annually if all 3 sources list the frequency as N.S. for a specific contaminant.

III. RESOURCES FOR SAMPLE COLLECTION AND LABORATORY ANALYSIS

This section describes how and where samples will be collected, field measurements will be performed, and laboratory analysis will be completed.

A. SAMPLE COLLECTION AND FIELD MEASUREMENT

Water quality sampling will be necessary in order to carry out the initial testing and ongoing monitoring required for all of the parameters listed in the above Tables II-A and II-B. As described in Section II, representative water samples will be collected from all water access points that are newly constructed or rehabilitated under ONSE in the II target districts. The ONSE subcontractor executing the construction or rehabilitation will be responsible for initial sampling and testing. Ongoing sampling and testing will be the responsibility of the operating entity, with support from the ONSE team.

In all cases, subsequent testing will be carried out by qualified water testing laboratories. The Central Water Laboratory within the Ministry of Agriculture, Irrigation and Water Development will be the primary testing lab, with the MBS testing laboratory in Blantyre and the University of Malawi testing laboratory in Zomba as alternative options as well. As such, sampling should be done in strict accordance with their standard sampling protocols, or preferably, carried out directly by a water quality sampling technician from the laboratory. The Ministry of Agriculture, Irrigation and Water Development is responsible for ensuring that drinking water supplies are safe for human consumption, and it is logical that ONSE work closely with the Central Water Laboratory to perform the required water quality sampling and testing and to build their capacity where needed.

While it is possible for a subcontractor to carry out the sampling independently, this will require that they create a parallel structure with a robust chain of custody protocol system, trained staff and the Central Water Laboratory (or other qualified laboratory) will need to agree to accept their samples for testing. For the purposes of expediency (e.g., initial testing), acceptability of results from government, and in order to strengthen the ONSE relationship with the Ministry of Agriculture, Irrigation and Water Development, ONSE will request subcontractors to use the established and approved testing laboratory trained technicians and support the Central Water Laboratory (or the other two aforementioned testing labs) rather than create stand-alone parallel structures.

For the long-term, ongoing monitoring, ONSE will work with the qualified testing laboratories, mainly the Central Water Laboratory, and local operators to determine the most sustainable way to promote continued WQ monitoring. Cost and technical capacity are major constraints. If the system is large enough, it may be possible to use system-generated revenue to pay for the periodic, required sampling by the Central Water Laboratory. In smaller systems, it may be more cost-effective to develop a training curriculum and conduct trainings with the local operators, Health Surveillance Assistants, and Water Monitoring Assistants to gradually transfer the sampling capacity to the local level. Different options for ensuring sustainable long-term monitoring will be explored during the first year of the ONSE Activity.

General Sampling Guidelines:

Representative Samples: It is essential to capture water samples that are characteristic and representative of the overall quality of the water point/system. For groundwater sources, the borehole should be

pumped before being tested. Samples for analysis should be taken once water that is representative of the aquifer is found, i.e., once equilibrium conditions have been established (rather than stagnant water around the well, or water that has been affected by drilling). A suggested time for the first sample would be when the temperature, pH, and conductivity measurements are stable (as determined by field probes). This is also true in piped systems, where the tap should be allowed to flow for a period of time at a moderate rate to try to approximate normal operating conditions of the water point.

Multiple Sampling Sites: The overall objective is to collect samples that are representative of the system as a whole, including the most unfavorable and likely contaminated sections of the system. In the case where multiple wells are being drilled into a common aquifer, it is required that all wells be tested separately. Aquifers are not necessarily homogenous in structure and can consist of separate geologic units with different geochemical properties. For piped systems, sampling should be carried out at the entrance into the system (directly after the treatment plant, if existent). Depending on the system size, samples should be collected at several sites within the system, particularly in areas of low-pressure zones and the ends of the system where residual chlorine may be low or contamination from external sources may be a possibility. The key is to gather samples that are representative of the system as a whole.

Specific Guidelines for the 8 Key Parameters: The data in the table below is taken from Annex A of the MBS Malawi Standard 214 and the USEPA Quick Guide to Drinking Water Sample Collection (Nov 2015) and provides sampling protocol guidelines for the parameters in Tables II-A and II-B. It is always preferable to minimize holding times, and where a range of acceptable holding times is provided, it is advisable to aim for the shorter time. This table is for reference purposes only and it is expected that the qualified testing laboratory will provide additional and more specific sample collection protocols as required.

DRINKING WATER SAMPLE COLLECTION GUIDELINES				
Parameter	Bottle Type	Preservative to Use	Holding Times	Sampling Instructions
Electrical Conductivity	Plastic or Glass	Cool to 4° C	1-7 days	Check with the laboratory on the sample volume required. Wear gloves to collect samples. Rinse the bottle and cap three times with sample water and fill the bottle to within one inch from the top. Place the sample into a cooler with ice for immediate shipment to the testing lab.
TDS	Plastic or Glass	Cool to 4° C	1-7 days	Check with the laboratory on the sample volume required. Wear gloves to collect samples. Rinse the bottle and cap three times with sample water and fill the bottle to within one inch from the top. Place the sample into a cooler with ice for immediate shipment to the testing lab.
pH	Plastic or Glass	Cool to 4° C	ASAP, on site	Testing strips or other simple analysis tools (pH probe) are most effective at taking in the field pH measurements.
Turbidity	Plastic or Glass	Cool to 4° C	4-24 hours	Check with the laboratory on the sample volume required. Wear gloves to collect samples. Rinse the bottle and cap three times with sample water and fill the bottle to within one inch from the top. Place the sample into a cooler with ice for immediate shipment to the testing lab.
Arsenic	Plastic or Glass	Nitric Acid (HNO ₃) to	6 months	Check with the laboratory on the sample volume required. Wear gloves and eye protection when handling acid and to collect samples. Rinse the

		pH <2		bottle and cap three times with sample water and fill the bottle to within one inch from the top. Carefully add the HNO ₃ as instructed by the lab. Deliver the sample to the lab.
Fecal Coliform	Sterile 125mL or 150 mL plastic.	Cool to 10° C and use Sodium Thiosulfate if sample is chlorinated.	8 hours	Wear gloves. Do not rinse bottles as they are sterile and care must be taken not to contaminate the bottle or cap. Once the distribution line is flushed and at equilibrium, quickly open the bottle (but do not set the cap down), holding the cap by the outside edges, and fill the sample bottle to just above the 100mL line leaving one inch of headspace. Cap the bottle immediately and place in the cooler with ice for delivery.
Fluoride	Plastic	Cool to 4° C	1-7 days	Check with the laboratory on the sample volume required. Wear gloves to collect samples. Rinse the bottle and cap three times with sample water and fill the bottle to within one inch from the top. Place the sample into a cooler with ice for immediate shipment to the testing lab.
Nitrate (as NO ₃)	Plastic or Glass	Cool to 4° C	24 hours	Check with the laboratory on the sample volume required. Wear gloves to collect samples. Rinse the bottle and cap three times with sample water and fill the bottle to within one inch from the top. Place the sample into a cooler with ice for immediate shipment to the testing lab.

If a third party (not the testing laboratory) is carrying out the sampling, they should make sure to comply with all required safe handling and record keeping procedures as outlined by the testing laboratory.

B. LABORATORY ANALYSIS

Water quality analyses for the initial testing phase of all ONSE-funded, newly constructed and rehabilitated water facilities will be carried out by a USAID-approved, qualified water-testing laboratory. There are three major laboratories in Malawi: 1) the Central Water Laboratory within the Ministry of Agriculture, Irrigation and Water Development in Lilongwe, 2) the Malawi Bureau of Standards testing laboratory in Blantyre, and 3) the University of Malawi testing laboratory in Zomba. The ONSE Team will prioritize and request subcontractors to use the Central Water Laboratory in Lilongwe whenever possible. This is the most trusted and well-equipped laboratory in the country and it will be advantageous to develop a long-term partnership with the CWL. According to USAID guidelines, the selected laboratory must be approved by at least one of the following persons: Bureau Environmental Officer, Regional Environmental Officer (or Advisor), Malawi Mission Environmental Officer or Malawi Mission Food for Peace Officer. ONSE will coordinate with USAID in the early stages to ensure that the Central Water Laboratory is accepted by USAID.

For the ongoing monitoring of water quality that will be carried out by the local operators, the ONSE Team will recommend that testing be carried out by one of the three qualified testing laboratories. ONSE will work with the testing laboratories and operators to find a feasible and cost-effective method to promote ongoing testing.

C. DOCUMENTATION OF AVAILABILITY OF RESOURCES

As mentioned above, the ONS E Team will prioritize the use of the Central Water Laboratory in Lilongwe for initial water quality testing. The table below is a summary of the availability of resources for sample collection and laboratory analysis at the Central Water Laboratory.

TABLE III-A: AVAILABILITY OF RESOURCES FOR SAMPLE COLLECTION AND LABORATORY ANALYSIS

Parameter	Collection and Field Measurement			Laboratory Analysis and Reporting			
	Field Team	Equipment	Protocol	Lab Location	Equipment	Methodology, Uncertainty	Personnel
Arsenic	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)	Portable Arsenic Kit		Onsite	Portable Arsenic Kit	10 minutes to process including quality control checks	Water Chemist, Water Quality Inspector, Water Quality Supervisors
Fecal Coliform	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)	Membrane Filtration Unit	Inoculation of the sample to specific media (membrane Laurly Sulphate Broth)	Field and Lab	Membrane Filtration Unit	>24 hrs involves incubation, colony counting	Water Chemist, Water Quality Inspector, Water Quality Supervisors
Fluoride	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)			Lab	UV/Visible Spectrophotometer + Reagents SPANDS.	1 hr including quality control checks	Water Chemist, Water Quality Inspector, Water Quality Supervisors
Nitrate (as NO ₃)	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)		Preservation of the sample with acid	Lab	UV/Visible Spectrophotometer + Reagents	3hrs running the standards before samples as quality control	Water Chemist, Water Quality Inspector, Water Quality Supervisors
EC	ONSE sub-contractor	EC Meter/ Combined	5	Lab	EC Meter, Temperatur	5 minutes calibration of	Water Chemist,

	(initial sampling) and qualified laboratory staff (subsequent collection) contractor	EC/TDS Meter	minutes		e	the meter with the recommended solution (1413 µs/cm)	Water Quality Inspector, Water Quality Supervisors
TDS	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)	Combined EC/TDS Meter	5 Minutes	Lab	Combined EC/TDS Meter	5 minutes calibration of the meter with the recommended solution (1413 µs/cm)	Water Chemist, Water Quality Inspector, Water Quality Supervisors
pH	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)	pH Meter		Lab	pH Meter	5 minutes calibration of the meter with pH4 & pH7 Buffers	Water Chemist, Water Quality Inspector, Water Quality Supervisors
Turbidity	ONSE sub-contractor (initial sampling) and qualified laboratory staff (subsequent collection)	Turbidity Meter		Lab	Turbidity Meter	calibration of the meter with STANDARDS ranging from 0 - 500 NTU	Water Chemist, Water Quality Inspector, Water Quality Supervisors

IV. IMPLEMENTATION OF THE WATER QUALITY ASSURANCE PLAN

Roles and Responsibilities:

WASH Senior Manager: The WASH Senior Manager will be responsible for the overall implementation of the water quality assurance plan. He/she will be responsible for ensuring that all ONSE WASH staff (Deputy Senior Manager and ONSE District WASH Officers) have fully understood the plan and how it relates to their daily activities. The WASH Senior Manager will also be responsible for coordinating with the ONSE Chief of Party to obtain any necessary approvals from USAID (e.g., qualified laboratory approval) and to inform them in the case of any major contamination exceedance event.

WASH Deputy Senior Manager: The WASH Deputy Senior Manager will be responsible for overseeing the ONSE District WASH Officers and ensuring that they are carrying out their duties as related to the water quality assurance plan. He/she will be responsible for maintaining an up-to-date file of all the

Record of Compliance forms for the eleven target districts. Additionally, the Deputy will be expected to liaise with the WASH Senior Manager and ONSE District WASH Officers to properly address any non-compliance issue that may arise.

ONSE District WASH Officers: As the district-based arm of the ONSE WASH Team, the ONSE District WASH Officers will interface directly with the community and the subcontractors. They will be responsible for 1) all field-based record-keeping, 2) oversight of subcontractors in the field to ensure they are following the WQAP, and 3) monitoring and signaling any contamination events.

First, in terms of record-keeping, the ONSE District WASH Officers will be responsible for completing the Record of Compliance form (see Annex A) for each new and rehabilitated water point in their respective district. Once the form has been completed for the initial testing, the ONSE District WASH Officer will make 2 copies of the form, sending one copy to the WASH Deputy Senior Manager and keeping the other on record at the District Water Office. The original form will then be transferred to the local operator who will be responsible for maintaining the form up to date with the results of the ongoing monitoring.

Second, as for the oversight of subcontractors, the ONSE District WASH Officers will be expected to represent ONSE on site, whenever possible, for initial water quality sampling activities as well as any other standard testing that may be carried out by the subcontractors (e.g., well pump tests).

Third, the ONSE District WASH Officers will be the first line of “defense” for any exceedance or contamination event. They will be expected to inform the WASH Deputy Senior Manager of any water point that is found to be in exceedance of the established water quality standards. The ONSE District WASH Officer will then work with the local Water District Office, local community and ONSE Team to put in place short-term and long-term solutions. Where it is deemed useful, the ONSE District WASH Officer will investigate potential sources of contamination and complete the Protocol for Investigation of Potential Sources of Contamination (see Annex B).

District Health Surveillance Assistants and Water Monitoring Assistants: These government staff will work in close coordination with the ONSE District WASH Officers to monitor construction and rehabilitation works, as well as contamination issues as they arise.

Initial Testing and Ongoing Monitoring

As described in Section III-A above, there are two primary water quality sampling protocols. The first is that the subcontractors doing the construction and rehabilitation will be responsible for the initial testing required before commissioning of the works. The ONSE District WASH Officers will directly oversee this process and the WASH Senior Manager will provide MSH with the results and recommendations for commissioning. The second is the ongoing water quality monitoring that will be carried out by the local operators. The ONSE District WASH Officers will provide technical and operation support to enable these operators to perform the necessary monitoring activities. In particular, the ONSE District WASH Officers will work with the local operators, District Water Officers and the ONSE Team to ensure that arsenic sampling and testing is done quarterly for the first 4 quarters for all ONSE-funded new and rehabilitated water facilities and that the results are within acceptable limits.

V. CORRECTIVE MEASURES

Approach to Resolution of Water Quality Contamination. The selection of the corrective measures to implement when the water quality guidance levels are exceeded depends on a variety of factors, most of which depend on potentially unique site characteristics. The two most important issues to consider prior to implementing a corrective response are:

- Does the exceedance present an immediate health risk to consumers?
- Are there alternative water sources that are accessible and safe?

If there is no immediate danger to the life and health of the beneficiaries, the ONSSE Team will follow the following corrective measures. For all exceedances the ONSSE District WASH Officer will note the exceedance on the Record of Compliance form and communicate this information to the WASH Deputy Senior Manager. In the case of arsenic and fecal coliforms, the ONSSE Team will also notify and consult with the relevant USAID MEO, REA, or BEO regarding the exceedance and appropriate responses.

Corrective Measures. If the water quality testing completed following the commissioning of the water point indicates that contaminant levels exceed the thresholds established in this WQAP, the ONSSE Team will take the following actions:

- If any of the levels are exceeded**, the following will be performed (if there is no immediate danger to life and health):
 - an additional round of sampling and analysis for the given parameters will be performed to confirm the initial results;
 - if the second round of sampling/analysis confirms the exceedance, an investigation of the potential source of contamination (see Annex B) will be performed.

In the case that there is immediate danger to life and health, the ONSSE Team will inform the District Water Officer and USAID COR of the situation and seek to work with the District Water Officer, USAID and the local community to immediately restrict access to the water point and find an alternative water supply for the affected community.

A. HUMAN HEALTH-RELATED DRINKING WATER QUALITY PARAMETERS OF CONCERN

- In the event that **arsenic** levels are found to be in exceedance of the standards set forth in this WQAP, the ONSSE District WASH Officers will notify the ONSSE WASH Deputy Senior Manager and appropriate local authorities (i.e., District Water Officer, District Environmental Health Officer) and investigate alternative safe water sources. If alternative sources are available, then:
 - Access to the alternative source will be provided to the community; and
 - The ONSSE WASH District Officers will ensure that the water point with the exceedance is disassembled or equipped to otherwise prevent use by the community.
- In the event that **fecal coliform** is detected, the ONSSE District WASH Officers will notify the ONSSE WASH Deputy Senior Manager and appropriate local authorities (i.e., District Water Officer, District Environmental Health Officer, local Water Point Committee and Water User Association) to ensure that the following measures are implemented:
 - An investigation of potential sources of contamination, and removal of the contamination, if possible;
 - Examination of the well³ construction will be conducted to ensure that the concrete apron and casing are sealed and in good condition and the well head is elevated such that runoff flows away from the concrete pad;

³ Wells may include bore holes, shallow wells, hand-dug wells, and artisanal wells in pastoral areas. The corrective measures will be modified as appropriate for each groundwater withdrawal infrastructure.

- iii. The sampled well will be disinfected via the shock chlorination technique.⁴ NOTE: THIS REQUIRES ADDITIONAL USAID AUTHORIZATION;⁵
 - iv. Outreach to community members will be completed (through radio announcements, community meetings, etc.) to boil water;
 - v. Purification tablets, like Aquatab™, will be distributed, and community members will be educated on proper use; or,
 - vi. Access to the water point may be restricted, if possible, to non-drinking water, non-domestic uses only (e.g., that water is used for irrigation purposes only, or livestock watering).
- c. In the event that **fluoride** levels are exceeded, the ONSE District WASH Officer will complete the following measures:
- i. An investigation of the presence of health effects (i.e. dental or skeletal fluorosis), additional sources of fluoride (e.g. brick tea consumption), will be performed, if possible;
 - ii. Alternative low-fluoride sources of water will be used;⁶ if possible, and, blending of the two sources will be executed; or,
 - iii. Fluoride treatment will be installed that is available and acceptable to the community, such as bone charcoal, contact precipitation, clay, activated alumina, calcium chloride, monosodium phosphate, and Nalgonda;⁷or,
 - iv. Access to the water point will be restricted to non-drinking water, non-domestic uses only (i.e., that water is used for irrigation purposes only).
- d. In the event that **nitrate** levels are exceeded, the ONSE District WASH Officer will complete the following measures:
- i. An investigation of potential sources of contamination, such as nearby agricultural fertilizer application, or leaking septic tanks, will be performed, and removal of the contamination will be completed, if possible; or,
 - ii. Access to the water point will be restricted to non-drinking water, non-domestic uses only (i.e., that water is used for irrigation purposes only).

⁴ Shock chlorination consists of mixing sufficient chlorine-based chemical with the well water to create a solution containing 200 milligrams per liter (mg/l), or parts per million (ppm) of chlorine throughout the entire system. Guidelines are available from regulatory authorities and universities, such as http://www.wellwater.bse.vt.edu/files/SHOCK442-663_PDF.pdf, or similar publications. (Benham & Ling, 2011)

⁵ The **use of chlorine** must be evaluated via a 22 CFR 216.3 (b) analysis and must be approved by the BEO.

⁶ Alternatives may include surface waters, rainwater, drilling a deeper borehole at this location, or investigating local low fluoride groundwater in the immediate area.

⁷ These treatment processes are described in the 2006 WHO Guidance entitled, "Fluoride in Drinking Water," accessed at: http://www.who.int/water_sanitation_health/publications/fluoride_drinking_water_full.pdf

B. OPERATIONAL-BASED DRINKING WATER QUALITY PARAMETERS OF CONCERN:

- a. If **electrical conductivity** or TDS levels are exceeded, the ONSE District WASH Officer will complete the following measures:
 - i. Perform additional testing for individual constituents of conductivity including, chloride, sodium, nitrate, calcium, magnesium, and sulfate, to ensure these constituents are not present at levels above the Malawi Bureau of Standards and Malawi Standards regulatory limits.
 - ii. An investigation of potential sources of contamination will be performed, and removal of the contamination will be completed, if possible; or,
 - iii. Access to the water point will be restricted to non-drinking water uses only (confirm that elevated conductivity does not preclude use for irrigation or for livestock watering).

- b. If **pH** levels are outside of the range (i.e. below 6.5 or above 8.5), the ONSE District WASH Officer will complete the following measures:
 - i. An investigation of potential anthropogenic sources of contamination, such as nearby industrial activities including mining, will be performed, and an investigation of alternative sources of water supply will be completed, if possible;
 - ii. An investigation of potential natural sources, such as subsurface geology, will be performed, to confirm that the low or high pH is a result of natural conditions;
 - iii. If the pH exceedance is due to natural conditions, such as local geology, an investigation of the potential of corrosion of the existing or proposed water supply extraction and distribution infrastructure (e.g. corrosive metal piping and pumping equipment) will be performed;
 - iv. If pH exceedances could result in corrosion, and leaching of metals from water supply equipment, then testing will be conducted for metals appropriate water treatment (e.g. neutralizing filter⁸) will be installed, at the water point, or at the point of use (e.g. in the residence); or,
 - v. Access to the water point will be restricted to non-drinking water, non-domestic uses only (i.e., that water is used for irrigation purposes only).

- c. If **turbidity** levels are exceeded, the ONSE District WASH Officer will complete the following measures:
 - i. An investigation of potential sources of contamination, and removal of the contamination, if possible;
 - ii. Water treatment that is available and acceptable to the community, such as fiber, cloth or membrane filters, granular media filters, sedimentation systems, moringa flocculation, sand filters, will be installed (or provided for household use) to remove turbidity; or,
 - iii. Access to the water point will be restricted to non-drinking water, non-domestic uses only (i.e., that water is used for irrigation purposes only).

⁸ Neutralizing filters include selected media to neutralize pH. For acidic (low pH) water, the neutralizing filter would contain calcite (marble chips) or ground limestone (calcium carbonate) or magnesia (magnesium oxide) to raise the pH. In most cases, water supply will not have a high pH; however, certain alkaline lakes (i.e. soda lakes) have pH between 9 and 12. For high pH water, acidic solutions or CO₂ can be added to the water at the point of use to lower the pH; however, these systems are not recommended in community village level water supply systems.

SUMMARY EMMP MATRIX

USAID’s Initial Environmental Examination (IEE) for USAID ONSE Health Activity on Health, Population and Nutrition Portfolio (612-008) provides clear guidance on regarding environmental review requirements for health related programs. Several ONSE activities fall under the category of “Negative Determination with Conditions” and, therefore, require ONSE and ONSE sub-contractors/sub-grantees to prepare an Environmental Monitoring and Mitigation Plan (EMMP) for those activities.

This plan documents activities that have an anticipated negative effect on the environment, and the mitigation and monitoring actions necessary to address them. Environmental screening procedures will be included in the ONSE Grants Manual.

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
<p>1. Activities that promote the generation of hazardous and very hazardous healthcare waste, including policy and strategy development, health provider training, direct support for health service delivery and capacity building of government and NGO agencies. These activities can generate infectious waste (blood, body fluids, human excreta), small quantities of chemicals pharmaceuticals (including vaccines), and sharps. Improper management of healthcare waste can spread disease, by entering the bodies of healthcare workers, hospital cleaning staff, patients, visitors, or anyone who comes in contact with the waste. Contamination from untreated water supply from health facilities can also spread epidemics such as cholera.</p>				
	<p>1. Project-generated policies and strategies will include sections on how to manage hazardous and very hazardous healthcare waste.</p>	<p>1. Review of project-supported policies and strategies.</p>	<p>1. Monitored during review of drafts of policies and strategies. Reported quarterly.</p>	<p>ONSE Technical Director, Clinical Services</p>
	<p>2. Training and supervision to health providers will include the proper handling, use and disposal of this waste.</p>	<p>2. Inclusion of management of hazardous and very hazardous waste in the training and supervision curriculum of project-supported activities.</p>	<p>2. Monitored during observation of project-supported training events. Reported quarterly.</p>	<p>ONSE Technical Director, Clinical Services</p>
	<p>3. Small renovation, equipment and supplies will include provision of physical spaces and goods to facilitate this proper handling, use and disposal (e.g. waste baskets for sharps, latrines)</p>	<p>3. Observation of practices of health providers (during supervision visits) of proper handling, use and disposal of hazardous and very hazardous waste.</p>	<p>3. Monitoring during each supervision visit and reported quarterly</p>	<p>ONSE Technical Director, Clinical Services</p>
<p>2. Activities that support the procurement, storage, management, distribution and disposal of public health commodities and equipment. These activities might generate expired drugs, laboratory supplies and vaccines and also Long Lasting Insecticide</p>				

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
<p>Treatment Nets (LLINs) and their wrappings which require disposal. Expired pharmaceuticals can be highly hazardous and require special attention during disposal due to their harmful effect on aquatic life. Disposal of LLINs, particularly by burning, can result in adverse effects human and environmental effects. Wrappings in open garbage cans can attract disease vectors such as rodents.</p>				
	<p>1. Training and supervision of health providers will include the proper management of these commodities and equipment and their proper disposal if expired and/or discarded. Solid waste disposal will follow the guidelines of USAID's Solid Waste Sector Environmental Guidelines. Disposal of packaging and other public health commodities will follow guidelines in the USAID Solid Waste Sector Environmental Guidelines.</p>	<p>1. Inclusion of management of public health commodities and equipment and their proper disposal in the training and supervision curriculum of project-supported activities.</p>	<p>1. Monitored during observation of project-supported training events. Reported quarterly.</p>	<p>ONSE Technical Director, Clinical Services</p>
	<p>2. Small renovation and equipment and supplies provision will include physical spaces and goods to facilitate good management and/or disposal of these commodities (e.g. drug storage areas)</p>	<p>2. Observation of practices of health providers (during supervision visits) of proper management of public health commodities and equipment, and of appropriate procedures to dispose of expired and discarded ones.</p>	<p>2. Monitored in each supervision visit and reported quarterly</p>	<p>ONSE Compliance Manager</p>
	<p>3. Education of the population on the proper operation and maintenance of the WASH infrastructure.</p>	<p>3. Supervision visits to the grantees operational sites to ensure proper operation and maintenance of the WASH infrastructure</p>	<p>3. Monitored during each supervision visit to communities. Reported quarterly.</p>	<p>ONSE Technical Director, Community Mobilization & Engagement</p>
<p>3. Rehabilitation and very small scale construction at existing health facilities (total area disturbed will be less than 1,000 m2).</p>				
	<p>1. The designs and plans for construction and rehabilitation will follow the guidance for Small Scale construction in the USAID Sector Environmental Guidelines.</p>	<p>1. Review of blueprints of the planned infrastructure. 2. Clause included in construction contract on dust suppression</p>	<p>For all mitigation measures, monitoring and reporting frequency will occur:</p>	<p>ONSE Compliance Manager</p>

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
	<p>Moreover, the site will not be within 30 meters of a permanent or seasonal stream of water, will not involve displacement of existing settlements or inhabitants, will have an average slope of 5% and will not be heavily forested or in an otherwise undisturbed ecosystem. If the facility is suspected to contain asbestos, it will be tested for its existence before the works begin. No lead paint will be used. Any improvements in water supply and sanitation will not affect existing sources of water supply or promote the transmission of infectious diseases. No burnt brick will be used for construction.</p> <ol style="list-style-type: none"> 2. Dust suppression measures such as dampening will be implemented to reduce dust on site during construction. 3. Construction vehicles travelling along the access roads will adhere to speed limits to avoid creating excessive dust 4. Measures will be taken during construction to control noise as dust, such as surrounding construction site with iron screens 5. Fires will be prohibited on-site 	<p>measures</p> <ol style="list-style-type: none"> 3. Clause included in construction contract on speed limit 4. Clause included in construction contract on measures to control noise and dust 5. Clause included in construction contract on prohibition of fire to dispose of waste 	<ul style="list-style-type: none"> • Before initiating construction (we will seek approval from the ONSE COR); Once during the review of blueprints. Reported quarterly. • One during construction 	
	<ol style="list-style-type: none"> 6. Observation of construction works to assess the compliance with design. 	<ol style="list-style-type: none"> 6. Supervision visits to the construction sites to assess compliance. 	<ol style="list-style-type: none"> 6. Monitored at least once during the construction of the infrastructure. Reported quarterly. 	<p>ONSE Compliance Manager</p>
	<ol style="list-style-type: none"> 7. Education of health care workers on the proper operation and maintenance of any provided WASH infrastructure. 	<ol style="list-style-type: none"> 7. Supervision visits to renovated facilities to ensure proper operation and maintenance of WASH 	<ol style="list-style-type: none"> 7. Monitored during each supervision visit to renovated facilities. Reported quarterly. 	<p>ONSE Compliance Manager</p>

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
		infrastructure		
4. Grants program for construction or rehabilitation of small-scale water or sanitation infrastructure includes measures to mitigate environmental consequences(see below # 5 and 6 for potential consequences)				
	I. Complete and seek approval of each grantees Environmental Review Form from USAID	I. Each grantee engaged in construction or rehabilitation of small-scale water or sanitation infrastructure has an ERF approved by USAID	I. Annually with contracting process	ONSE Compliance Manager, sub-grantees
<p>5. Construction or Rehabilitation of Small-Scale Water Infrastructure (<\$250,000)</p> <p>Activities may include the construction of boreholes and shallow wells, spring capping, and the conversion of open wells to pumps, including associated infrastructure such as towers/tanks/standpipes. In operation, wells, boreholes, and small water systems (Gravity Fed Water Systems) can:</p> <ul style="list-style-type: none"> • Deplete groundwater when abstraction exceeds replenishment of a groundwater resource. • Create stagnant (standing) water in the vicinity of the water supply point, leading to the presence of disease vectors (breeding sites for mosquitoes, risk of foot infection for water point users, contamination of the wells due to seepage, etc.) • Create human health risks from the provision of biologically or chemically contaminated water. Even if the water is not contaminated initially, it can become so through flooding, failure to exclude livestock from the water point, use of contaminated containers to draw water from hand-dug wells, and other factors. • Lead to human health risks from the contamination of water fetched from the water points to the end users (arising from contamination of containers, mishandling, etc). • Be detrimental if the wrong construction materials are used (e.g., construction with burnt brick poses particular concerns in Malawi. Even small-scale uses of burnt brick for water supply, such as well enclosures and water towers, should be avoided.) <p>For small-scale interventions, however, these impacts can be controlled below the level of significance by appropriate siting, water quality assurance protocols (including testing), design (including drainage and exclusion of livestock from water points), and maintenance. With respect to the latter, capacity-building of communities, service providers, and/or other stakeholders in</p>				

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
equipment/system maintenance is essential to the construction/installation of small-scale water supplies.				
	<p>I. Good-practice design standards must be implemented for new construction and rehabilitation works, consistent with USAID’s Sector Environmental Guidelines: Water Supply & Sanitation: http://www.usaidgems.org/Sectors/watsan.htm.</p> <ul style="list-style-type: none"> •Ensure siting of new water points is removed from groundwater contamination sources (e.g., latrines, septic tanks, dumps). Ensure that water containers have lids. •Do not use burnt brick as a primary construction material. •Construct spigot or similar system that prevents people from touching impounded water with their hands or mouths. •Don’t let animals graze or be watered uphill from wellhead. A wall will be built around the wellhead to prevent animals from contaminating the water. •Don’t allow animals to drink directly from water source, by building a wall around the water source. •Prevent standing water at supply points - ensure spilled water and rainwater drain to a soakaway or equivalent structure and do not accumulate and create stagnant standing water. •Monitor drains and soakaways and keep them clear of debris. •Monitor and repair leaks from cracked 	<p>I. Oversight of all new construction and rehabilitated infrastructure, as well as periodic monitoring of operating condition/maintenance needs of new and rehabilitated infrastructure.</p>	<p>I. At the time of construction/rehabilitation and then annually</p>	<p>ONSE sub-contractors with oversight from the District WASH Officers.</p>

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
	<p>containment structures, broken pipes, faulty valves, and similar structures.</p> <ul style="list-style-type: none"> • Include focus on proper use and maintenance as part of the behavior change and education program. Provide training of communities, including HSAs, to maintain the water source, treat with chlorine as needed, etc. • Monitor water levels in wells or impoundment structures to detect overdrawing. 			
	<p>2. Water Quality Assurance Plan</p> <p>Provide a separate Water Quality Assurance Plan to USAID.</p>	<p>2. Construction will not take place until the Water Quality (WQ) Assurance Plan has been approved. WQ testing will occur before opening the source to public consumption and WQ monitoring will continue quarterly for the first year of operation.</p>	<p>2. At program outset and quarterly</p>	<p>ONSE Sub-contractors with oversight from the District WASH Officers.</p>
	<p>3. Capacity-building in equipment/system maintenance must be co-programmed with construction/installation of small-scale water supply infrastructure. Initial training on operations and maintenance (O&M) will be provided by the subcontractor before opening the facility for public use.</p>	<p>3. O&M capacity building activities are required for all construction activities and, therefore, included in the construction sub-contracts.</p>	<p>3. After construction and before opening to public use and as needed</p>	<p>ONSE Sub-contractors with oversight from the District WASH Officers.</p>
<p>5. Construction of Small-Scale Sanitation Facilities (<\$250,000)</p> <p>Activities will include, but not be limited to, household latrines and toilets (appropriate model to be determined) in schools and public</p>				

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
<p>institutions, such as health facilities. In operation, latrines can contaminate shallow groundwater and wells and, when not well maintained or of an open-pit design, can be a breeding ground for flies and mosquitoes, and the source of diseases and foul odors. This includes urine-diverting, composting “EcoSan” toilets; the experience in Malawi to date is that maintenance, use, and adoption of these toilets is poor. Poorly composted feces present significant health risks. At this time, UNICEF is strongly recommending against moving forward with broad promotion of EcoSan toilets in Malawi pending evidence of better sustainability and efficacy. The Ministry of Health, on the other hand, is supportive of EcoSan toilets.</p> <p>More specifically, poorly designed sanitation facilities can lead to insect-borne diseases: flies and cockroaches often thrive on excreta and have been implicated in the transmission of fecal-oral diseases.</p> <p>However, for small-scale interventions these impacts can be controlled below the level of significance by appropriate siting, design, and maintenance. With respect to the latter, capacity-building of communities, service providers, and/or other stakeholders in equipment/system maintenance is essential to the construction/installation of small-scale water supplies.</p> <p>Finally, construction with burnt brick poses particular concerns in Malawi. Even small-scale uses of burnt brick for small-scale sanitation (e.g. latrine blocks, etc.) should be avoided.</p>				
	<p>Grants manual will includes measures for compliance with USAID’s Environmental Guidelines: Water Supply and Sanitation.</p>	<p>ONSE grants manual and contracts require compliance with USAID’s Environmental Guidelines: Water Supply and Sanitation</p>	<p>Monitored during annual contracting process</p>	<p>MSH, Grants Manager</p>
	<p>I. Good-practice design standards must be implemented for new construction and rehabilitation works, consistent with USAID’s Sector Environmental Guidelines: Water Supply & Sanitation: http://www.usaidgems.org/Sectors/watsan.htm.</p> <ul style="list-style-type: none"> • Do not use burnt brick as a primary construction material. • Ensure that siting of sanitation facilities prevents contamination of water supplies. Evaluate depth to water table, including seasonal fluctuations. Pit latrines should 	<p>I. Oversight of all new construction and rehabilitated infrastructure, as well as periodic monitoring of operating condition/maintenance needs of new and rehabilitated infrastructure.</p>	<p>I. At the time of construction/rehabilitation and then annually</p>	<p>ONSE sub-contractors with oversight from the District WASH Officers.</p>

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
	<p>not be installed where the water table is shallow or where the composition of the overlying deposits make groundwater or an aquifer vulnerable to contamination.</p> <ul style="list-style-type: none"> • Choose latrine type based on local environmental conditions (e.g., pit latrines are rarely suitable in locations where the water table is high). • Devote adequate attention to identifying and addressing social barriers to using a latrine. • Include focus on proper latrine use, cleaning, and maintenance as part of the behavior change and education program. • Provide handwashing stations. • Properly decommission pit latrines. Do not leave pits open. Fill in unused capacity with rocks or soil. <p>Small Capital Investment Grants will be provided to enable small sanitation service providers to build latrines, purchase vacuum trucks and upgrade infrastructure (such as retaining walls and pipes). Grants will also enable the purchase or upgrade of existing treatment facilities as well as the construction of new treatment plants. Good practice standards will be shared with grant recipients managing septic waste. They include:</p> <ul style="list-style-type: none"> • Avoid direct discharge of effluent to waterways if possible. • Ensure that a reliable system for safely removing sludge and transporting the 			

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
	collected material off-site for treatment is available. This should include use of a mechanized (e.g., vacuum-based) removal system.			
	2. Capacity-building in equipment/system maintenance must be co-programmed with construction/installation of small-scale sanitation infrastructure. Initial training on O&M will be provided by the subcontractor before opening the facility for public-use.	O&M capacity building activities are required for all construction activities and, therefore, included in the construction sub-contracts.	After construction and before opening to public use and as needed	ONSE sub-contractors with oversight from the District WASH Officers.
4. Support to Access for Financing for Water and Sanitation Improvements				
<p>Access to finance (commercial financing, output-based aid options, or matching grants) should be accompanied by technical assistance on best practices in infrastructure construction and maintenance to ensure environmental safeguards are applied. Access to financing at the community level presents risks if increased finance availability is not accompanied by complementary interventions that assure small-scale/household installations conform to appropriate design and siting criteria, and are properly operated and maintained. Such complementary interventions include, for example, training local contractors, working with community WASH committees to assure that credit is directed toward well-designed installations, etc.</p>				
	Financed interventions must be designed to provide reasonable assurance that the resulting water supply and sanitation installations largely conform to the good-practice design standards enumerated above, and to build capacity and motivation for proper operation and maintenance.	ONSE grant proposals will be thoroughly screened to ensure projects adequately account for environmental impacts.	During review of small grants proposals	WASH Senior Manager and District WASH Officers.
5. Research/Limited Piloting of WASH Innovation Technologies for Latrines etc				
<p>Innovative latrine technologies may be promoted for their cost advantages, ease of construction, attractiveness to users because they better address environmental contamination and disease vector problems, minimize odors, or for other reasons. As a class, however, they present the same potential risks as existing latrine technologies, and may or may not be an appropriate design choice in a specific</p>				

Activity	Mitigation measure(s)	Monitoring indicator(s)	Monitoring and Reporting Frequency	Party(ies) responsible.
context. Assessing and managing these risks for field testing or wider installation of innovative latrine technologies requires a specific examination of the technology and its proposed context for use.				
	<ol style="list-style-type: none"> 1. Prior to field testing or wider installation of any such innovative technology, the formal subproject/subgrant review process, as set out by the AFR Environmental Review Form (available at http://www.usaidgems.org/Documents/ComplianceForms/AFR/AFR-EnvReviewForm-20Dec2010.doc) must be completed and approved by the Contracting Officer's Representative (COR), MEO, and Regional Environmental Advisor (REA). 2. Technical assistance will be provided to districts and communities when they mobilize their own resources to engage in activities that may have environmental implications (e.g. construct a house for an HSA with burnt bricks from community but no financial resources from USAID for construction). We will provide information/ guide them on the potential environmental consequences of their proposed actions. 	<ol style="list-style-type: none"> 1. ONSE will ensure that scale-up of any innovative technology does not take place without first getting the ERF approved by the appropriate USAID officers. 2. Potential innovations will be discussed with the Ministry of Health Chief Environmental Health Officer to gauge the Ministry's position. 	<ol style="list-style-type: none"> 1. Before scale-up of any innovative technology 	WASH Senior Manager and ONSE sub-contractors.
	<ol style="list-style-type: none"> 3. Specific mitigating measures and monitoring conditions will be outlined in the approved ERF and must be followed by the implementing partners. 	<ol style="list-style-type: none"> 3. ONSE will review the approved ERF and put in place necessary monitoring systems. An EMMP will be put in place for all such activities. 	<ol style="list-style-type: none"> 3. Prior to scale-up and just after approval of the ERF, the EMMP will be produced and monitoring will occur according to the EMMP 	ONSE sub-contractors, WASH Senior Manager, District WASH Officers.

ANNEXES

Annex A: Water Quality Assurance Plan Record of Compliance Form

Annex B: Questionnaire Form for Investigation of Potential Sources of Contamination

ANNEX A

WATER QUALITY ASSURANCE PLAN (WQAP) RECORD OF COMPLIANCE FORM

General Information on Water Access Point

Type: _____
(Describe system)

Location: _____
(Village/community; include GPS coordinates)

In-Service Date: _____
(Date construction/installation/rehabilitation completed)

Using the Compliance Template

- Complete and retain this document as a record of water quality testing and monitoring
- Ensure template remains current with ongoing results.

Initial Water Quality Testing:

Arsenic

SAMPLE DATE	RESULT (mg/l)	EXCEEDANCE (Y/N)	INITIALS	NOTES / ACTION TAKEN

Fecal Coliform

SAMPLE DATE	RESULT (/100mL)	EXCEEDANCE (Y/N)	INITIALS	NOTES / ACTION TAKEN

Other Water Quality Parameters

SAMPLE DATE	RESULT	EXCEEDANCE (Y/N)	INITIALS	NOTES / ACTION TAKEN
Fluoride				
Nitrate (as NO ₃)				
Electrical Conductivity (EC)				
Total Dissolved Solids (TDS)				
pH				
Turbidity				

Long-Term Monitoring

Arsenic

Record of Response Actions

Action date	Response Trigger	Responsible Party Notified	Initials	Pending Action

(Attach additional records if needed)

ANNEX B

QUESTIONNAIRE FORM FOR INVESTIGATION OF POTENTIAL SOURCES OF CONTAMINATION

SANITARY SURVEY CHECKLIST (UNICEF, 2013) (USAID, 2009)

	Question	Yes	No	Remarks
1	Is there a latrine, waste dump or obviously contaminated surface water within 30 meters of the well?			
2	Is the latrine at higher elevation than the well?			
3	Is there any other source of pollution within 10 meters?			
4	Is there ponding/stagnating water around the well?			
5	Is the drainage channel broken/cracked or overflowing within 2 meters of the apron?			
6	Is there adequate fencing around the well (preventing animals from approaching the well)?			
7	Is the apron radius less than 1 meter around the well?			
8	Is there ponding/stagnating water at the apron?			
9	Are there any cracks in the well apron?			
10	Is the hand pump loose at the point of attachment?			
11	Is the well likely to be properly sealed (lined) within the first 3 meters below ground level? Is the above ground well casing cracked or shows signs of fatigue?			
12	If there is a cover on the well? Is it properly sealed so that no water can flow into the well?			
13	Is the hand pump broken?			
Other Important Issues to Review:				
	Do nearby surface waters show evidence of being abnormally low for the season?			
	Are nearby surface waters overgrown with aquatic plants/algae?			
	Are children getting water-borne illnesses more frequently and/or more severely than in the past, and are these children drinking from a USAID-provided water source?			
	Taste the water. Does it taste bad or salty? Are users complaining of a bad taste?			
	Look at and smell the water. Is it off-color? Is there sediment? Does it smell bad? Are users complaining of any these issues?			
	Are wells going dry (seasonally) at the inspection site or in the			

Question	Yes	No	Remarks
surrounding area that did not in the past?			
Is water leaking from tanks/pipes/supply points?			

Please see also the Water Supply Visual Guide (December 2009) at:

http://www.usaidgems.org/Documents/VisualFieldGuides/ENCAPVsiFldGuide--WaterSupply_1Dec09.pdf

FIGURE 1: MAP OF POTENTIAL SOURCES OF CONTAMINATION (UNICEF, 2013)

