

Dug well with a hand pump

This management advice sheet should be used as guidance for the operation and maintenance (O&M) of a dug well with a hand pump.

Guidance for typical O&M activities is provided in Table 1 with suggested frequencies for each activity. To protect water quality, these activities are important for maintaining the dug well and hand pump in a good working condition.

Table 2 lists potential issues associated with a dug well and hand pump and provides basic corrective actions to consider for each potential issue.

I. OPERATION AND MAINTENANCE

For non-professionally run systems, O&M can normally be carried out by the users of the system, or by a caretaker. Larger repairs may require skilled labour, which may be provided by local craftspeople. With individual wells, O&M is typically arranged by the users themselves.

Construction of new latrine pits, septic tanks, sewers etc., should not be undertaken near to the well unless hydrogeological studies demonstrate that it is safe to do so. Sources of naturally occurring (i.e. geogenic) contaminants, such as arsenic and fluoride, and contamination resulting from human activities, such as agriculture and industry, should be investigated to determine their impact on the quality of water entering the well.

Ensuring the integrity of the dug well structure (particularly the above ground components) is important to minimize the risks from surface and sub-surface contamination entering the well. Where the pump needs to be removed for cleaning or maintenance work, standard operating procedures should be followed to ensure contaminants are not introduced into the well during the procedure.

Table 1. Operation and maintenance schedule guidance^a

Frequency	Activity
Daily	<ul style="list-style-type: none"> Inspect and clean the well site. Ensure the hand pump is functioning. If present, ensure the inspection port lid is locked in place and in good condition. Check the fence or barrier is in good condition. Check the drainage channel is clear.
Annually	<ul style="list-style-type: none"> Perform detailed inspection of the well structure (including the well wall or lining) for obvious signs of damage or failure.
As the need arises ^b	<ul style="list-style-type: none"> Disinfect the well.^c Deepen the well and repair the well wall. Monitor water yield and use (e.g. during periods of drought). Drain the well at the end of the dry season, remove debris/sediment and clean walls (e.g. using a brush and clean water), repair where necessary, and then disinfect the well.

Notes:

- The suggested frequencies in Table 1 represent a minimum requirement and may need to be increased depending on the local context. A suitable timetable should be made for each site.
- Only persons with relevant training/skills should undertake the activities in Table 1. Care should be taken when handling disinfection products or undertaking any activity that requires entry into the well (e.g. inspection, maintenance etc.).
- For guidance on appropriate frequencies for monitoring (e.g. sanitary inspections and water quality testing), refer to [Guidelines for drinking-water quality, 2nd edition: Volume 3 – Surveillance and control of community supplies](#) (WHO, 1997).

II. ISSUES AND REMEDIAL ACTIONS

Table 2. Common issues associated with a dug well with hand pump, and suggested remedial actions

Each issue in Table 2 is linked to a corresponding question in the *Dug well with hand pump* sanitary inspection form (e.g. issue 1 below is linked to question 1 in the sanitary inspection form.)

Issue		Remedial actions to consider
1	The pump is damaged and/or loose at the point of attachment to the cover slab, potentially allowing contaminants to enter the well.	<ul style="list-style-type: none"> • Repair any damaged or severely corroded components of the pump. • Repair the pump unit so that it is firmly attached to the cover slab and properly sealed such that contaminants are unable to enter the well (e.g. surface water, excrement or other environmental contaminants). • To reduce the risk of contamination to the well during maintenance of the pump, standard operating procedures should be put in place and followed.
2	The cover slab is absent or inadequate (e.g. has deep cracks), which could allow contaminants to enter the well.	<ul style="list-style-type: none"> • Where absent, consider rehabilitating the well to include a raised, sealed cover slab to prevent contaminants entering the well. • Where the cover slab is cracked, repair all deep cracks to ensure that the well is adequately sealed to prevent the entry of contaminants.
3	There is an inspection port and its lid is missing or inadequate, providing a route for contaminants to enter the well (e.g. by animals or vandalism).	<ul style="list-style-type: none"> • If an inspection port lid is absent or inadequate, provide a temporary seal (e.g. impermeable plastic sheeting) over the inspection port to minimize contamination from entering the well, before repairing or replacing the inspection lid.
4	The walls of the well, including the aboveground (i.e. headwall) and/or below ground sections, are inadequately sealed at any point (e.g. gaps, deep cracks, faults), providing a route for contaminants to enter the well.	<ul style="list-style-type: none"> • Seek relevant skilled assistance to repair/rehabilitate the belowground well walls (e.g. repair mortar and brick work). • Where the headwall is damaged, repair to ensure that the wall is adequately sealed to prevent contaminants entering the well.
5	The apron around the well is absent or inadequate (e.g. less than 1 meter wide all around the headwall, has deep cracks and/or insufficient downward slope), making drainage poor and which may allow contaminants into the well (e.g. surface water).	<ul style="list-style-type: none"> • Where absent, consider constructing an apron at least 1 meter around the cover slab, ensuring it slopes downward to a defined collar. • Where the apron is damaged or has deep cracks, repair to ensure it is adequately sealed to prevent contaminants entering the well.
6	The drainage is poor (e.g. absent or inadequate drainage channel or slope), which could result in the ponding of stagnated water and contamination of the well area.	<ul style="list-style-type: none"> • If a drainage channel does not exist, dig temporary channels to divert water away from the well site until more permanent channels can be built. • If a drainage channel is present but not functioning correctly, consider if the channel needs maintenance (e.g. repair, cleaning), or if deepening/widening or extending is required.
7	The fencing or barrier around the well is absent or inadequate to prevent animals from damaging or contaminating the well area.	<ul style="list-style-type: none"> • If a fence or barrier is absent, construct a suitable fence/barrier to prevent animals from accessing the well site (or to prevent unauthorized access if relevant). • If a fence/barrier is present but inadequate to prevent contamination, repair or replace the fence/barrier to ensure it can prevent animals from accessing the well site.

Table 2. Common issues associated with a dug well with hand pump, and suggested remedial actions (continued)

Issue	Remedial actions to consider
<p>8 There is sanitation infrastructure (e.g. a latrine, septic tank or sewer line) within 15 meters of the well that could affect water quality (e.g. by infiltration).</p>	<ul style="list-style-type: none"> Consider what immediate actions should be taken to minimize the risk to public health (e.g. if the risk posed is significant, advise users to seek an alternative safe water source or disinfect the water at the point of use). Consider appropriate steps to eliminate the hazard in the longer-term.
<p>9 There is sanitation infrastructure on higher ground within 30 meters of the well that could flow towards and contaminate the well.</p>	<ul style="list-style-type: none"> Consider what immediate actions should be taken to minimize the risk to public health (e.g. if the risk posed is significant, advise users to seek an alternative safe water source or disinfect the water at the point of use). Consider appropriate steps to eliminate the hazard in the longer-term.
<p>10 There are signs of other sources of pollution (e.g. animals, rubbish, human settlement, open defecation, fuel storage) within 15 meters of the well that could affect water quality.</p>	<ul style="list-style-type: none"> Where practical, remove the source of pollution (e.g. clean-up animal excrement, remove rubbish etc.). Consider what actions may be appropriate to eliminate the source of pollution.
<p>11 There is a point of entry to the aquifer (e.g. open/uncapped well or borehole) within 100 meters of the well that could provide a direct pathway for contaminants to enter the well.</p>	<ul style="list-style-type: none"> Liaise with the appropriate stakeholders to cover the well or borehole as a short-term priority. Consider what actions are appropriate to decommission/relocate the well or borehole in the longer-term if required.

- a. For more details, see: Brikké, F. and Bredero, M. (2003). [Linking technology choice with operation and maintenance in the context of community water supply and sanitation: A reference document for planners and project staff](#) (WHO, Geneva).
- b. See Table 2 for potential issues that could trigger these activities.
- c. For guidance on disinfecting dug wells, see [Technical notes on drinking-water, sanitation and hygiene in emergencies: Cleaning hand-dug wells](#) (WHO/WEDC, 2013)