Dug well with a windlass

A. GENERAL INFORMATION

A.1. Dug well information

Dug well location (e.g. village, town, community, parish, district, province, state)						
Additional location information State the reference system and units, if using coordinates (e.g. national grid reference coordinates, GPS coordinates)						
Year of construction of dug well	**Depth of dug well** (including units)	**Approximate number of households using this water source** Circle one of the options below				
		1–10	11–50	51–100	101–500	>500
Circle the options below				If **Yes**, describe (e.g. what happens, how often, for how long)		
Is the dug well affected by flooding?	Unsure	No	Yes			
Is the dug well affected by drought?	Unsure	No	Yes			

A.2. System functionality

Circle **Yes** or **No** to indicate if water is currently available from the dug well. If **No**, describe why (e.g. broken windlass, low water level) and then go to Section B. In Section C, record the corrective actions needed for the dug well to provide water, and record the details of any alternative water source(s) currently being used.

Is water currently available from the dug well?		If **No**, describe why (then go to Section B)
Yes	No	

A.3. Weather conditions during the 48 hours before inspection

Circle the temperature and precipitation options below to indicate the main conditions during the 48 hours before the inspection. More than one option may be circled if conditions changed during this time. Record additional information in Section C if needed.

Temperature	<0 °C	0–15 °C	16–30 °C	>30 °C
Precipitation	Snow	Heavy rain	Rain	Dry

A.4. Water quality sample information

Record details of any water quality samples taken during the inspection. Include information for any parameters tested. Add **NA** if information is not applicable. Record additional information in Section C if needed.

Sample taken? Circle **No** or **Yes**		**Sampling location**	**Sample identification code**	**Other information**
No (go to A.5)	Yes			

Parameter tested	*E. coli*[a]		***or*** Thermotolerant (faecal) coliforms[a]		Additional parameter		Additional parameter		Additional parameter	
Results and units	Results	Units	Results	Units	Results	Units	Results	Units	Results	Units

A.5. Water treatment

Tick (✓) the appropriate box(es) and provide additional information as needed.

❑ **No treatment applied.**

❑ **Treatment applied at the well.** Describe (e.g. chlorine dose, frequency of dosing, how it is applied).[b]

❑ **Treatment applied downstream of the well.** Describe (e.g. household water treatment).

[a] The presence of *E. coli* (or thermotolerant [faecal] coliforms) suggests recent faecal contamination. If detected, further action is needed, such as additional sampling and investigation of potential sources of contamination, and/or household water treatment advisories (e.g. boil water notice). *Note* – thermotolerant (faecal) coliforms are distinct from "total coliforms", where total coliforms do not necessarily indicate recent faecal contamination.

[b] Where chlorine is applied, the free chlorine residual concentration in the drinking-water should be tested and the result recorded in Section A.4. Where possible, turbidity and pH should also be measured. For general information on chlorination, refer to Technical notes on drinking-water, sanitation and hygiene in emergencies: measuring chlorine levels in water supplies (WHO & WEDC, 2013).

General notes

- This form is intended for use on a single dug well with a windlass. Where there are multiple dug wells to be inspected, additional forms will be needed. Dug wells may be inspected on a rotational basis where there are too many to cover during each inspection.
- If other water sources are in use (e.g. spring, borehole), or if users collect and store water in the home, carry out additional sanitary inspections using the corresponding sanitary inspection packages.

B. SANITARY INSPECTION

IMPORTANT: Read the following notes before completing the sanitary inspection

1. Tick (✓) the appropriate box for each question. For guidance, refer to the numbered risk factors in Figure 1; the numbers in the figure are linked to the questions. Record any additional risk factors present in Section C. Refer also to the *Technical fact sheet* for information on the individual components of the dug well. *Note* – the questions in this section are example risk factors only, which can be used as a starting point for adapting the form to the local context.
2. Tick the **NA** (not applicable) box if the question ***does not apply*** to the dug well being inspected.
3. Tick the **No** box if the question does apply to the dug well being inspected, but the risk factor ***is not present***.
4. Tick the **Yes** box if the risk factor ***is present***. For important situations that require attention, record the corrective actions to be taken in the last column. These notes can be used to develop a detailed improvement plan, documenting what will be done, who will do it, by when it will be done and what resources are required. For guidance, refer to the *Management advice sheet*. Where possible, address the most serious risk factors first, considering low-cost or no-cost improvements that can be made immediately.
5. If a question cannot be answered because access to a component is not possible, tick the **Yes** box. Record these issues in Section C for further investigation.

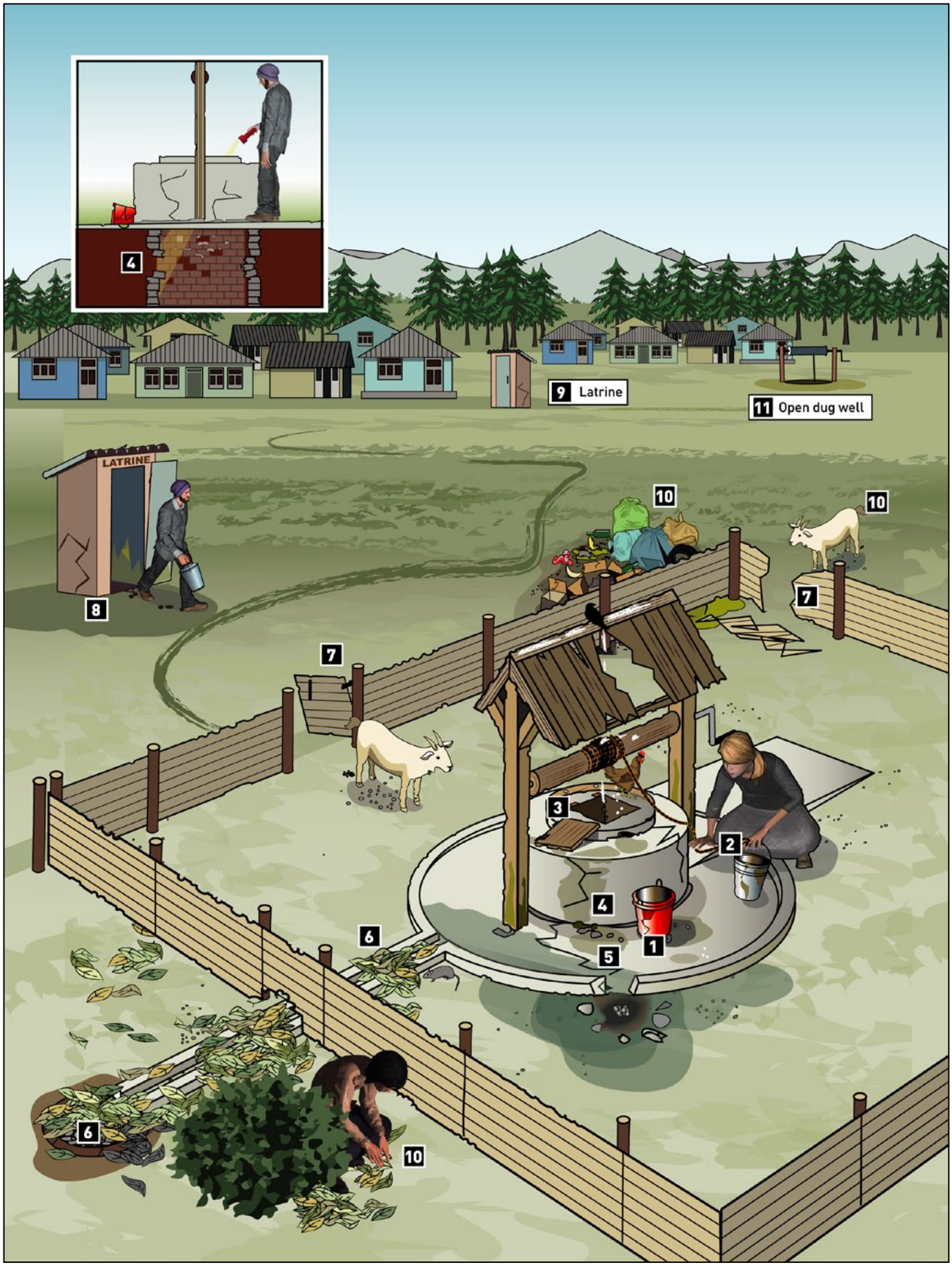

Figure 1. Typical risk factors associated with a dug well with a windlass

Sanitary inspection questions		NA	No	Yes	If Yes, what corrective action is needed?
1	**Is the bucket and chain (or rope) dirty?** Contaminants could enter the water if the bucket and chain (or rope) are dirty. This could also happen if they are stored in a way that they could become dirty when not in use (e.g. in a wet area, on the ground).	❑	❑	❑	
2	**Do individuals use their own buckets for drawing water from the well?** Contaminants could enter the well if individuals use their own buckets that are dirty, or have been used for purposes other than drinking-water collection (e.g. storing milk, chemicals, fuel, oil).	❑	❑	❑	
3	**Is the well inadequately covered to prevent the entry of contaminants?** Contaminants could enter the well, particularly after rain, if there is no well cover in place. This could also happen if the cover or access hatch is in poor condition (e.g. damaged, deep cracks, severely corroded, does not tightly fit when closed).	❑	❑	❑	
4	**Is the well wall damaged?** Contaminants could enter the well if there are deep cracks or gaps in either the aboveground headwall, or the belowground well wall.	❑	❑	❑	
5	**Is the apron around the well absent or in poor condition?** Contaminants could enter the well, particularly after rain, if there is no apron. This could also happen if the apron is damaged (e.g. gaps, deep cracks). Erosion under the apron could also allow contaminated surface water to enter the well.	❑	❑	❑	
6	**Is drainage inadequate, which could allow water to accumulate in the well area?** Stagnant water could contaminate the well if there is no drainage system in place. This could also happen if the drainage system is damaged (e.g. deep cracks) or blocked (e.g. from leaves, sediment). This is especially likely after rain. *Note* – the presence of pooled water and/or erosion under the apron may indicate poor drainage.	❑	❑	❑	

SANITARY INSPECTION FORM: Dug well with a windlass

Sanitary inspection questions		NA	No	Yes	If Yes, what corrective action is needed?
7	**Is the fence or barrier around the well missing or inadequate so that animals could enter the well area?** Animals could contaminate or damage the well area if the fence or barrier around the well is missing. This could also happen if the fence or barrier is broken or poorly built (e.g. has large gaps), or the entry point (e.g. gate) does not close securely.	❑	❑	❑	
8	**Is there sanitation infrastructure within 15 metres of the well?**[c] Sanitation infrastructure (e.g. latrine pit, septic tank, soakage field, sewer pipes) close to the well may affect water quality. For example, waste could seep into the groundwater or overflow and be washed into the well, particularly after rain. Visually check structures in this area, and ask community members, to see if the structures are sanitation related.	❑	❑	❑	
9	**Is there sanitation infrastructure on higher ground within 30 metres of the well?**[c] Contaminated groundwater and surface water may flow downhill from sanitation infrastructure towards the well. This could result in harmful microorganisms and other contaminants entering the well, particularly after rain.	❑	❑	❑	
10	**Can other sources of pollution be seen within 15 metres of the well (e.g. open defecation, animals, drinking troughs for livestock, rubbish, commercial activity, fuel storage)?**[c] The presence of animals or faeces on the ground close to the well poses a serious risk to the safety of the drinking-water. Contaminants from other waste (e.g. household, agricultural, industrial) could be washed into the well during rain or seep into the groundwater.	❑	❑	❑	
11	**Is there any unprotected entry point to the aquifer within 100 metres of the well?**[c] An unprotected entry point to the aquifer (e.g. uncapped borehole, open dug well) could allow contaminants to enter the groundwater and contaminate the well.	❑	❑	❑	
	Total number of Yes responses				

[c] General guidance only. Appropriate minimum safe distances depend on local factors including soil type and permeability, depth of the water table, and volume and concentration of contaminants. For guidance on determining minimum safe distances for polluting activities, refer to Guidelines for drinking-water quality: small water supplies (WHO, 2024).

C. ADDITIONAL DETAILS

Include any additional risk factors,[d] recommendations, observations or remarks from users of the water source (e.g. problems with the taste, odour or appearance of the water, water source reliability). Attach additional sheets and photographs if needed.

[d] These risk factors should be considered for future inclusion in Section B.

D. INSPECTION DETAILS

Name of inspector: _____

Organization: _____

Designation/title of inspector: _____

Signature: _____ Date: _____

Name of water supply representative: _____

Contact number (if available): _____

Signature (if available): _____ Date: _____

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Website: https://www.who.int/health-topics/water-sanitation-and-hygiene-wash

World Health Organization

Dug well with a windlass

This technical fact sheet provides background information on a dug well with a windlass, which supports the sanitary inspection of this drinking-water source.[a]

A dug well consists of an excavated hole in the ground with a water-lifting device (e.g. hand pump, windlass) that is used to bring groundwater to the surface.

Groundwater is considered to be better quality than surface water in many places. However, appropriate treatment/disinfection are required for groundwater sources that are vulnerable to contamination.

Improved dug wells are lined, covered and fitted with a secure water-lifting device to provide safe drinking-water. **Unimproved dug wells** are open or uncovered wells. These are more likely to become contaminated, and should be improved where possible.

Dug wells can be excavated by hand or with a machine. The diameter of a dug well is often more than 1 metre. This means that dug wells can typically be accessed by a person for inspection, operations and maintenance or improvement works (e.g. repairing the well wall, removing sediment, deepening the well).

Dug wells should have adequate capacity (i.e. have an appropriate depth below the water table and width) to meet the needs of users at all times of the year. Limited capacity could result in users seeking alternative drinking-water sources that could be less safe.

The water collection area should be built so it is accessible for all users.[b]

Figure 1 shows a common type of dug well with a windlass. A section view of the belowground elements of the well is shown in Figure 2. These figures show a typical design. Other designs can also provide safe drinking-water.

Typical risk factors associated with a dug well with a windlass are presented in the corresponding *Sanitary inspection form.*

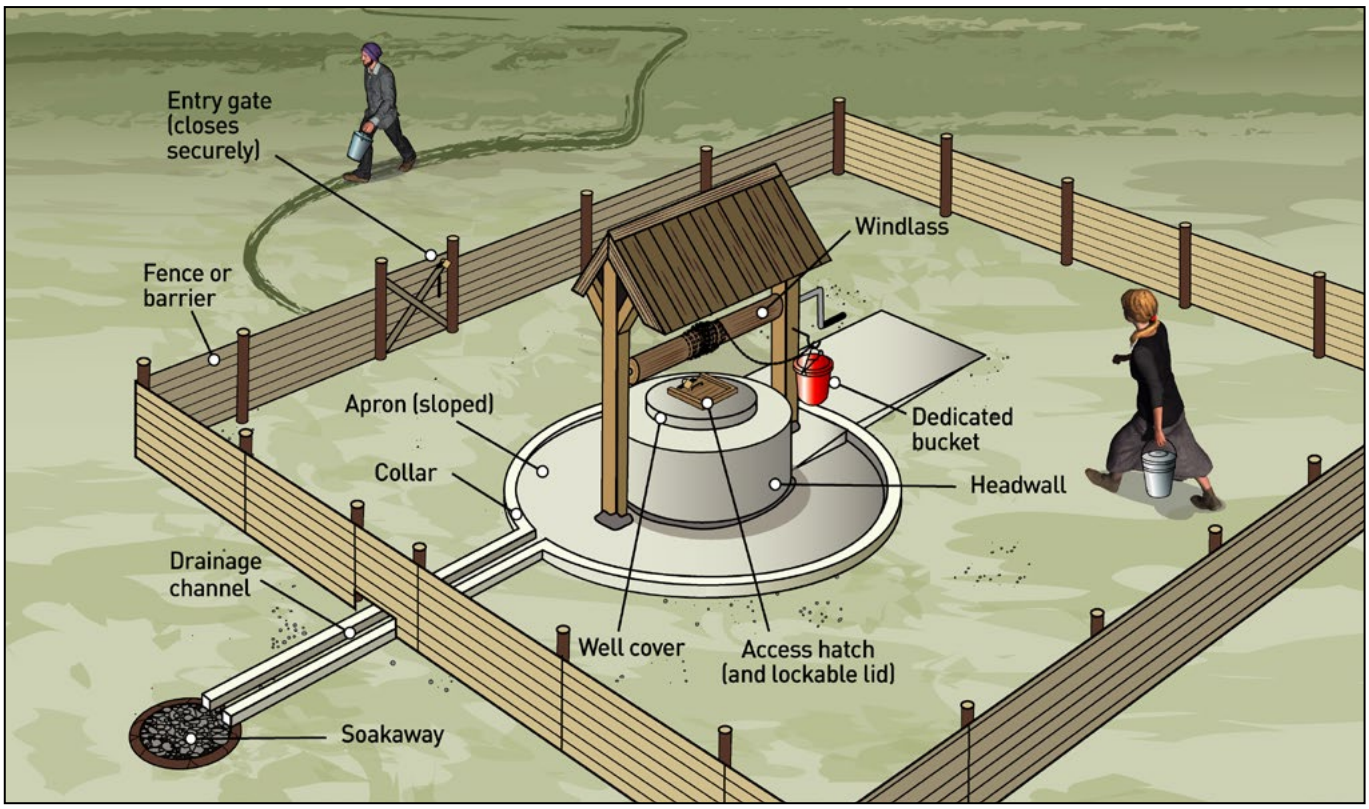

Figure 1. A common dug well with a windlass in a sanitary condition

[a] This fact sheet is not intended to serve as a guide to construction. For detailed guidance on the design and construction of a dug well, refer to Hand-dug shallow wells: series of manuals on drinking water supply, Vol. 5 (Collins, 2000).

[b] For guidance on designing accessible facilities, refer to Water and sanitation for disabled people and other vulnerable groups: designing services to improve accessibility (Jones & Reed, 2005).

A dug well with a windlass typically includes the following main components.

- **Windlass:** Draws groundwater from the well and delivers it to the surface. A windlass is typically a fixed structure positioned above the well that collects water by manually rotating a windlass handle to lower/lift a bucket.
- **Bucket:** Allows users to collect water from the well. The bucket should be fixed to the windlass (e.g. by a chain or rope), and used only for the collection of drinking-water from the well. When not in use, the bucket should be kept in a sanitary storage area with a tightly fitting lid that closes securely (e.g. a clean, dry storage area that is raised off the ground).
- **Well wall:** The wall (or lining) between the well and the surrounding ground, which gives structural support that prevents the well from collapsing. The well wall is often constructed using reinforced concrete rings, bricks or concrete blocks. At least the top 3 metres of the well should be lined with an impermeable barrier (e.g. bricks and mortar) to stop surface water from draining into the well. Below this, the well wall should be permeable to allow groundwater to enter the well.
- **Headwall:** The part of the well wall aboveground that supports the cover slab. The headwall should have a water-tight seal with the cover slab and apron to stop surface water from entering the well.
- **Well cover:** A tightly fitting cover that is fixed in place over the headwall to prevent contaminants entering the well. The well cover is typically made from metal, plastic or wood. It should only be removed to allow inspection and operations and maintenance activities.
- **Access hatch:** Allows access to the well to collect water. The inspection hatch should have a lid that is tightly fitting and lockable to stop contaminants from entering the well, and to stop unauthorized access by people.
- **Apron:** A reinforced stone, brick or concrete floor built around the headwall to drain water away from the well. To ensure adequate protection, the apron should be at least 1 metre wide all around the headwall. The apron should slope down from the well towards a collar for adequate drainage. The apron also provides a standing area for users when collecting water.
- **Collar:** The raised edge of the apron that captures water and directs it to a drainage channel.
- **Drainage channel:** Directs water away from the well to a drainage area or soakaway, where the water can drain into the ground. The drainage channel should slope down from the well. This prevents water ponding and stagnating, which could contaminate the well. Drainage water may be used to provide water for livestock or other activities, provided that these activities occur at a safe distance downhill from the well.[c]
- **Soakaway:** A hole in the ground filled with coarse material (e.g. gravel, stones, rocks), or that has a permeable wall, that allows water to drain back into the ground. It should be located at a safe distance downhill from the well.[c]
- **Fence or barrier:** A physical barrier to prevent animals from contaminating the well area or damaging the components. It may also prevent unauthorized access by people. The fence or barrier should have an entry point (e.g. a gate) that can be closed tightly and latched shut/locked. Where practical, the fence or barrier should ideally be constructed at least 15 metres from the well (general guidance only).[c]

Additional considerations

Before the dug well is constructed, sources of naturally occurring contaminants (e.g. arsenic, fluoride) and contamination from human activities (e.g. agriculture, industry) should be investigated to determine their impact on groundwater quality. Latrines and other sanitation facilities should be identified before choosing a site for the well.

After a new dug well is constructed, it should be cleaned, flushed and disinfected (e.g. with chlorine), and flushed again, to disinfect the components before the water is used.[d] Ideally, water quality testing should be conducted before the dug well is commissioned to confirm the water is safe for consumption. Periodic disinfection and testing may also be required (e.g. after flooding, after well maintenance).

The corrosion potential of the groundwater should be considered when selecting components for the windlass. If the groundwater has low pH, high salinity and high chloride, corrosion-resistant materials are required.

When constructing new dug wells or rehabilitating old ones, all materials used should be safe for contact with drinking-water (e.g. using materials approved through an appropriate certification scheme).

[c] For guidance on determining appropriate minimum safe distances for polluting activities, refer to Guidelines for drinking-water quality: small water supplies (WHO, 2024).

[d] See Technical notes on drinking-water, sanitation and hygiene in emergencies: cleaning and rehabilitating hand-dug wells (WHO & WEDC, 2013).

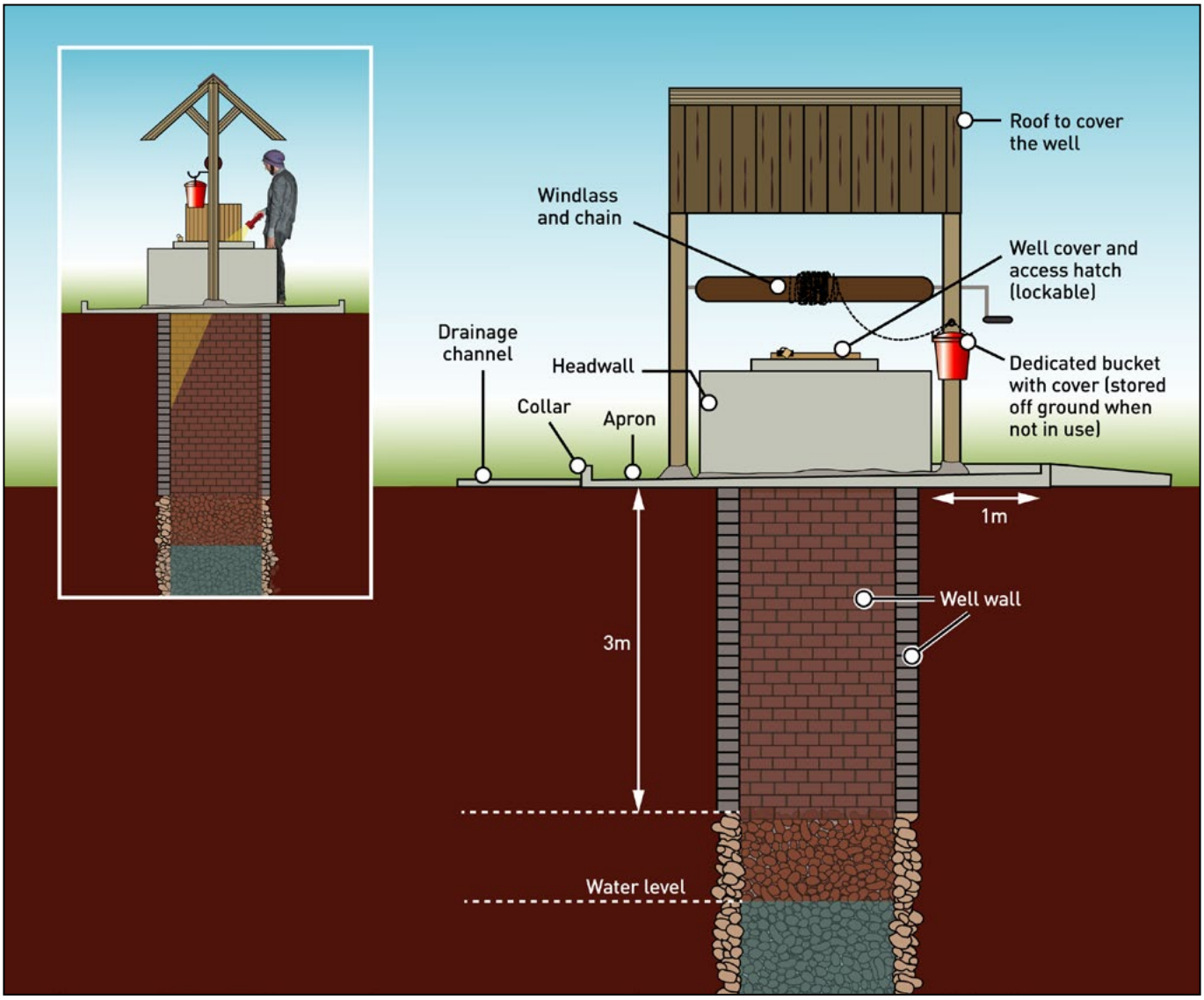

Figure 2. A common dug well with a windlass in a sanitary condition (section views)

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World Health Organization

Dug well with a windlass

This management advice sheet provides guidance for the safe management of a dug well with a windlass, which supports the sanitary inspection of this drinking-water source.

Guidance for typical operations and maintenance (O&M) activities is provided in Table 1, including suggested frequencies for each activity. These activities are important for keeping the dug well and windlass in good working condition and protecting drinking-water quality.

Table 2 lists potential problems that may be identified during a sanitary inspection, and provides basic corrective actions to consider for each problem.

This management advice sheet can also support routine management and monitoring practices, which are required to help ensure the ongoing safety of the water supply.

A. OPERATIONS AND MAINTENANCE

Basic O&M can usually be carried out by a trained owner, user or caretaker/operator (e.g. simple maintenance tasks such as cleaning the well area). Larger repairs and maintenance tasks (e.g. repairing the well wall, windlass maintenance) may need skilled labour which can be provided by local craftspeople, or with support from outside of the local area.

The condition of the dug well and windlass should be inspected routinely to help prevent contaminants entering the well. Any damage or faults should be repaired immediately (e.g. deep cracks in the headwall, broken fence, soil erosion around the apron). Standard operating procedures (SOPs) should be developed for important O&M tasks (e.g. entering the well to inspect the well wall). These should be followed by trained individuals so the work is carried out safely and the well is not contaminated during the work.

Consultation with the relevant authorities may be required to ensure that sanitation infrastructure (e.g. latrine pits, septic tanks, sewers, soakage fields) is not built near the well unless hydrogeological studies show that it is safe to do so. Consideration should also be given to catchment activities that extract groundwater (e.g. for irrigation, mining, power) to ensure an adequate quantity of drinking-water to meet the needs of users.

Activities other than the collection of drinking-water (e.g. laundry, washing, bathing) should not be permitted at the dug well area. These should be carried out at a safe distance downhill from the well.

Adequate treatment/disinfection are required before consuming the drinking-water if the dug well is vulnerable to contamination, or if the water could be contaminated due to unhygienic storage and handling by the user during transport or in the home.

Table 1. Guidance for developing an operations and maintenance schedule

Frequency	Activity
Daily to weekly	• Check and clean the dug well facility. Remove any polluting materials (e.g. faeces, rubbish). • Check and clean the bucket and chain (or rope). Store in a sanitary manner (e.g. in a clean/dry area, off the ground). • Check that the windlass is working. Repair or replace damaged parts as needed. • Check that the well cover and access hatch lid are in place and in good condition, and can be closed and latched shut/locked securely. Repair or replace damaged parts, or lock as needed. • Check that the drainage channel is clear and in good condition. Remove debris or repair as needed. • Check that the fence or barrier is in good condition and that the entry point (e.g. gate) can be closed securely and latched shut/locked. Repair as needed.

Table 1. ...continued

Frequency	Activity
Annually	• Perform a detailed inspection of the well structure (including the well wall) for signs of damage or failure. Repair as needed.[a]
As the need arises[b]	• Drain the well (e.g. pump out as much water as possible), remove debris or sediment and clean the internal walls (e.g. using a brush and clean water), and then disinfect the well (e.g. with chlorine).[c] • Rehabilitate the well (e.g. repair the well wall, deepen the well).[a] • Replace any eroded earth around the dug well, and fill any depressions in the ground where water ponds. • Monitor water yield and use to identify changes (e.g. during periods of drought). • Ensure procurement of any materials in contact with drinking-water and water treatment chemicals (where used) are safe for drinking-water use.

[a] For guidance on construction aspects, refer to Hand-dug shallow wells: series of manuals on drinking-water supply, Vol. 5 (Collins, 2000).

[b] See Table 2 for potential problems that could trigger these activities.

[c] For guidance on safely cleaning and disinfecting dug wells, see Technical notes on drinking-water, sanitation and hygiene in emergencies: cleaning and rehabilitating hand-dug wells (WHO & WEDC, 2013). This activity is required following a contamination event (e.g. flooding, *E. coli* detection). *Note* – in water scarce areas, consult with local health authorities before draining the well to make sure that the risk to water quality justifies the loss of water. If the well is drained, alternative water supply arrangements may be needed to ensure that users have sufficient water quantity to meet domestic needs.

General notes

- The suggested frequencies in Table 1 are a minimum recommendation. The frequency of activities may need to be increased depending on the local context. A suitable O&M schedule should be made for each site, including who is responsible for performing the work. Completion of activities as per the O&M schedule should be recorded, including additional details for any problems identified and corrective actions undertaken.
- Only people with relevant training and skills should undertake the activities in Table 1. Appropriate safety measures should be in place when entering the well for inspection or maintenance. Safety risks such as well collapse and asphyxiation should be appropriately managed. Care should be taken when handling disinfection products.
- For guidance on appropriate frequencies for monitoring (e.g. sanitary inspections, water quality testing), refer to Guidelines for drinking-water quality: small water supplies (WHO, 2024).

B. PROBLEMS AND CORRECTIVE ACTIONS

Each problem in Table 2 is linked to the same question number in Section B of the *Sanitary inspection form*. Where relevant, corrective actions should be completed by trained individuals according to SOPs. Where needed, develop awareness raising and education programmes, and if necessary, local rules or regulations, to support safe drinking-water management in the context of the guidance provided in Table 2.

If problems are identified that represent an immediate threat to drinking-water safety (e.g. likely presence of faecal contamination in the water supply, positive *E. coli* detection), consider what immediate actions should be taken to minimize the risk to public health (e.g. advise users to seek an alternative safe drinking-water source, disinfect the water at the point of use).

Table 2. Common problems associated with a dug well with a windlass, and suggested corrective actions

Question	Problem identified	Corrective actions to consider
1	The bucket and chain (or rope) are dirty or stored in a way they could become contaminated (e.g. in a wet area, on the ground).	• If the bucket and chain (or rope) are dirty, clean and disinfect them (e.g. with chlorine). • If there is no dedicated sanitary storage place for the bucket and chain (or rope), install a storage space for them (e.g. a hook or shelf raised off the ground). • Communicate the importance of routine cleaning/maintenance, and returning the bucket and chain (or rope) to the dedicated storage location after each use. Consider installing information signs at the well to remind users of the risk.
2	Individuals use their own buckets for drawing water from the well, which could allow contaminants to enter the well.	• Ensure there is a bucket present that is dedicated for drawing drinking-water from the well. • Communicate the importance of using only the dedicated bucket for drawing water from the well. Consider installing information signs at the well to remind users of the risk.
3	The well is inadequately covered, which could allow contaminants to enter the well (e.g. via surface water, entry of animals).	• If the well cover or access hatch lid is absent or damaged (e.g. deep cracks, severely corroded, does not fit tightly when closed), provide a temporary cover (e.g. impermeable plastic sheeting) to minimize the entry of contaminants. Install or repair the cover and/or lid as soon as possible.
4	The walls of the well – either above the ground (i.e. the headwall) or below the ground (i.e. well wall), are damaged (e.g. deep cracks, or gaps), which could allow contaminants to enter the well.	• Repair the headwall to ensure that the well is adequately sealed (e.g. repair mortar and brickwork). • For the belowground well wall, seek skilled help as needed to repair and seal the well wall. Pay special attention to the health and safety risks to workers when entering the well, and the potential to contaminate the well during the work. • Clean and disinfect (e.g. with chlorine) the well once finished.[c]
5	The apron around the well is absent or in poor condition (e.g. with gaps, deep cracks; signs of erosion under the apron), which could allow contaminants to enter the well (e.g. from contaminated surface water).	• If the apron is absent, construct an apron at least 1 metre around the headwall, ensuring that it slopes downward to a defined collar. • If the apron is damaged or has deep cracks, repair it to ensure that it is adequately sealed. • If the area around or under the apron shows signs of erosion, replace any eroded earth to ensure that it is adequately sealed. (Where the erosion is caused by poor drainage, see row 6.)
6	The drainage is inadequate (e.g. absent, damaged or blocked drainage channel or soakaway), which could result in stagnant water contaminating the well.	• If a drainage channel or soakaway is absent, dig a temporary channel to divert water away from the well site. Construct a permanent solution as soon as possible. • If a drainage channel or soakaway is not working, consider whether maintenance is needed (e.g. repairing, cleaning), or if deepening, widening or extending is required.

Table 2. ...continued

Question	Problem identified	Corrective actions to consider
7	The fence or barrier around the well is absent or inadequate, which could allow animals to contaminate or damage the well area.	• If absent, construct a robust fence or barrier with a lockable gate that closes securely. • If a fence or barrier is present but inadequate to prevent access, repair or replace it. • If the entry point (e.g. gate) to the well area is damaged and/or does not close securely, repair or replace it.
8	There is sanitation infrastructure (e.g. latrine pit, septic tank, soakage field, sewer line) within 15 metres of the well that could contaminate the well (e.g. from overflow, seepage).[d]	• Involve local authorities to assess the significance of the risk from the sanitation infrastructure. • Consider what immediate actions should be taken to minimize the risk to public health (e.g. advise the household to treat the water before consumption). • Consult with local authorities to consider appropriate steps to relocate or eliminate the source of pollution.
9	There is sanitation infrastructure on higher ground within 30 metres of the well that could contaminate the well.[d]	

10	There are other sources of pollution (e.g. open defecation, animals, drinking trough for livestock, rubbish, commercial activity, fuel storage) within 15 metres of the well that could contaminate the well.[d]	• Where practical, remove the pollution (e.g. remove animal faeces, rubbish). Communicate the importance of maintaining the dug well area in a clean condition.
		• Consult with local authorities and users to consider:
		  ◦ appropriate actions to relocate or eliminate the source of pollution
		  ◦ other actions to minimize the issue from occurring again (e.g. signage, enforcement measures).

11	There is an unprotected point of entry to the aquifer (e.g. open or uncapped well or borehole) within 100 metres of the well that could provide a direct pathway for contaminants to enter the groundwater and contaminate the well.[d]	• Consult with local authorities to:
		  ◦ assess the significance of the risk from the unprotected point of entry to the aquifer
		  ◦ cover the point of entry in the immediate term
		  ◦ consider what actions are appropriate to permanently seal, decommission or relocate the point of entry.

[d] General guidance only. Appropriate minimum safe distances depend on local factors including soil type and permeability, depth of the water table and the volume and concentration of contaminants. For guidance on determining minimum safe distances for polluting activities, refer to Guidelines for drinking-water quality: small water supplies (WHO, 2024).

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