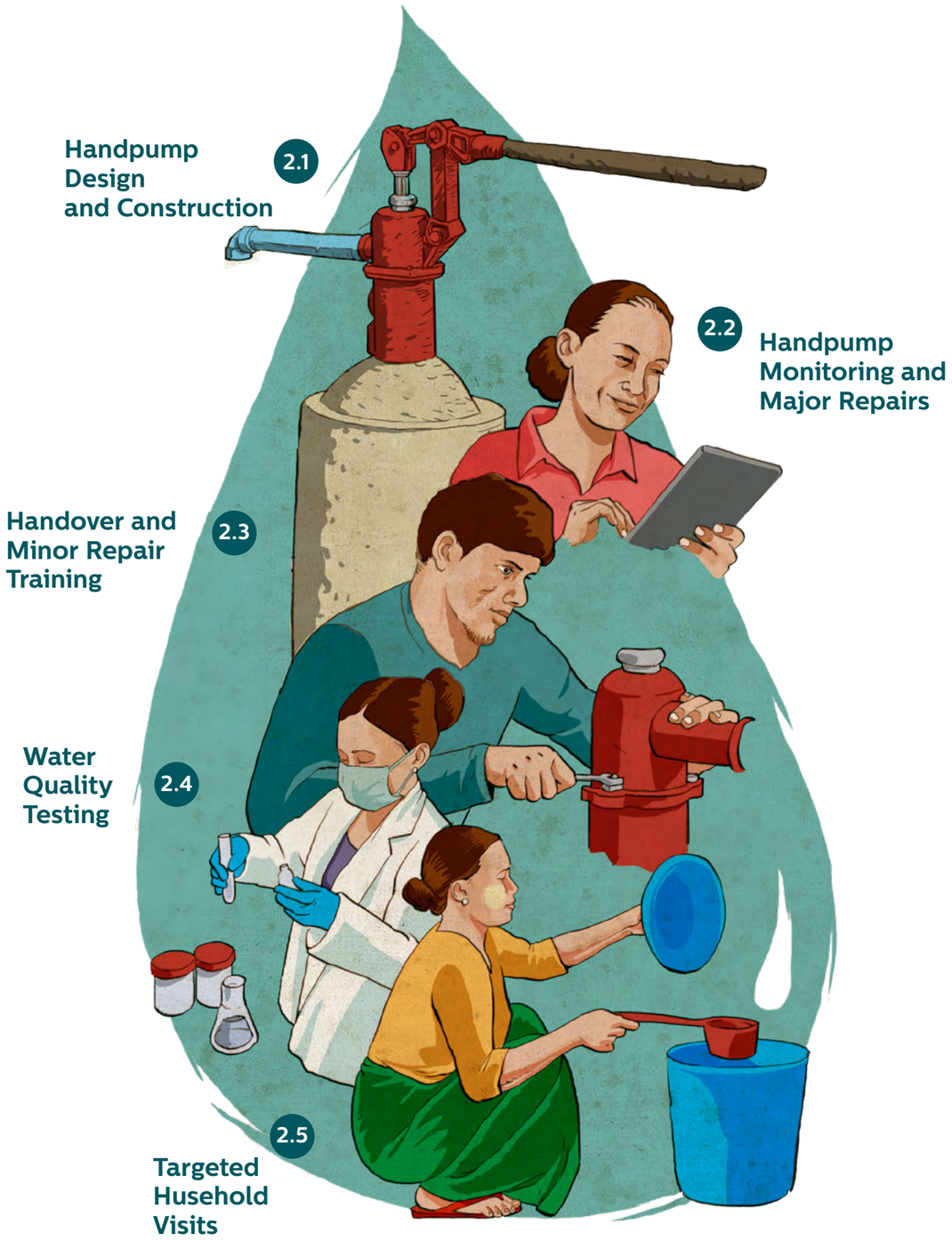


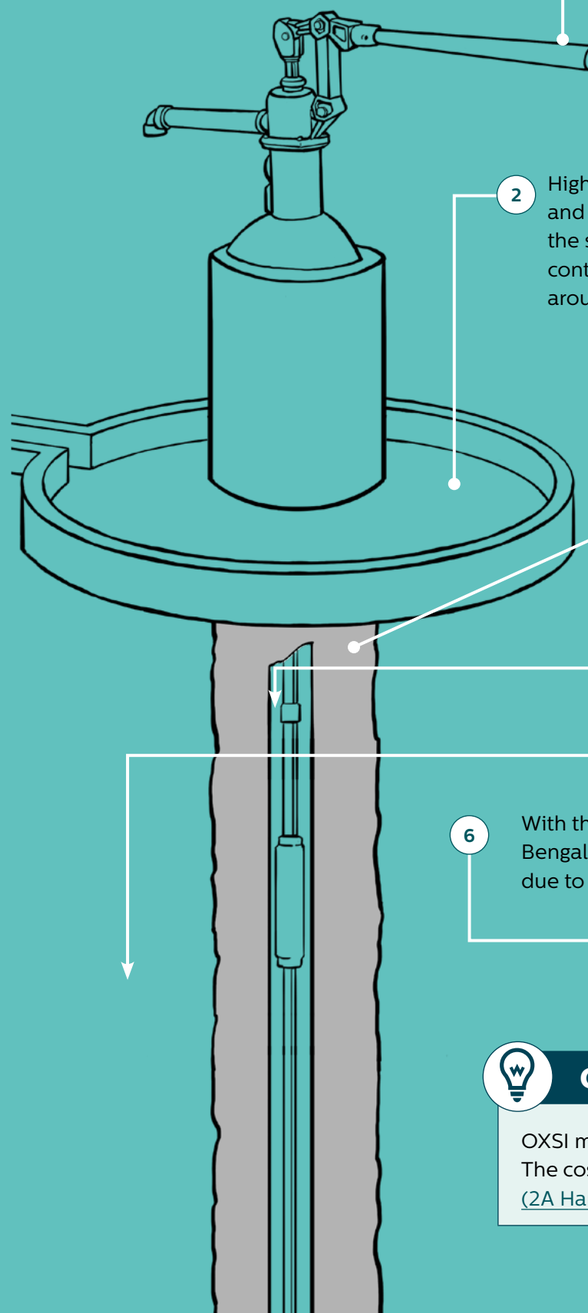
C2. Water

The United Nations General Assembly recognised safe drinking water and sanitation as a human right in 2010, acknowledging that these basics are essential for health, dignity, and the realisation of other rights. During a crisis, inadequate water quantity and quality is the underlying cause of most public health problems. Water can easily become contaminated at different points as users collect, transport, store, and use it. Therefore, WASH agencies should work with communities to manage the entire water chain: water sourcing, treatment, distribution, collection, household storage, and consumption.

As part of the humanitarian WASH programme in the Sittwe restricted area, Oxfam and Solidarites International (OXSI) are responsible for construction and major repairs of boreholes and handpumps, monitoring of the systems, training communities to conduct minor repairs, water quality testing and follow–up, and raising awareness to reduce contamination risk during storage, transport, collection, and use.

2.1 Handpump Design and Construction

Design Considerations



1. Manual handpumps were chosen due to the lack of electricity, shallow boreholes, the community's familiarity with the technology, availability of spare parts, and cost effectiveness for installing and maintaining them.
2. High–quality construction of the concrete apron and drain is essential to ensure durability of the structure (~5 years), to prevent groundwater contamination, and to reduce stagnant water around the pump.
3. The sanitary seal (~20 ft deep) around the well casing prevents contamination of the aquifer.
4. Gravel pack (~14 ft) around the filter pipe keeps the sand from clogging the filter pipe.
5. Due to the high water table in the area, shallow boreholes (30–50 ft deep) are adequate.
6. With the restricted area located adjacent to the Bay of Bengal, boreholes cannot be drilled too close to the water due to the risk of saltwater intrusion.

Quick Facts

OXSI manages over **1000** boreholes and handpumps.
The cost of a new borehole and handpump is **145 USD** (2020).
(2A Handpump BOQ and Drawings)

Overview of Construction Process for Hand–Drilled Boreholes

The team fills a 6" PVC pipe with water, covers the top, and pushes downward while twisting; this creates the pressure needed to drill down through the soft soil. They attach another PVC pipe to the first one and continue this process until the hole is approximately 40 ft deep.

The team installs the filter pipe, casing pipe, and the suction pipe in the hole. They pour in the gravel pack, a layer of clay, and the cement grout sanitary seal to fill the gap between the outside of the casing pipe and surrounding soil.

The team constructs the handpump pillar, borehole apron, and borehole drainage. While constructing the concrete pillar, they install the nuts and bolts to which the handpump will attach. They leave the concrete to dry.

The team installs the handpump and plasters the borehole apron and drainage with cement. The water quality will be tested by the Water Quality team prior to handing over the new handpump to the community.

OXSI Challenges	OXSI Solutions
Due to complex power dynamics in Sittwe camps, OXSI's approach of directly constructing WASH infrastructure without engaging corrupt contractors sometimes led to blockages of new construction by camp leaders.	Continuous dialogue with key stakeholders to build relationships and provide updates on plans and processes is vital in any WASH programme. OXSI learned to engage with camp leaders, appealing to their desire to improve conditions in camps to push forward the construction of new infrastructure without feeding into established systems of corruption. OXSI's decision to implement directly instead of contracting out services is explained in more detail in Section 1.3.

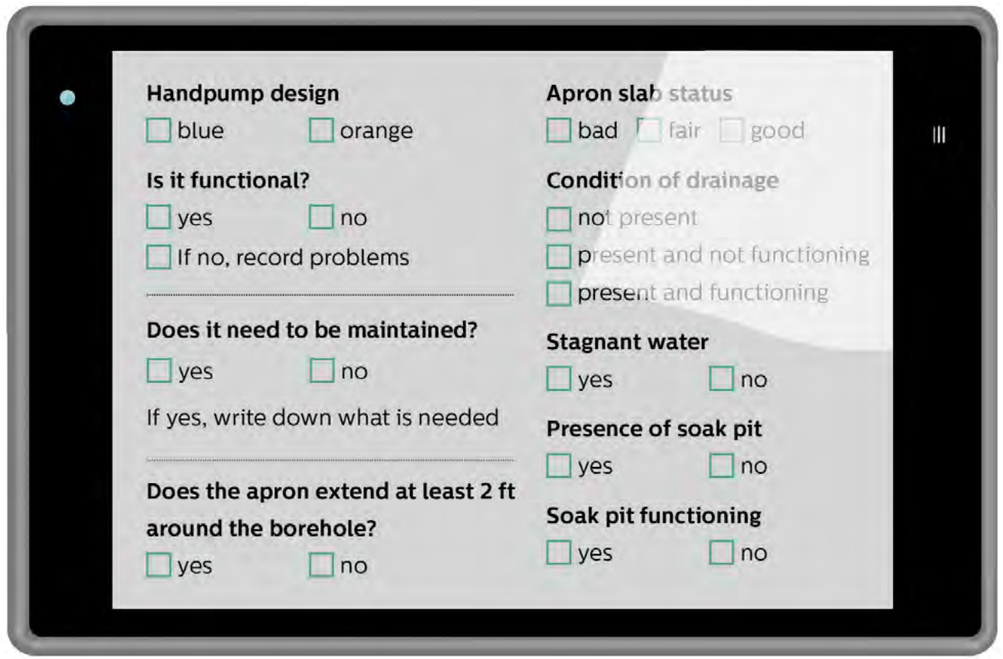
2.2 Handpump Monitoring and Major Repairs

WASH programmes should aim to involve communities in WASH service provision in multiple ways, including monitoring infrastructure and reporting issues.

In the OXSI programme, MEAL teams check the status of every handpump each month using a mobile–based functionality monitoring tool (2B Handpump Functionality Check), but communities can also file a Service Request through the Accountability mechanism at any time to receive a faster response to a problem (see Section 7.2). The MEAL team promotes Service Requests because they demonstrate a sense of ownership and initiative of the community—eventually, functionality checks will be used exclusively for internal functionality tracking and donor reporting rather than for making maintenance schedules.

The definition of functionality may vary in different contexts. OXSI defines a handpump as "functional" if there are no issues with the pump head, pillar, or slab and the borehole produces adequate flow. Each month, following a functionality check, the OXSI construction team receives a list of handpumps that need major repairs and schedules these repairs into their monthly workplan. (Communities handle minor repairs, addressed in the next section.) Borehole major repairs include replacing the casing pipe, replacing the borehole suction pipe, replacing the entire handpump, and repairing the apron slab.

OXSI Monthly Functionality Check



OXSI Challenges	OXSI Solutions
In a protracted crisis, multiple organisations may have built water infrastructure of varying designs and standards over many years. In the Sittwe camps, organisations imported and installed handpumps for which spare parts cannot be found locally (the "blue pumps"). This is a challenge as the handpumps break and OXSI cannot repair them. In addition, many of the "non–OXSI" boreholes are not built correctly and frequently experience issues such as pumping up sand or discoloured water. OXSI does not have the capacity to regularly monitor, repair, and test each of these boreholes and handpumps.	WASH agencies must have a clear strategy for taking over infrastructure built by other agencies and communicate clearly with camp leaders, communities, and with other service providers about how monitoring and repairs will be handled. OXSI monitors and repairs only OXSI–managed boreholes, which are clearly labelled, and spreads awareness for residents to use only these boreholes for drinking and cooking. As the imported handpumps break, OXSI gradually replaces them with local handpumps and ensures that spare parts are always available. OXSI also advocates within the WASH Cluster for other agencies to monitor and test the boreholes they have drilled, as well as to use a standard design for boreholes to avoid common design problems.

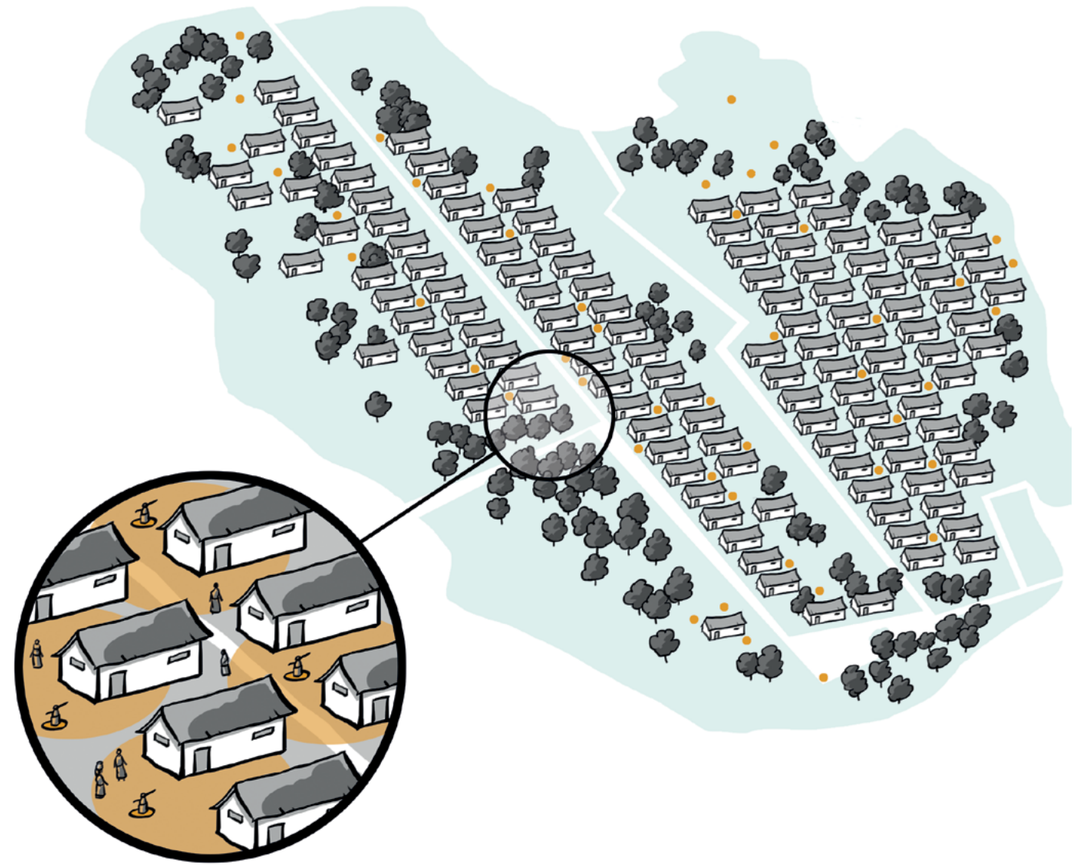
2.3 Handover and Minor Repair Training

In addition to engaging women and men (and where appropriate, girls, boys, the elderly, and people living with disabilities) in designing, building, repairing, and maintaining WASH infrastructure, a process of "handing over" new infrastructure to users is important to increase the community's sense of ownership, as well as to communicate that the new infrastructure is ready to use.

However, forcibly displaced families grouped into artificial "communities" are unlikely to feel the same sense of ownership over infrastructure that they might have at home. During the handover, communities and WASH agencies should agree on roles and responsibilities so that communities feel engaged but not over–burdened by caring for WASH infrastructure.

While OXSI handpumps are public and available to all, the closest residents (about 20 households) will be most likely to use a new handpump and agree to take responsibility for it during the handover ceremony (2C Handpump Handover Certificate). The community's responsibilities involve keeping the area around the borehole clean, conducting minor repairs, reporting theft to CMCs, and reporting major repair needs to OXSI through Service Requests. OXSI takes responsibility for training, providing spare parts for minor repairs, monthly monitoring, water quality testing and follow up, and major repairs.

The OXSI construction team holds trainings once a year to teach community members how to conduct minor handpump repairs. The Community Mobilisation team invites one female and one male representative from each longhouse to the training, although everyone is welcome to join. During the training, the construction team explains all the tools they will need and how to replace each part included in the list of materials. The participants then practice using the tools and changing the parts. They are also informed of the procedure to swap old parts for new parts and borrow tools from any OXSI office. Minor repairs conducted by communities include replacing the outlet PVC pipe, replacing missing bolts and nuts that hold the handpump together, and replacing the handpump arm and handle.



Each longhouse
Up to 10 households
1 Longhouse leader

Longhouse
Borehole

Groups of shelters around a borehole are responsible for repairs.
Part of Dar Paing Camp, Sittwe.

Focus on equity – gender, protection, and inclusion

It remains difficult to engage women in infrastructure repair because it is still not widely accepted as "women's work" in many places around the world. By encouraging one male and one female representative from each longhouse to join the minor repair training, OXSI has raised the percent of female participants who volunteer for the trainings to 15%. Women are rarely seen conducting minor repairs on handpumps, but they participate in minor repairs by requesting spare parts from the offices.

OXSI Challenges	OXSI Solutions
The looting of WASH infrastructure is common practice when it is known that agencies will replace stolen parts to repair infrastructure. OXSI's system of providing spare parts for minor repairs opens the door to theft of handpump parts, particularly for the repair of handpumps that are not managed by OXSI.	Raising awareness about the value of public handpumps that WASH agencies actively monitor, repair, and test helps to reduce looting. To further deter theft, OXSI also informs communities that a stolen part must be brought back before a repair can be done.

2.4 Water Quality Testing

To ensure delivery of high–quality water, WASH agencies should test water regularly.

Local conditions and the source and treatment of water all contribute to determining the tests necessary, but the minimum recommendation is to test for thermotolerant coliforms and turbidity, as well as pH and free residual chlorine if water is chlorinated.

In the Sittwe restricted area, WASH partners previously distributed household–level filters, which had a short lifespan and high breakage rate and later showed inconsistency in providing clean water. Data from years of water quality testing in the area showed that contamination was incredibly low in boreholes and tended to occur at the household level or between the borehole and household. As a result of this information, OXSI implemented a new water quality strategy for this programme with a focus on testing boreholes and households, preventing contamination, and promoting safe water chain behaviours.

The OXSI WASH programme established a Water Quality Testing (WQT) laboratory in the Oxfam office in Sittwe in late 2017. The lab analyses samples collected in camps and villages for the following: E.Coli (all OXSI–managed boreholes and a sample of households), specific conductivity and pH (all OXSI–managed boreholes), and arsenic (5–10% of OXSI–managed boreholes in each location). Turbidity testing is not needed for the clear water produced from the groundwater sources in Sittwe. OXSI conducts tests twice per year, during the dry season and the rainy season (2D Water Quality Sampling and Testing SOP).

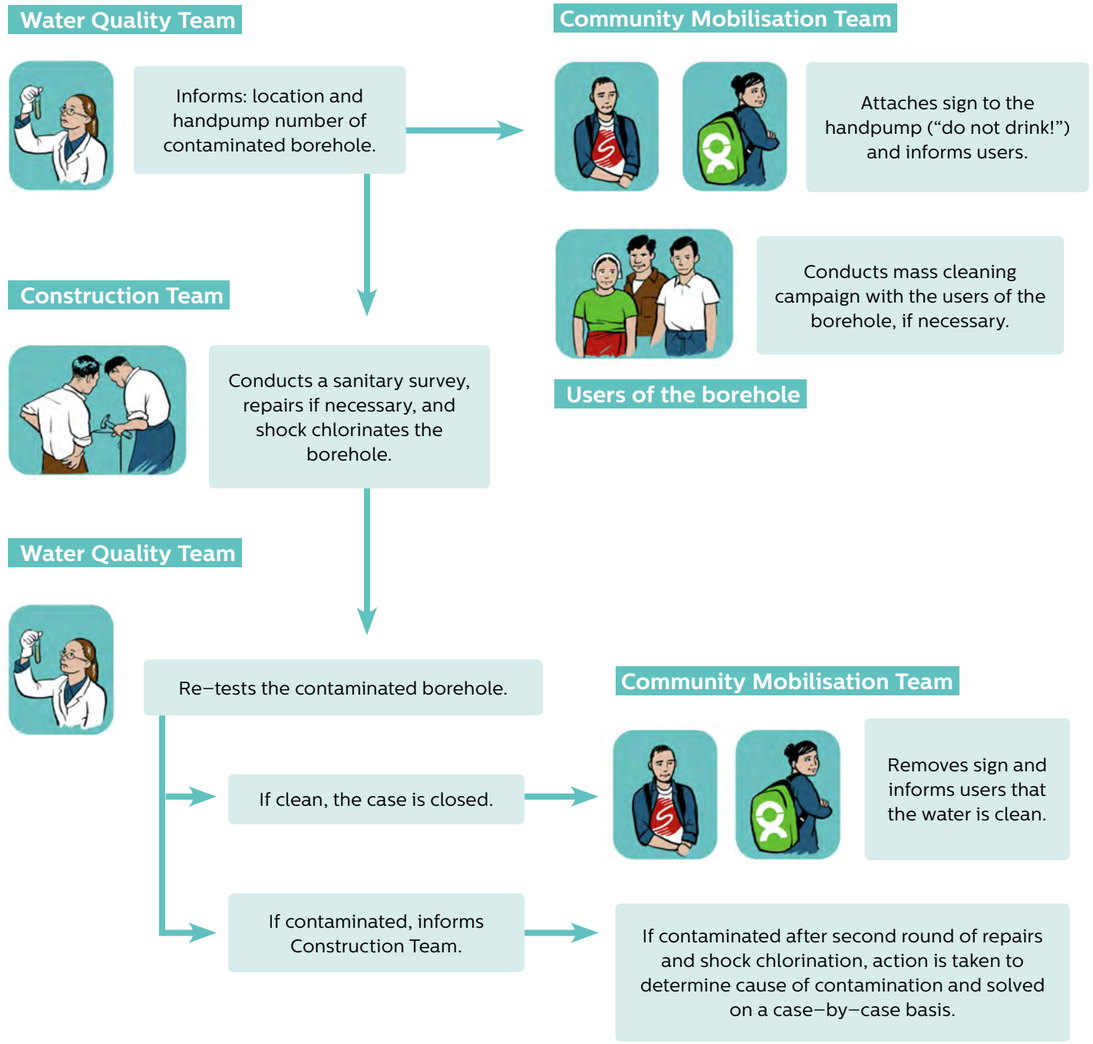
OXSI temporarily "closes" boreholes that fail the microbiological test (>10 CFU / 100 mL) until the construction team takes remedial action to reduce contamination and treat the borehole (2E Shock Chlorination SOP) and a follow–up test confirms the water is clean. The Water Quality team also tests a sample of households, and the Community Mobilisation team conducts household visits as a follow up for all failed household samples (see Section 2.5).

Testing over several years prior to the start of the programme indicated that arsenic was not a common problem in the area; however, a few borehole samples showed arsenic levels exceeding the Myanmar standard in 2019. In response, OXSI set up a response protocol, increased testing from 5% to 10% of all OXSI boreholes, and advocated to the WASH Cluster for comprehensive arsenic testing. When a borehole sample exceeds the Myanmar standard of 50 ppb, OXSI dismantles the handpump permanently so it cannot be used, and another water source is recommended or a new borehole drilled for the users of the closed borehole.

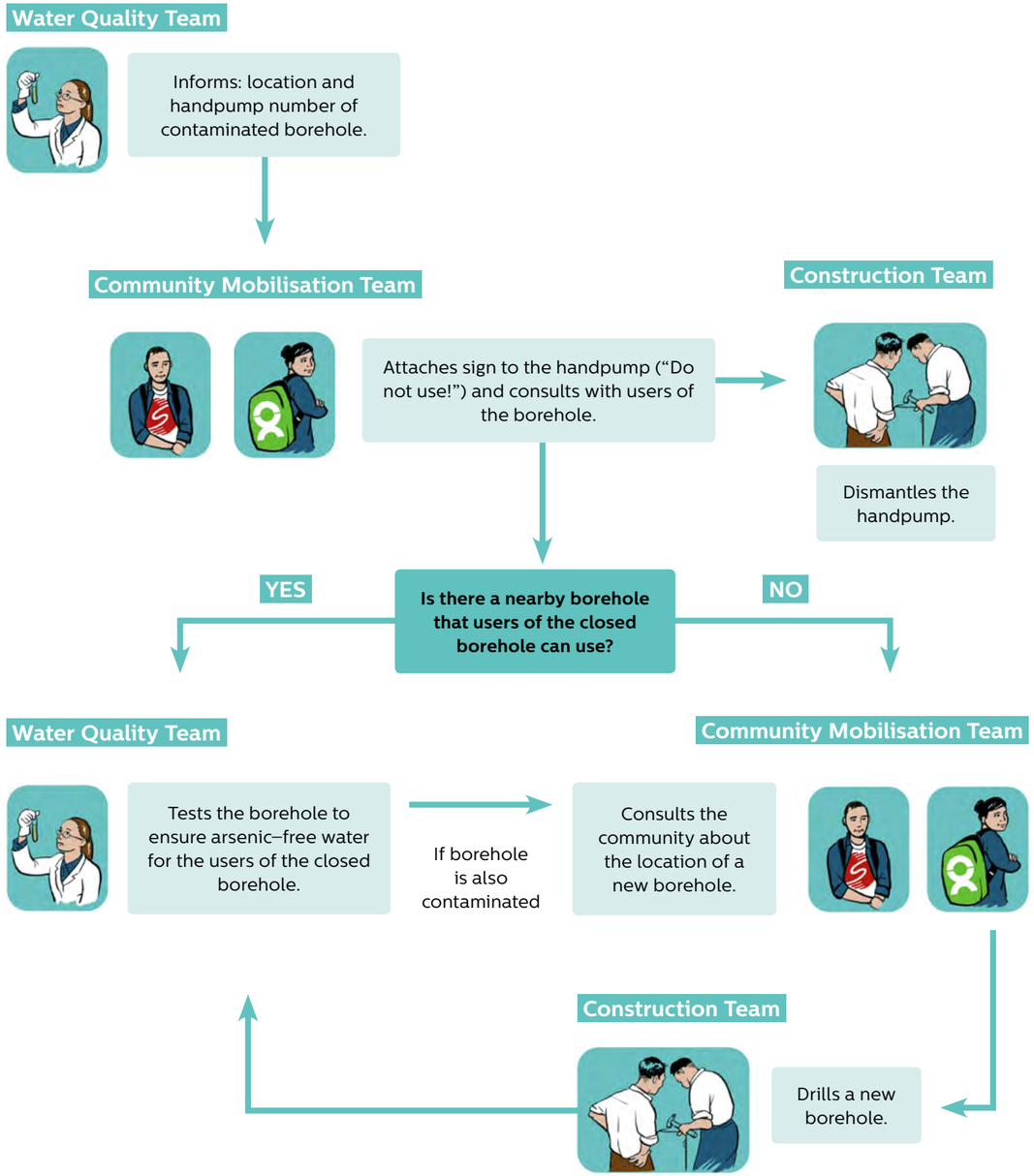
OXSI Challenges	OXSI Solutions
In a protracted crisis where multiple organisations and individuals have built infrastructure over many years, the current WASH actor may not be able to sufficiently manage all pre–existing WASH infrastructure. OXSI focuses on maintaining, testing, and rehabilitating only the boreholes handed over from the previous WASH actor, but receives many requests to test boreholes not built or managed by a recognised WASH agency.	WASH agencies must communicate clearly with communities about the services they provide and areas they cover. In the Sittwe restricted area, OXSI focuses on testing only OXSI–managed boreholes, which are clearly labelled, and spreads awareness for residents to use only these boreholes for drinking and cooking. Communities use water from non–monitored boreholes for other water needs, such as laundry and cleaning.
Collection of water quality data is among the most difficult to digitise, because information is entered both in the field and in the laboratory on different days.	WASH agencies should not avoid digitising data collection even if the entire process cannot be digitised. OXSI water sample collectors use tablets to record information in the camps, which lab officers in Sittwe town download and combine manually with the test results. Launching this process required creative solutions for transporting and charging tablets and training staff but collecting even half of the data digitally saves time, improves data quality and analysis, and significantly reduces paper use.

Signs placed on the contaminated handpump instruct users not to use the water for drinking or cooking; in case of arsenic contamination, the handpump is completely dismantled.

This flowchart shows the actions taken and communication between and among teams when a borehole sample fails the microbiological test.



This flowchart shows the actions taken and communication between and among teams when a borehole sample fails the arsenic test.

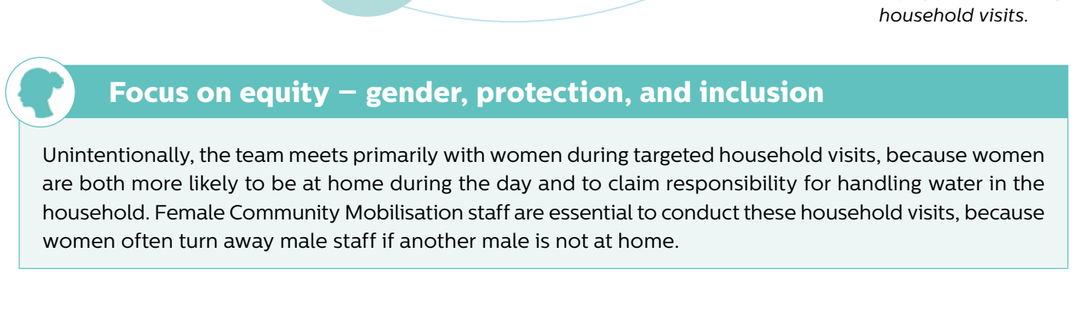


2.5 Targeted Household Visits

Feeding back to the community the results of water testing is important to build and maintain trust, especially after relatively intrusive household water sampling.

When a household water sample fails, the Community Mobilisation team visits the family to share the results and recommend behaviour changes to minimise the risk of contaminating drinking water when collecting, transporting, storing, and using water.

The team shares good practices with the help of the Water Safety Flipchart to ensure that household members have specific knowledge for how to improve their water behaviours (2F Targeted Household Visit SOP).



Messaging on water safety shared during household visits.

Focus on equity – gender, protection, and inclusion

Unintentionally, the team meets primarily with women during targeted household visits, because women are both more likely to be at home during the day and to claim responsibility for handling water in the household. Female Community Mobilisation staff are essential to conduct these household visits, because women often turn away male staff if another male is not at home.