



BHUTAN DRINKING WATER QUALITY STANDARDS 2025

Department of Water
Ministry of Energy and Natural Resources
ROYAL GOVERNMENT OF BHUTAN



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Finally, I would like to commend the hard work of the Task Force Members and my colleagues in the Department of Water for coming up with this revised Bhutan Drinking Water Quality Standard 2025. It is hoped that this Standard will serve as a valuable tool for ensuring safe and clean drinking water for all, thereby safeguarding public health and supporting Bhutan's journey toward achieving its national and global development goals.

Tashi Delek!

A handwritten signature in blue ink, appearing to read 'Karma Tshering', with a long horizontal stroke extending to the right.

(Karma Tshering)
Secretary

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ACKNOWLEDGEMENT

The Bhutan Drinking Water Quality Standard 2025 was developed through the collective efforts and collaboration of key agencies and stakeholders. It builds upon the Bhutan Drinking Water Quality Standard 2016, published by the erstwhile National Environment Commission.

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3. United Nations Development Programme – Bhutan.
4. Department of Agriculture, Ministry of Agriculture and Livestock.
5. Department of Human Settlements, Ministry of Infrastructure and Transport.
6. Bhutan Food and Drug Authority, Ministry of Health.
7. Bhutan Standard Bureau, Ministry of Industry, Commerce, and Employment.
8. Thimphu Thromde.
9. Samdrup Jongkhar Thromde.
10. Dzongkhag Administration of Gasa, Mongar, Punakha, Samtse, Trongsa, and Trashigang, Tsirang.
11. Tarayana Foundation.

Their collective insights and feedback have greatly enriched the quality and applicability of this revised standard.

The Bhutan Drinking Water Quality Standard 2025 is an initiative implemented under the Advancing Climate Resilience in the Water Sector (ACREWAS) Project, supported by UNDP-GEF and executed by the Royal Government of Bhutan (RGoB).

LIST OF ABBREVIATIONS

BDWQS	Bhutan Drinking Water Quality Standard
BHU	Basic Health Units
CFU	Colony Forming Units
DoID	Department of Infrastructure Development
DoW	Department of Water
mg/L	milligrams per liter.
ml	milliliter
MoH	Ministry of Health
MoIT	Ministry of Infrastructure and Transport.
NEC	National Environment Commission
NTU	Nephelometric Turbidity Units
pH	Potential of Hydrogen
PHC	Primary Health Centers
RCDC	Royal Centre for Disease Control
RWSS	Rural Water Supply Scheme
SOP	Standard Operating Procedures
TCU	Turbidity Color Units
WaQMIS	Water Quality Monitoring Information System
WaSIS	Water and Sanitation Information System
WHO	World Health Organization
WSP	Water Safety Plan
WUA	Water Users' Association
$\mu\text{S/cm}$	Microsiemens per centimeter

1. INTRODUCTION

1.1. General Considerations and Principles

Access to safe and adequate drinking water is fundamental to human health and well-being. The World Health Organisation (WHO) emphasises ensuring water as safe and accessible as possible. Similarly, the United Nations General Assembly recognises access to safe drinking water, sanitation, and hygiene (WASH) services as a basic human right. Despite this recognised universal right, the 2023 WHO update estimated that in 2022, nearly 27% of the global population still lacked access to safely managed drinking water sources.

At the national level, the Water Act of Bhutan 2011 recognises the above universal rights and states that *“every individual shall have access to safe, affordable and sufficient water for human needs”*, which mandates the state to provide its citizens with safe, acceptable, sufficient and affordable water for domestic and sanitation use.

1.2. Bhutan Drinking Water Quality Standard 2016

Based on the above international and national general considerations and principles, the Bhutan Drinking Water Quality Standard (BDWQS) was developed and approved by the National Environment Commission in 2016. This standard sets parameters and maximum allowable limits for urban and rural drinking water quality in Bhutan. It also includes the role and responsibilities of the relevant agencies in monitoring, data management, reporting, and ensuring regulatory compliance.

1.3. Need for Revision of Bhutan Drinking Water Quality Standards

With evolving global benchmarks and environmental threats, Bhutan must periodically update its water quality regulations to ensure alignment with international best practices and to uphold the nation’s commitment to public health and sustainable development.

In accordance with Section 13 of the BDWQS 2016, the standards need to be reviewed and revised every five years or as and when deemed necessary. However, no revision has been undertaken since its adoption, and the standards have remained unchanged for more than eight years.

Therefore, it is timely and imperative to revise the BDWQS 2016 to address potential gaps and shortcomings and to ensure the standard and its parameters are relevant to the current context in alignment with the latest WHO standard and guidelines. Furthermore, in accordance with the Civil Service Reform Act of 2022, institutional mandates must be updated to clearly define roles and responsibilities and coordination mechanisms among implementing agencies to enhance regulatory clarity and operational efficiency.

Recognizing the above gaps, the revised BDWQS 2025 has updated parameters, including units and permissible limits, and added a few new parameters, as well as the roles and responsibilities of the implementing agencies, to align with the latest WHO Standards and national policy reforms.

Overall, BDWQS 2025 will serve as the living document to ensure drinking water quality assurance and further apply as a revised version of the previous Drinking Water Quality Standards developed in 2016.

The BDWQS 2025 is an outcome of the Advancing Climate Resilience of the Water Sector (ACREWAS) project, which is being implemented by the Royal Government of Bhutan (RGoB) in collaboration with the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP)-Bhutan.

2. GOAL AND OBJECTIVES

2.1. Goal

To establish national standards and a framework for safe drinking water to protect public health.

2.2. Objectives

- (1) To set safe concentrations of nationally relevant drinking-water parameters.
- (2) To contribute towards a progressive improvement of drinking-water quality management (e.g., sampling, testing, reporting and documentation) by all service providers.
- (3) To strengthen the application of water safety planning in all drinking-water systems.
- (4) To build a national drinking-water quality database.
- (5) To contribute towards increased public awareness of drinking-water safety.
- (6) To improve accountability of all stakeholders in the provision of a safe drinking water supply.

3. TERMS AND DEFINITIONS

For the purpose of the standard, the following terminology shall apply.

- (1) Health facilities means sub-posts, primary health centres, 10-bed hospitals, dzongkhag hospitals, and referral hospitals.
- (2) Beneficiaries means water users in both rural and urban water supply systems.
- (3) Certify means to attest or confirm in a formal statement.
- (4) Competent authority means the ministries, agencies, local authorities, committees, or any other entity as may be determined by the Department of Water as the competent authority.
- (5) Disease outbreak means the occurrence of more cases of disease than expected in a given area (Place) or among a specific group of people (People) over a particular period (Period) of time (3Ps).
- (6) Drinking water means water that is suitable for human consumption, such as drinking and cooking. It is also called potable water.
- (7) Drinking Water Quality Standard means rules established to control the level of contamination in drinking water under prescribed standard conditions.
- (8) Groundwater means any water located or found beneath the earth's surface in soil pore spaces and in the fractures of rock formations, which are called aquifers.
- (9) Institution means a society, organization, or establishment founded for a specific purpose.
- (10) Maintenance means a set of measures and activities aimed at keeping or restoring the optimal and reliable functionality of equipment that is used to sustain and protect drinking water.
- (11) Maximum permissible limit means the maximum allowable concentration.
- (12) National reference laboratory means a leading national laboratory that has been officially designated for the testing of water quality in Bhutan.
- (13) Operational monitoring means routine collection and testing of water samples and/or visual inspection of the water supply system to ensure the safety of the drinking water supply by the water service providers.

- (14) Packaged/bottled water means water that is intended for human consumption and is sealed in food-grade bottles with proper labelling.
- (15) Rural means any area or settlement outside the declared municipal boundary.
- (16) Rural water supply system means a domestic water supply system that provides water to rural areas, which is designed and constructed to Rural Water Supply System (RWSS) standards. In this context, the RWSS also includes water supply systems managed by water user associations, institutions, and households in rural areas.
- (17) Safe drinking water means water meeting the prescribed microbial, chemical, and physical characteristics under the Bhutan Drinking Water Quality Standard (BDWQS).
- (18) Surveillance means an ongoing and systematic process of collecting, analysing, interpreting, and reporting water-related data to protect public health and prevent waterborne diseases.
- (19) Surveillance body means the Ministry of Health, more specifically the Royal Centre for Disease Control and health facilities.
- (20) Thromde means urban areas as defined in the Local Government Act.
- (21) Water Safety Plan means effective ways of consistently ensuring a safe drinking water supply through a risk assessment and risk management approach to the water supply chain, beginning from its catchment to the consumer point.
- (22) Water Safety Audit means a systematic assessment of the safety of water supply systems, focusing on the entire water supply chain. This includes the identification of potential hazards, vulnerabilities, and risks, from the water source to treatment, distribution, and consumption
- (23) Urban water supply system means a system where water is abstracted from various sources and processed through different treatment units to make water clean, safe and compliant with the BDWQS and distributed to the users of thromde and adjoining peri-urban areas through a piped network.
- (24) Users means drinking water consumers in both rural and urban areas.

- (25) Water User Associations (WUA) means an association formed as per the Water Act of Bhutan.
- (26) Water service providers means any water entity (government or private) responsible for source management, infrastructure development and maintenance, abstraction, treatment, and distribution of water to the users.

4. NORMATIVE REFERENCE

The Bhutan Drinking Water Quality Standard has been developed in accordance with the Water Act of Bhutan.

5. SCOPE

The Bhutan Drinking Water Quality Standard shall apply to all drinking water supplies managed by water service providers, including water supplies managed by water user associations, institutions, and households.

Notwithstanding the above, this standard shall not apply to drinking water that is packaged or bottled.

6. OBLIGATION AND COMPLIANCE

Water service providers—including user associations, institutions, and households—are responsible for supplying safe water in accordance with established standards. All authorities must comply with the established standards.

In case of non-compliance, the surveillance body will notify the providers to take corrective actions. If urban water service providers fail to act within the given timeframe, the case will be referred to the Department of Water (DoW) as per the Water Act and its regulations. For rural water service providers, the surveillance body will inform the Gewog administration to take corrective action. If the concerned service providers do not comply, the surveillance body shall escalate the issue to the Dzongkhag administration and DoW for further action.

7. POINTS OF COMPLIANCE

7.1. Point of compliance – Urban

Any point immediately after the water treatment system to any tap connected to the network, or at the outlet of any water tanker operated by the water service provider.

Note: The responsibility for ensuring compliance with water quality standards beyond the water meter and associated fittings lies with the building owner.

7.2. Point of compliance – Rural

Any point immediately after the main intake tank to any tap connected to the network or any tap connected to the outlet of any reservoir supplied by a rooftop rainwater harvesting system.

8. REFERENCE STANDARDS FOR UNSPECIFIED PARAMETERS

If any parameters or substances are identified in the water that are not specifically included in this standard, the current edition of the WHO Guidelines for Drinking-Water Quality shall be the primary reference to assess the safe level of those substances and parameters.

9. COMMENCEMENT

This standard shall come into effect from November 19, 2025.

10. ROLES AND RESPONSIBILITIES

10.1. Department of Water

The Department of Water shall:

- (1) Ensure implementation and enforcement of the drinking water quality standard.
- (2) Review and revise, as needed, the drinking water quality standard in consultation with relevant stakeholders.
- (3) Facilitate capacity-strengthening initiatives for institutions and stakeholders through targeted training, provision of essential equipment, and enhancement of testing facilities.
- (4) Coordinate with relevant stakeholders to prepare and publish an annual report on drinking water quality compliance.
- (5) Coordinate periodic meetings among the implementing agencies to ensure effective exchange of information and collaboration for effective implementation of the standard.

- (6) Develop a common standard operating procedure for WSP for the water service providers.
- (7) Lead annual water safety auditing to ensure effective implementation of the WSP.

10.2. Department of Infrastructure Development

The Department of Infrastructure and Development shall:

- (1) Provide technical backstopping to water service providers in areas such as design, material procurement, testing, and development of appropriate and affordable technologies for water abstraction, treatment, and distribution to prevent contamination.
- (2) Prepare and implement plans and strategies to improve the coverage for a safe and sustainable water supply in both urban and rural areas.
- (3) Explore and adopt alternative technologies to provide safe drinking water.
- (4) Assist water service providers to develop and implement WSP.
- (5) Assist the Department of Water in monitoring and evaluating the WSP through water safety audits.
- (6) Ensure operational monitoring of water quality and report to the concerned Competent Authorities through an online system.
- (7) Periodically train engineers and technicians working in the water sector to provide safe drinking water.
- (8) Ensure provisioning of safe drinking water during emergencies, including mobilizing resources.

10.3. Department of Public Health

The Department of Public Health shall:

- (1) Promote advocacy and awareness efforts to educate communities on safe drinking water practices, the public health impacts of water contamination and waterborne diseases, and measures to prevent and control such diseases.
- (2) Develop and implement strategies to minimize health risks from waterborne diseases during outbreaks and emergencies.

10.4. Royal Centre for Disease Control

The Royal Centre for Disease Control shall:

- (1) Lead the surveillance of drinking water quality.
- (2) Serve as the National Reference Laboratory for drinking water quality testing and monitoring.
- (3) Establish, upgrade and manage a centralized drinking water quality database.
- (4) Assess and certify the technical competency of drinking water quality testing laboratories.
- (5) Continuously strengthen the capacity for monitoring the drinking water quality.
- (6) Undertake water quality testing in Thimphu Thromde
- (7) Compile data and submit an annual report to the Department of Water.
- (8) Report to the Department of Water, including concerned agencies, in the event of non-compliance with the standard, which may pose a potential threat to consumer health.
- (9) Assist the Department of Water in monitoring and evaluating the WSP through water safety audits.
- (10) Recommend the Department of Water on the updation of drinking water quality parameters, aligning with the WHO Guidelines.
- (11) Facilitate the inclusion of drinking water testing in the Health Assistant Training Curriculum
- (12) Strengthen the role of District Public Health Officers on water quality surveillance and their role in supervision and the development of advocacy programs.
- (13) Evaluate the potential health impacts of contaminants in drinking water, ensuring that standards effectively protect against waterborne diseases and chemical exposures.

10.5. Dzongkhag Hospitals

The Dzongkhag Hospital shall:

- (1) Carry out pre-feasibility water quality testing for any new schemes in urban areas in the respective Dzongkhag.
- (2) Undertake urban water quality testing.

- (3) Carry out advocacy and awareness programs for the water service providers and users on safe drinking water.
- (4) Provide water quality testing support to the health facilities within its jurisdiction.
- (5) Disseminate water quality test reports within two weeks of sample testing to the water service providers, Dzongkhag Administration and to the RCDC.
- (6) Ensure the availability and proper functioning of standard water quality testing equipment to support accurate and reliable monitoring.
- (7) In the absence of a Dzongkhag hospital, 10-bedded hospitals/primary health centres shall undertake the above responsibilities.

10.6. Ten-Bedded Hospitals and Primary Health Centers

The Ten (10)-Bedded Hospitals and Primary Health Centers shall:

- (1) Carry out pre-feasibility water quality testing for any new rural schemes within their jurisdiction.
- (2) Undertake rural water quality testing.
- (3) Seek support on water quality testing from the Dzongkhag Hospital.
- (4) Disseminate water quality test reports within two weeks of sample testing to the water service providers, including institutions, water user associations, households, Gewog Administration, Dzongkhag Administration, and the RCDC.
- (5) Carry out advocacy and awareness programs for the water service providers and users on safe drinking water.
- (6) Ensure the availability and proper functioning of standard water quality testing equipment to support accurate and reliable monitoring.

10.7. Thromde and Dzongkhag Municipal

The Thromde and Dzongkhag Municipal shall:

- (1) Prepare and implement Water Safety Plan (WSP) in their respective jurisdiction and periodically review and update and submit WSP to DoW.
- (2) Develop Standard Operating Procedures (SOP) for monitoring drinking water supply systems.

- (3) Implement plumbing codes of practice with regard to design, installation, construction, testing, operation, and maintenance of water supply systems.
- (4) Enhance technical capacities to ensure quality construction and operation of the water supply schemes.
- (5) Facilitate drinking water quality surveillance activities.
- (6) Conduct periodic review meetings, including ad hoc meetings during the emergency, to ensure users' access to safe drinking water.
- (7) Support advocacy/awareness programmes initiated by relevant agencies or conduct similar programs.
- (8) Create awareness on water handling procedures at consumer level for safe storage.

10.8. Gewog Administration

The Gewog Administration, with support from the Dzongkhag Administration shall:

- (1) Prepare and implement a Water Safety Plan (WSP) in their respective jurisdiction and periodically review and update and submit the WSP to DoW.
- (2) Develop Standard Operating Procedures (SOP) for monitoring drinking water supply systems.
- (3) Enhance technical capacities to ensure quality construction and operation of the water supply schemes.
- (4) Facilitate drinking water quality surveillance activities for both rural and private water supply systems.
- (5) Conduct periodic review meetings, including ad hoc meetings during the emergency, to ensure users' access to safe drinking water.
- (6) Support advocacy/awareness programs initiated by relevant agencies.
- (7) Create awareness on water handling procedures at the consumer level for safe storage.

- (8) Develop mechanisms to promote community ownership of rural water supply systems.

10.9. Users (Rural and Urban)

The users shall:

- (1) Ensure safe storage and handling of drinking water to avoid contamination.
- (2) Maintain adequate water storage capacity at the household level.
- (3) Clean and maintain water storage tanks at regular intervals.
- (4) Allow access to water storage tanks and plumbing systems to monitor water quality and connections by relevant agencies.
- (5) Carry out timely inspection, repair, and maintenance of household plumbing.
- (6) Report any waterborne disease outbreaks to the nearest health facility for timely intervention.
- (7) Install float valves in storage tanks to prevent overflow and unhygienic conditions.
- (8) Ensure there are no illegal or unauthorized water connections.

11. MONITORING

11.1. Urban Water Supply Systems - Monitoring

For urban water supply systems, water service providers and surveillance bodies – such as the RCDC for Thimphu Thromde and Dzongkhag Hospitals for their respective Thromdes – should monitor water quality parameters according to the operational monitoring frequencies outlined in **Table 5** and **Table 6**. However, urban water service providers and their respective surveillance bodies may decide to increase the frequency of operational monitoring.

11.2. Rural Water Supply Systems - Monitoring

For the Rural Water Supply System, water service providers such as the Gewog Administration and WUAs, with support from WSP teams and the Dzongkhag Administration and surveillance bodies (health facilities in respective areas), shall monitor the parameters based on the frequency of operational monitoring specified as specified in **Table 5**.

12. DATA MANAGEMENT AND REPORTING

12.1. Operational Monitoring Data and Reporting

12.1.1. Urban Water Supply System

- (1) The water service providers will maintain and update the water quality test results as per the operational monitoring schedule provided in Table 5. The results shall be shared with the DoID and RCDC.
- (2) The DoID shall share the operational monitoring data with the RCDC.
- (3) The DoID shall provide timely feedback and technical support on the operational data to the water service providers.

12.1.2. Rural Water Supply System and Reporting

- (1) The water service providers will maintain and update the water quality test results for the parameters mentioned in **Table 6** and **Table 7**. The result shall be shared with the DoID.

12.2. Surveillance Data and Reporting

12.2.1. Urban Water Supply System

- (1) The surveillance body (Dzongkhag Hospitals) shall update the water quality test results as per the surveillance monitoring schedule provided in Table 6. The surveillance body will share the raw data with the RCDC.
- (2) The RCDC shall review the raw data and provide feedback within two weeks of receiving the results.
- (3) After validation, the RCDC will then forward the validated data to the relevant agencies, as outlined in **Figure 1**. Surveillance data flow.

12.2.2. Rural Water Supply System

- (1) The surveillance body (PHCs/10-Bedded Hospitals/Subpost), in collaboration with water services providers, shall update the water quality test results as per the surveillance monitoring schedule provided in **Table 6** and **Table 7**. The

surveillance body and water service providers will share the collected data with the RCDC and DoID.

- (2) The RCDC shall review the raw data and provide feedback within two weeks of receiving the results from the surveillance bodies. The RCDC will then validate and share the validated data with the relevant agencies, as outlined in **Figure 1**. Surveillance data flow.
- (3) The surveillance body shall conduct water quality monitoring at least twice a year, in January and July.

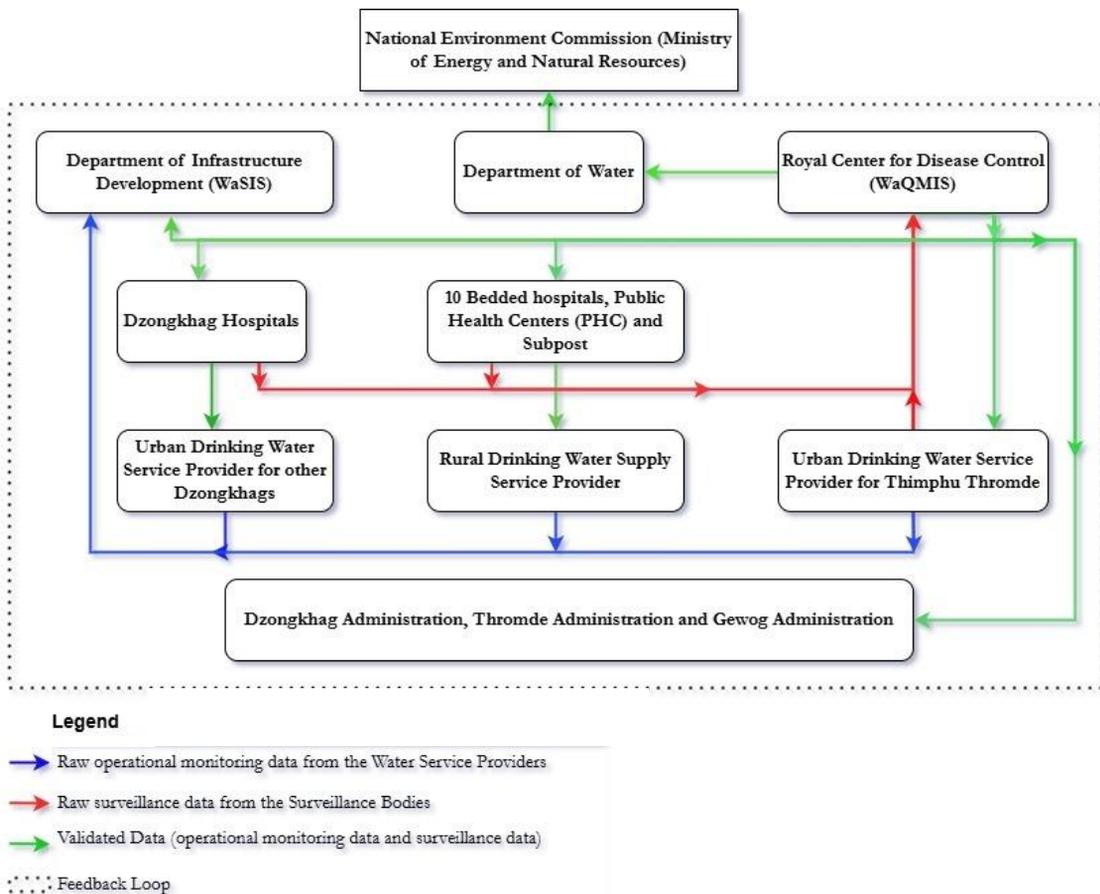


Figure 1. Surveillance data flow

13. WATER SAFETY PLAN (WSP)

A Water Safety Plan is an organized and systematic approach to ensure the safety of a drinking water supply, focusing on the key hazards identified from the catchment to the point of use by the consumers and with the following core objectives:

- i. Minimize contamination at the water source;
- ii. Reduce or remove contamination through treatment processes; and
- iii. Prevent contamination during storage, distribution and handling.

The WSP should address normal operating conditions as well as incident or emergency situations. The WSP must also include provisions for review and revision so that the plan remains current and accurate.

The DoW shall carry out periodic WSP assessments through WSP auditing for:

- (1) Verifying whether WSPs have been developed in accordance with nationally approved WSP guidelines/SOPs, also if control-measure operational monitoring is being carried out as per the WSP, and if the WSP is being reviewed and revised as required.
- (2) Measuring the impact of WSPs on the overall management of water supply systems.

14. URBAN DRINKING WATER QUALITY STANDARDS AND MONITORING FREQUENCY

Parameters and concentrations, frequency of operational monitoring, and surveillance monitoring

Table 1. Physiochemical parameters

Sl. No.	Parameter	Unit	Maximum Permissible Limit	Remarks
1	Colour	TCU	5	
2	Odour	-	Non-objectionable	
3	pH	-	6.5 – 8.5	
4	Taste	-	Non-objectionable	
5	Turbidity	NTU	1	In at least 70% of the samples in any month.

6	Conductivity	μS/cm	1000
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Table 2. General chemical parameters causing undesirable effects

Sl. No.	Parameter	Unit	Limit
1	Calcium	mg/L	No permissible limit, but recommended < 75
2	Free Residual Chlorine ¹	mg/L	0.2 – 0.5
3	Iron	mg/L	No permissible limit but recommended < 0.3
4	Manganese	mg/L	0.4 (Maximum Permissible Limit)
5	Sulphate	mg/L	No permissible limit, but recommended < 250
6	Zinc	mg/L	3 (Maximum Permissible Limit)
7	Aluminum	mg/L	0.2 (Maximum Permissible Limit)
8	Barium	mg/L	0.7 (Maximum Permissible Limit)
9	Boron	mg/L	0.5 (Maximum Permissible Limit)
10	Magnesium	mg/L	30-100

¹Chlorine residual must be maintained throughout the distribution system

Table 3. Chemical parameters of health concern

Sl. No.	Parameter	Unit	Maximum Permissible Limit
1	Fluoride ¹	mg/L	1.5
2	Nitrates	mg/L	50
3	Arsenic	mg/L	0.01
4	Lead	mg/L	0.01
5	Mercury	mg/L	0.006
6	Cadmium	mg/L	0.003

¹To be tested for groundwater and spring water only.

Table 4. Microbiological parameter

Sl. No.	Parameter	Unit	Maximum Permissible Limit
1	<i>E. coli</i>	CFU/100 ml sample	0

Table 5. Parameters and frequency of operational monitoring

Sl. No.	Parameter	Minimum Monitoring Frequency	Raw Water	After Treatment Processes				Distribution Network
				Coagulation	Sedimentation	Filtration	Disinfection	
1	Conductivity ¹	Weekly	✓					✓
2	pH ¹	Daily	✓					✓
3	Turbidity	Daily	✓			✓		✓
4	Taste and odour	Weekly	✓				✓	✓
5	Free residual chlorine ²	Daily					✓	✓
6	Flow rate ³	Daily	✓	✓	✓	✓	✓	

¹Indicator parameters such as conductivity and pH should be used to trigger further investigations if the concentrations change over time.

²Free residual chlorine should be monitored only in water treatment systems that use chlorine as a disinfectant.

³Although flow rate is not a water quality parameter, this should be recorded for each treatment process to understand its influence on the treatment system efficiency.

Table 6. Parameters and frequency of monitoring by surveillance body

Sl. No.	Parameters	Monitoring Frequency	Sampling Sites			
			Untreated/Raw water before entering the water treatment system	Entry point of treated water to the distribution system	Exit point of treated water from pipe network	Distribution /Sampling stations
1	Conductivity ¹	Monthly	✓	✓	✓	
2	Taste and odour	Monthly	✓	✓	✓	✓
3	Colour	Monthly				✓
4	Odour	Monthly				✓
5	pH ¹	Monthly				✓
6	Taste	Monthly				✓
7	Turbidity	Monthly				✓
8	Free Residual Chlorine ²	Monthly	✓	✓	✓	✓
9	<i>E. coli</i>	Monthly	✓	✓	✓	✓
10	Calcium	Yearly	✓	✓	✓	
11	Iron	Yearly	✓	✓	✓	✓
12	Manganese	Yearly	✓	✓	✓	
13	Sulphate	Yearly	✓	✓	✓	
14	Zinc	Yearly	✓	✓	✓	✓
15	Aluminum	Yearly	✓	✓	✓	✓
16	Cadmium	Yearly	✓	✓	✓	✓
17	Fluoride ³	Yearly	✓	✓	✓	
18	Nitrate ⁴	Yearly	✓	✓	✓	✓
19	Arsenic ⁵	Yearly	✓	✓	✓	
20	Lead	Yearly	✓	✓	✓	✓
21	Hardness	Yearly	✓	✓	✓	

¹Indicator parameters such as conductivity and pH should be used to trigger further investigations if the concentrations change over time.

²Free residual chlorine should be monitored only in water treatment systems that use chlorine as a disinfectant.

³Fluoride test is applicable to ground and spring water only.

⁴Nitrate test should be tested bi-annually if surface water source is vulnerable to contamination from nitrate sources.

⁵Arsenic test is applicable to groundwater only.

Note: In addition to the above, the Surveillance body may monitor samples within a household to ensure that water in households is safe.

If the Surveillance body determines that Lead is of concern, samples should usually be taken from households for verification. If the Surveillance body determines that Mercury is of concern, samples would usually be taken at the exit point of the treatment point or the water source on an annual basis. If the concentrations of these parameters are less than 50% of the limit, then monitoring frequency can be reduced. If the data concludes that these are stable over time then reduced monitoring is acceptable with concentrations of up to 75% of the limit.

15. RURAL DRINKING WATER QUALITY STANDARDS AND MONITORING FREQUENCY

Parameters and Concentrations, Frequency of Operational Monitoring, and Surveillance Monitoring

Table 7. Physiochemical parameters*

Sl. No.	Parameter	Unit	Target limits
1	Conductivity	μS/cm	1000
2	Odour	-	Non-objectionable
3	Physical Appearance		Non-objectionable
4	pH	-	6.5 – 8.5
5	Taste	-	Non-objectionable
6	Turbidity	NTU	5

Table 8. Risk categorization of microbiological parameter (*E. coli*)*

Range (CFU/100 ml sample)	Risk Assessment	Cautionary Note
0	 Safe Water	Water is safe for drinking as no fecal contamination is detected.
1 - 10	 Low Health Risk	Water is not ideal for drinking without treating or boiling, as there is a minor level contamination.
11 - 50	  Intermediate to High Health Risk	Unsafe for drinking as it indicates high fecal contamination and must be treated immediately before drinking/consumption.

>50



Grossly Polluted

Heavily contaminated. Due to the elevated risk of waterborne disease, the water is considered unsafe for drinking and all domestic purposes without adequate treatment. Declare unsafe for domestic use and issue a public health advisory notice immediately for urgent action.

** Water quality monitoring for rural drinking water quality parameters (Tables 7 and 8) shall be done twice a year, representing dry (January-March) and wet season (June-September).*

16. REVISION

The DoW, in collaboration with relevant stakeholders, may review and revise the standard every five years or as and when deemed required.

17. ANNEXURES

Annexure 1: Water Sampling Method

- (1) All precautions shall be taken to prevent contamination of the sample and to ensure that the concentration of the substance being determined does not change between the time of sampling and analysis.
- (2) Samples shall be collected by trained personnel only (e.g., inspectors for drinking water quality surveillance).
- (3) Sampling methods shall comply with ISO **OR** Standard Methods for the Examination of Water and Wastewater (*Joint publication by the American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF)*) **OR** the SOP on sample collection drafted by the Royal Centre for Disease Control.

Annexure 2: Water Testing Methods

Analytical methods shall comply with ISO **OR** Standard Methods for the Examination of Water and Wastewater (*Joint publication by the American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF)*) **OR** the SOP on sample testing drafted by the Royal Centre for Disease Control.

Annexure 3. Technical Guidance on Exceedances

A. Guidance following Detection of *E. coli* or Thermotolerant Coliforms

- (1) If *E. coli* is found in a sample, an immediate investigation should be undertaken, including, but not limited to, the following actions:
- (2) Immediate inspection of the drinking water system to identify and rectify any:
 - a. *breaks in pipe work and other infrastructure (e.g., tank hatches left open),*
 - b. *evidence of failure or poor performance of treatment processes. This should include checking disinfectant residuals.*
- (3) In systems that use disinfection treatment, concentrations of the disinfectant could be increased. Where practical, chlorination of service tanks or flushing of mains could be considered.
- (4) Immediate collection of additional samples to confirm the presence of *E. coli*, followed by identification of possible sources and extent of the contamination. As a minimum, a repeat sample should be collected from the original sample location, an upstream sample (e.g. a service reservoir) and a downstream sample location.
- (5) Where corrective actions are taken, further follow up samples should be collected to verify that corrective actions have been effective.
- (6) If *E. coli* is detected in repeat samples, or if faults are identified that could lead to repeat events, the Competent Authority should be notified to enable further action to be determined.

B. Guidance following Exceedance of Chemical Parameters

Exceedance of chemical parameters should be a signal, as a minimum, to:

- (1) Investigate the cause with a view to taking remedial action as necessary including collecting additional samples as part of the investigation to confirm exceedances and to assess the persistence of the chemical; and
- (2) Consult the authority responsible for public health for advice on suitable action, taking into account the intake of the substance from sources other than drinking-water, the toxicity of the substance, the likelihood and nature of any adverse effects and the practicality of remedial measures.

Note: *Chemicals almost invariably require long-term exposure to high levels to cause health-effects and generally, there is a substantial margin of safety built in to guideline*

values. Therefore, exceedance does not necessarily mean health effects and the extent of any health impact depends on the value and duration of the exceedance.

Annexure 4. Guidance on Sampling Locations and Numbers of Samples

For microbial parameters, the sampling locations should account for:

- (1) locations within the system with long travel times;
- (2) times of increased likelihood of contamination (e.g. seasonal variations or in case of intermittent water supplies); and
- (3) deterioration from outlets of treatment plants (and service reservoirs) to the water distribution system;

It is recommended that sites are rotated amongst designated sample sites throughout the distribution system.

The location of sample sites should provide for good geographic representation of the water supply system and also enable the comparison of water quality over time for particular sections of the system.

Table 9. Recommended minimum sample numbers for faecal indicator testing in distribution Systems

Population category type for piped water supplies	Total number of samples per month
Population < 5000	5 samples per month
Population 5000 – 100,000	5 samples per month for 5000 people +1 additional sample every additional 5000 people
Population 100,000 – 500,000	20 samples per month for 100,000 people +1 additional sample for every additional 5000 people

Note: Parameters such as chlorine, turbidity and pH should be tested more frequently as part of operational and verification monitoring.

Annexure 5. Stakeholder Consultation Meetings

First Stakeholder Consultation Meeting (May 28-30, 2024)

Sl No	Name	Designation	Agency
1	Penjor Dukpa	Principal Engineer	Thimphu Thromde
2	Tenzin Drugyel	Principal Agricultural Officer	Department of Agriculture
3	Sonam Y Rabgye	Programme Analyst	UNDP-Bhutan
4	Pema Chopel	Dy. Chief Laboratory Officer	Royal Centre for Disease Control
5	Sonam Peday Zam	Legal Officer	Ministry of Energy and Natural Resources
6	Kencho Dorji	Asst. Engineer	Punakha Dzongkhag
7	Pema Wangdi	Technician Supervisor	Punakha Dzongkhag
8	Govinda Dhaurali		Department of Human Settlements
9	Cheten Zangmo	Asst. Engineer	Bhutan Standards Bureau
10	Tshering Tshomo	Asst. Engineer	Department of Energy
11	Jigme Gembo	Asst. Environment Officer	Department of Environment and Climate Change
12	Dorji Wangmo	Offt. Planning Officer	Gasa Dzongkhag
13	Choki Tshering	Development Regulatory Officer	Gasa Dzongkhag
14	Tshering Sonam Wangmo	Statistical Officer	Policy and Planning Division, Ministry of Energy and Natural Resources
15	Tashi Penjor	Asst. Engineer	Tsirang Dzongkhag
16	Sonam Penjor Tshering	Sr. Regulatory and Quarantine Inspector	Bhutan Food and Drug Authority

Second Stakeholder Consultation Meeting (December 26-29, 2024)

Sl No	Name	Designation	Agency
1	Chencho	Assistant Engineer	Phuentsholing Thromde
2	Losel Wangpo	Junior Engineer	Samdrup Jongkhar Thromde
3	Ngawang Tshering	Junior Engineer	Samdrup Jongkhar Thromde
4	Pema Chopel	Dy. Chief Laboratory Officer	Royal Centre for Disease Control
5	Ugyen Choeki	Assistant Dzongkhag Public Health Officer	Gasa Dzongkhag

6	Namgay Dawa	Dzongkhag Public Health Officer	Punakha Dzongkhag
7	Gang Dorji	Dzongkhag Public Health Officer	Tsirang Dzongkhag
8	Tenzin Dakpa	Municipal Engineer	Samtse Dzongkhag
9	Budhi Raj Rai	Architect	Trongsa Dzongkhag
10	Jamtsho	Municipal In-Charge	Trashigang Dzongkhag
11	Tenzin Tobgyal	Assistant Dzonkhag Engineer	Mongar Dzongkhag
12	Sonam Y Rabgay	Programme Analyst	UNDP-Bhutan
13	Tashi Tshering Doya	Tarayana Foundation	Chukha

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