



Health & Safety Department (Environmental Health Section)

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1. Introduction

In order to ensure the safety and health of the community, maintain the quality and safety of water systems in emergency situations, and achieve proactive prevention of public health, Dubai Municipality has prepared this guideline in accordance with the transparency and governance practices followed in the Emirate of Dubai. The technical guideline for Water System Safety in Emergency Situations reflects the best practices for implementing emergency plans, in addition to providing a clear approach to preventive measures before, during and after the event, and defining the roles and responsibilities of stakeholders to ensure that the desired level of safety and quality is achieved.

2. Purpose



The technical guideline for Water System Safety in Emergency Situations has been prepared in readiness for emergencies. It ensures that the relevant constructed environments are operated and maintained during, before and after emergencies in accordance with health and safety standards.

3. Objectives

The guide aims to build public confidence in the water systems in the emirate, and ensure that they meet quality standards and requirements, in addition to achieving the following:

- Proactive prevention of public health.
- Ensuring the safety and health of the community.
- Protecting the environment from pollution.
- Reducing physical damage.
- Providing a safe environment that achieves risk prevention for the human and physical elements.
- Ensuring the readiness of building and facility owners for emergencies and enhancing their abilities to understand crises and threats.
- Raising awareness about the safety of water systems.

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4. Laws and Legislations



Local Order No. (11) of 2003 Concerning Public Health and Safety of The Society in The Emirate of Dubai

5. Scope

This guide applies to all constructed environments that use water systems in the Emirate of Dubai, including hotels, non-medical professional service provider buildings, educational institutions, commercial, government and residential buildings, labor cities, fitness centers, etc.



6. Terms and definitions

| Term | Definition and meaning |
|------------------------------|---|
| Emirate | Emirate of Dubai |
| Municipality | Dubai Municipality. |
| Authorities | Relevant federal and local authorities (each according to their competence). |
| Accredited Laboratory | Laboratory accredited by the Emirates International Accreditation Center "EIAC in accordance with the requirements of the international standard ISO/IEC 17025 in the field of water testing. |
| Cleaning | The process of removing dirt, sediment, algae or other contaminants from water tanks, cleaning filters, supply pipes, water purification filters and other systems in order to maintain the safety and quality of the water stored therein. |

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| Term | Definition and meaning |
|---------------------------|---|
| Building Owner | A person or his legal representative, who owns or has actual control over the constructed environment or any part thereof. |
| Water Tank | It refers to any container designed to contain and store water intended for use, and the definition includes any pipes associated with the tank. |
| Cleaning Company | The company or institution licensed and accredited to perform any operations or activities related to the cleaning and disinfection of water systems. |
| Sampling | Withdrawal of water samples periodically by laboratories accredited by the Emirates International Accreditation Center or the competent regulatory authority, from the water of tanks or taps representing the water network to test them in the laboratory according to the types of tests required. |
| Laboratory Test | Conducting an analysis of the water sample taken determine its compliance with the relevant standard specifications, or any specifications, standards, or limits determined by the municipality. |
| Water Network | It refers to any water network that conveys water designated for use within buildings, including pipes and fittings, joints, valves, backflow prevention devices, as well as the water tank, pumps, and any related equipment. |
| Water Quality | One of the measurable indicators for water, taking into account chemical, physical, and biological indicators. |
| Pollution | The presence of a biological, chemical, physical, or radiological agent that causes disease or any other harm to public health or the environment. |
| Water Disinfection | The process of eliminating pathogens, microorganisms, and viruses or disrupting their mechanisms of action, or even removing them. |

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| Term | Definition and meaning |
|------------------------|---|
| Risk Assessment | It is the comprehensive process of analyzing and assessing risks that can be defined by the following points: identifying potential future events that could negatively affect people, property and the surrounding environment. They are then detailed and classified for the study and analysis of each possibility individually. |

7. Roles and responsibilities



7-1 Dubai Municipality

- Monitoring, auditing and inspecting the facilities, institutions and buildings mentioned within the scope of application to ensure compliance with the conditions and requirements set by Dubai Municipality, represented by the Health and Safety Department, and taking legal action against violators.
- Issuing applicable circulars and notifications that ensure compliance with the standards and requirements outlined in this guideline.
- Periodic updates based on new data, information or other requirements aimed at achieving a better level of awareness of the effects caused by chemical substances or microbial organisms that affect water quality.
- The Municipality has the right to withdraw samples from all water supply points to conduct the appropriate tests and to verify their safety throughout the entire supply chain and ensure compliance with the conditions contained in the UAE Drinking Water Control System (Cabinet Resolution No. 26 of 2013).

7-2 The owner of the building or his representative

- Develop a proactive plan (assessing potential risks, analyzing the situation, identifying pollution sources and affected areas and the extent of their impact on water.)
- Communicate with the concerned authorities (municipality - cleaning and disinfection companies approved by Dubai Municipality) regarding cases of water contamination in the building.
- Provide safe alternative water sources for drinking and daily use and encourage residents to utilize these alternative sources.
- Instruct residents to avoid using contaminated drinking water.

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- Cooperating with companies approved by Dubai Municipality to maintain and treat water systems in accordance with the requirements and guidelines related to water safety and quality in buildings, including, but not limited to:
 - Technical Guidelines (17) for the Quality of Unbottled Drinking Water. DM-HSD-GU17-DW1
 - Technical Guidelines (44) for Legionella control in water system. DM-HSD-GU44-LCWS1
- Document maintenance reports for water systems, including routine and emergency maintenance.
- Test contaminated drinking water in laboratories accredited by the Emirates International Accreditation Center.
- Commit to implementing the requirements and standards outlined in this guideline to ensure the quality and safety of water in the building.

8. Possible emergency

Disasters, crises and emergencies pose a significant challenge worldwide, and their types and risks vary based on surrounding factors and environmental and social conditions. These emergency events can be classified into several categories based on their nature and impact:



8.1 Natural disasters:

- Earthquakes: Ground tremors lead to the destruction of buildings and infrastructure and cause significant human losses.
- Floods: These result in property destruction, water contamination, and threaten the safety of populations.

8.2 Environmental disasters:

- Environmental pollution: It can due to chemical spills or biological contamination and affects wildlife and human life.
- Epidemics and infectious diseases: cause the spread of epidemic diseases and threaten public health.

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9. Safety Procedures for Water Systems Before an Emergency Occurs

The building owner or their representative should take the following actions:

- Form an emergency team consisting of individuals trained in water quality, health and safety.
- Develop an emergency plan that outlines roles, responsibilities, and procedures to follow during emergencies.
- Develop a plan that suits the building's water systems, its location and the surrounding environment.
- Training emergency team members on how to deal with water pollution cases.
- Provide the necessary equipment for water treatment and quality assessment.
- Provide illustrative plans for the building's water systems and their components.
- Conduct mock exercises involving various emergency scenarios.
- Include backup power provisions for operating pumps and water systems in the emergency plan, such as backup generators.
- Provide a list of communication channels with relevant authorities during emergencies.

Appendix No. (1) How to Prepare and Implement a Water Safety Plan

10. Safety Procedures for Water Systems During an Emergency

The building owner or their representative should take the following actions:



Coordination with authorities and concerned authorities

- Notify the authorities and relevant parties in case of water contamination in the building or if any signs indicate a change in water quality, such as color or odor.

Informing building users about the following:

- Do not use contaminated water.
- Rationalizing the use of water until necessary measures are taken to ensure the required quality.
- Follow public health instructions on dealing with water contamination, including handwashing instructions and avoiding drinking contaminated water.



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Ensure the safety of the water systems in the building:

- Assess the extent of water contamination and determine the type of contaminants present (e.g., bacteria, viruses, or chemicals).
- Identify the source of water pollution, whether due to a plumbing system leak, flood, or rain entering the building.
- Close the contamination source if possible, such as repairing a plumbing leak or preventing floodwater from entering the building.
- Prevent the spread of contamination to other parts of the building using barriers or isolating materials.
- Isolate contaminated pipes and water tanks from the building's water network.
- Use stored water from tanks that have not been contaminated through appropriate valves and fittings.
- Provide alternative water supplies and check the quality of alternative water supplies offered in emergencies.
- Perform necessary operational procedures for alternative water sources to ensure water quality, such as disinfectant levels.
- Perform operational procedures for using existing building water, including disinfectant levels and pH.
- Ensure the effectiveness of emergency equipment such as generators and the fuel needed to operate water systems.
- Use water treatment systems in the building such as filters and disinfection systems, if available.
- Monitor the physical properties of water such as turbidity and odor.
- Test water quality by an accredited laboratory to ensure it is free from contaminants before use.

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11. Safety procedures for water systems after an emergency occurs

The building owner or their representative should take the following actions:



- Assessing potential risks to water systems after an emergency and identifying potential contamination sites.
 - Appendix No. (2) Risk Assessment Matrix for Water Systems in Buildings After an Emergency.
 - Appendix No. (3) Potential Risk Analysis.
- Cleaning and disinfecting water systems by companies approved by Dubai Municipality.

A. Cleaning and disinfecting of tanks:

Cleaning and disinfecting water tanks in the (post-emergency) phase is important to ensure water quality and safety. Chlorine can be used to clean and disinfect tanks according to the following guidelines:

1. Isolate sources of contamination.
2. The water in the tank must be completely emptied before starting the cleaning and disinfection process.
3. In case of hard-to-remove deposits, the walls and floor inside the tank should be cleaned using cleaning products approved by the relevant authorities.
4. Rinse the tank thoroughly with clean water several times to ensure all chemicals and residues are removed.
5. Prepare a chlorine solution at a concentration of 1 - 2 ppm.
6. Fill the tank with clean water up to 3/4 of its capacity, then add the chlorine solution and stir the water well to ensure that the chlorine is evenly distributed in the tank.
7. Water and chlorine solution should be kept in the tank for at least 4-6 hours, with the chlorine concentration in the water being between 1-2 ppm during this period.
8. After the disinfection period, the tank should be rinsed again with clean water thoroughly until chlorine is removed.
9. Refill the tank with clean water to full capacity, and make sure that there is no leakage in the tank or any malfunctions in the system.
10. Take a water sample from the tank and send it for analysis to an accredited laboratory to ensure its quality, compliance with standards, and absence of contaminants.

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B. Cleaning and disinfection of the internal network:

Disinfecting the internal water systems network in the post-emergency phase is important, aiming to remove deposits, sediments, and organic matters that may accumulate in pipes and fittings according to the following guidelines:

1. Before starting the disinfection process, the main water source valve for the building should be closed to prevent water flow during the process.
 2. All draining faucets in the building should be opened to eliminate remaining water in the network and completely drain it.
 3. Prepare chlorine solutions at a concentration of 1 -2 ppm.
 4. Disinfect the internal water systems network by distributing the chlorine solution throughout all pipes and fittings.
 5. Leave the chlorine solution in the network for at least 4-6 hours to ensure complete disinfection.
 6. After the disinfection period is over, thoroughly rinse the network with clean water to remove chlorine and remaining organic matter.
 7. Take water samples from various points of use to be analyzed in an accredited laboratory to ensure water quality and compliance with standards, confirming it is free from contaminants.
 8. Restart the network after ensuring the water quality.
- Water quality testing in laboratories accredited by the Emirates International Accreditation Center.
 - In case of water systems contamination during emergencies, water quality tests must be conducted to ensure safety and suitability for use as described in Appendix 4.
 - Develop an emergency plan to deal future water contamination, outlining responsibilities and duties for each person in case such situations arise.
 - General maintenance of damaged water systems:
 - Regularly inspect and maintain water filtration and purification devices to ensure their efficiency and replace damaged parts according to technical directives.
 - Periodic inspection: A regular of water systems must be conducted to ensure there are no leaks or damage to pipes and valves.

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- Purifier maintenance: Purification devices such as water filters should be regularly checked and maintained to ensure efficient operation.
- Replacement of damaged parts: Any damaged or corroded parts in water systems must be replaced to ensure their efficient operation.
- Installation of barriers and preventatives: Barriers and preventatives can be installed to prevent contaminated water from flooding into the clean water systems in the building.
- Review and update procedures:
 - Regular review and evaluation of the procedures taken, updating them according to the latest health guidelines and standards.
 - Continuous implementation of effective procedures to ensure the safety of water systems in buildings after floods.

12. Preventive measures

To prevent, reduce and control accidents and injuries in affected buildings, the following must be adhered to:

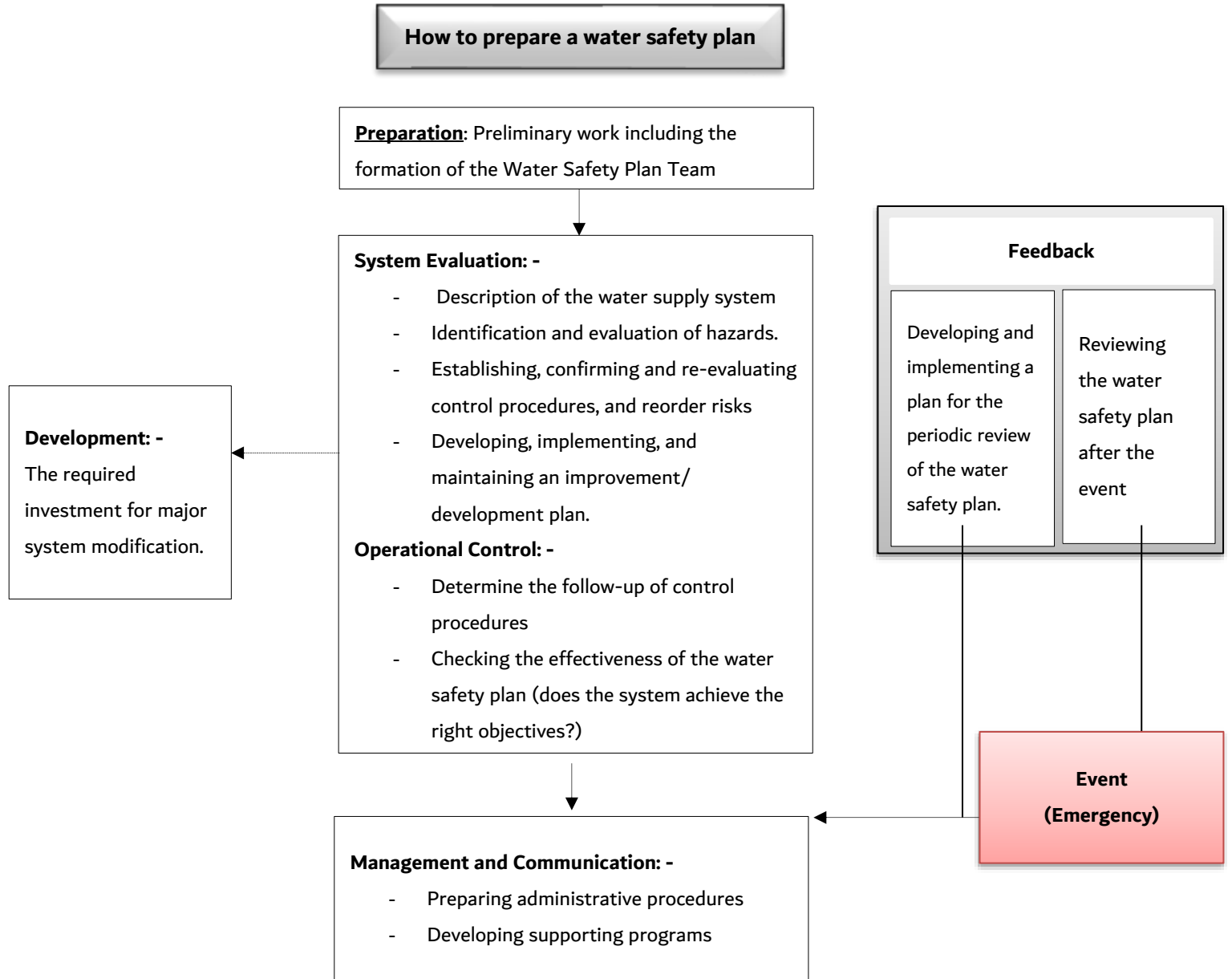
1. Appropriate personal protective equipment (PPE) must be selected that complies with accredited standards.
2. Safe work practices/procedures should be followed during maintenance operations, such as:
 - Ensuring that no worker performs any maintenance tasks alone.
 - Verifying the safety of the worksite during maintenance activities to avoid hazards and injuries.



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13. Appendix

13-1 Appendix No.1: How to prepare and implement a water safety plan









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13-2 Appendix No. 2: Risk Assessment Matrix for Water Systems in Buildings after an Emergency

Risk Assessment Matrix



| Probability of occurrence | | | | | | |
|---------------------------|-----------------------|-----------------|-----------|---------------|-------------|--------------|
| Impact range (intensity) | | Improbable 1 | Rare 2 | Probable 3 | Likely 4 | certain 5 |
| | Very high impact 5 | 5 | 10 | 15 | 20 | 25 |
| | high Impact 4 | 4 | 8 | 12 | 16 | 20 |
| | Medium Impact 3 | 3 | 6 | 9 | 12 | 15 |
| | Low Impact 2 | 2 | 4 | 6 | 8 | 10 |
| | Very low impact 1 | 1 | 2 | 3 | 4 | 5 |

| | |
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|  | Very high (catastrophic) |
|  | High |
|  | medium |
|  | low |

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13-3 Appendix No. 3: Potential Risk Analysis Form

| Activity | Hazard/Damage | Risk | | |
|---------------------------------|--|-----------------|---------------|------------|
| | | Probability (h) | Intensity (u) | Rate (h×u) |
| Bacterial contamination | Bacterial contamination; intestinal bacteria, cholera, etc | 5 | 4 | 20 |
| | Viral contamination; rotavirus | 4 | 4 | 16 |
| | Contamination of fungi, mold and yeasts (Giardia parasite) | 3 | 4 | 12 |
| Chemical contamination | Contamination with organic matter such as petroleum | 2 | 5 | 10 |
| | Contamination with toxic substances such as mercury and lead | 1 | 5 | 5 |
| | Contamination with pesticides and heavy metals | 3 | 5 | 15 |
| Damages to water systems | Leakage of pipelines and corrosion of water storage tanks | 5 | 3 | 15 |
| | Damage to equipment and water pumping systems | 5 | 2 | 10 |
| | Interruption of water supply service | 3 | 4 | 12 |

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13-4 Appendix No. (4) Laboratory tests required for water



| Sample description | Required teste | |
|-----------------------------|--|------------------------------------|
| | Chemical | Microbiological |
| non-drinking Waters | Not required | Legionella Aerobic Colony Count |
| Non-Bottles Drinking Waters | Copper, Iron, Zinc, Calcium, Magnesium, Sodium, Chloride, Nitrate, Sulphate, Bromate, pH value at 25 C, Total Dissolved Solids, Hardness as CaCo3 | Coliforms |
| | | E. coli |
| | | Bacillus subtilis |
| | | Rotavirus |
| | | Vibrio cholerae |
| | | Shigella Sonneie |
| | | Fecal coliform |
| | | Protozoa |
| | | Escherichia Coli |
| | | Swimming Pool Waters |
| Fecal streptococci | | |
| Pseudomonas aeruginosa | | |
| Total Coliform | | |

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14. References

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- Administrative Order No. (30) of 2007 Issuing Local Order No. (11) of 2003 Concerning Public Health and Safety of the Society in the Emirate of Dubai.
- Technical Guidelines (17) for Quality of Unbottled Drinking Water. DM-HSD-GU17-DW1
- Technical Guidelines (44) for Legionella Control in Water Systems
- Water SafetyPlan Manual- Step-by-step risk management for drinking-water suppliers
- Health Emergency and Disaster risk management Framwork – (WHO,2019) – ISBN 978-92-4-151618-1
- Guidelines for drinking-water Quality_ fourth edition incorporating the first addendum – (WHO,2017) – ISBN 978-92-4-154995-0
- Crisis and Emergency Risk Communication Small Water System Workbook (CDC, March 2006)
- Drinking water resources criteria in emergencies and disasters: A systematic literature review (Environmental Health engineering and Management Journal 2022)
- Evidence reviews and research priorities: Water, sanitation, and hygiene for emergency response (London School of Hygiene & Tropical Medicine
- Planning for an Emergency Drinking Water Supply (EPA, June 2011)
- TECHNICAL NOTES ON DRINKING WATER, SANITATION AND HYGIENE IN EMERGENCIES (WHO)

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| For (suggestions, comments, and complaints) | For further information |
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