

## Bureau of Indian Standards

*Draft Indian Standard*

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### संकट के दौरान वैकल्पिक पेयजल सेवा प्रावधान - दिशानिर्देश

## Alternative Drinking Water Service Provision During a Crisis — Guidelines

*ICS (03.080.30; 13.060.20)*

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Drinking Water Supply, Wastewater and Stormwater Systems and Services Sectional Committee,  
SSD 14

**Last Date of Comment: 07 July 2024**

### FOREWORD

*(A formal clause will be added later)*

Drinking water supply relies on systems that can be subject to disruption from internal or external factors including operational error, lack of rehabilitation, damage to the drinking water system, malicious acts (such as vandalism, criminality or terrorism) and natural disasters.

In many cases, operational and organizational processes will exist within drinking water utilities to deal with short periods of localized interruption to drinking water distribution. However, if the service interruption exceeds the duration or extent of anticipated events, an interruption can escalate into a crisis at local, regional or exceptionally, national level.

The provision of an alternative drinking water service (ADWS) necessitates thorough preparation (to address planning, procurement, logistics, control and communication), as well as awareness of the need and commitment at all levels of the organization to be effective and efficient.

This standard is intended for drinking water utilities that normally provide a service without interruption through a drinking water supply system. It provides guidelines for the effective implementation of ADWS provision during extended periods of disruption to the drinking water supply.

## Alternative Drinking Water Service Provision During a Crisis — Guidelines

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#### 1 SCOPE

This Indian standard provides guidelines on alternative drinking water service (ADWS) provision during a crisis.

This document addresses:

- a) ADWS principles and methods;
- b) ADWS operational planning and implementation.

#### NOTES

1 This Indian standard is not applicable to planned drinking water supply interruptions forming part of drinking water utilities' normal operations.

2 Many of the principles and methods described in this standard can be appropriate in the following circumstances:

- a) Drinking water supplied for the ongoing operation of key establishments and facilities during a crisis, such as hospitals, old aged homes, schools and vital plants; and
- b) Drinking water supplied to all types of temporary settlements.

#### 2 REFERENCES

The standard listed below contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the listed edition was valid. The standard is subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard listed below:

<i>IS No.</i>	<i>Title</i>
IS 17392:2023	Disaster management in drinking water utility — Requirements
18188: 2023	Service activities relating to drinking water supply, wastewater and stormwater systems — Vocabulary
IS 10500 : 2012	Drinking Water — Specifications ( <i>second revision</i> )

#### 3 TERMS AND DEFINITIONS

For the purpose of this standard, in addition to the terms and definitions provided in IS 18188, the following shall apply.

**3.1 Alternate Drinking Water Supply (ADWS)** — Drinking water provided to users by means other than through the normal piped drinking water system.

**3.2 Crisis** — Event or situation which adversely affects the organization and impacts its services which requires more than the usual means of operation and/or organizational structure to deal with it.

**3.3 Temporary Points of Distribution** — A designated location or facility established by a relevant authority for a specified duration to provide access to safe drinking water during a crisis.

## 4 PRINCIPLES FOR ALTERNATIVE DRINKING WATER SERVICE PROVISION

### 4.1 General

In order to determine its ADWS provision, a drinking water utility should first have a clear understanding of its normal operation during typical (non-crisis) circumstances.

During a crisis involving an operational interruption to drinking water distribution for more than 36 h, the drinking water utility should ensure the following:

- a) An ADWS provision to its users; and
- b) Assets (such as clean and disinfected drinking water containers) that are intended to be used in contact with drinking water are authorized by the relevant authority.

To properly plan for and respond to a water crisis requiring ADWS provision, the drinking water utility should establish a set drinking water quota per day per capita to be supplied to users confirming the quantity requirement as per IS 17392 and quality requirements as per IS 10500 until the normal operation is restored.

#### Notes

**1** Refer to Annex A for the establishment of a drinking water quota per day per capita during a crisis.

**2** The drinking water utility's pre-planning of issuing drinking water should aim to ensure a suitable level of control, including a contingency for excessive withdrawals. The inability to exercise such control can lead to legitimate users' needs remaining unfulfilled. This can have consequences, including a decline in ADWS service levels and financial and reputational impacts.

**3** Drinking water utilities may encourage users to exercise restraint by providing adequate information in advance or as soon as possible (see 6).

### 4.2 Alternative Drinking Water Service Approaches

#### 4.2.1 *Using the Drinking Water Distribution Network in a Non-Conventional Manner*

If feasible, the drinking water utility can supply drinking water to users via the drinking water distribution network but using different means than the regular operational methods.

Proven methods of ADWS provision using the distribution network in a non-conventional manner are described in **6.2**.

#### 4.2.2 *Using Temporary Points of Distribution (TPD)*

This approach involves the establishment of temporary points of drinking water distribution (independent of drinking water distribution networks) throughout the affected service area.

The drinking water utility during its normal operations (before the onset of a crisis), should have communicated to users about the need to approach a TPD to receive drinking water during a crisis.

This approach allows the drinking water utility to provide drinking water to the users reasonably close to their normal point of use.

## **5 PLANNING FOR ALTERNATIVE DRINKING WATER SERVICE PROVISION**

### **5.1 General**

ADWS provision should form an integral part of the drinking water utility's wider crisis management response. During normal operation, and based on a risk assessment, the drinking water utility should identify the disruption scenarios that can lead to the need for ADWS provision.

The drinking water utility should plan for adequate ADWS provision by developing:

- a) engineering, operational and logistical plans to implement its chosen approach(es) to ADWS provision. The methods of ADWS provision selected should be planned and exercised during times of normal operation, and responders should be appropriately trained to demonstrate their readiness, when required;
- b) pre-coordination with other service providers to facilitate transportation of ADWS resources to the TPDs, filling and replenishment of drinking water at the TPDs, and collection and return of ADWS resources from the TPDs following recovery from the crisis;
- c) informing stakeholders on ADWS provision, while addressing the differing needs of each type of user;
- d) pre-coordination with other third parties, for example neighbouring and other drinking water utilities (if mutual aid arrangements can be agreed), military aid to the civil community (if such a protocol exists) and other stakeholders from whom understanding, support and/or agreement to the ADWS arrangements are essential for maintaining public confidence; and
- e) developing and maintaining a regularly updated inventory of potential non-conventional technologies (rainwater harvesting, air to water), and best practices for ADWS for effective use during the crisis period.

Where this involves the provision of bottled water, the plan should include pre-coordination with bottled water producers or suppliers. Such co-ordination could include contractual arrangements for the supply of agreed quantities and product sizes. It could also include arrangements for minimum stock levels (held by the supplier and/or the drinking water utility) and the product's delivery to designated TPDs or intermediate storage destinations. Such agreements should also specify timeframes for implementation including out-of-normal working hours arrangements.

NOTE — Refer Annex B for the development of the logistic plan for ADWS provision.

### **5.2 Pre-planning**

#### **5.2.1 *Establishing Individual Disruption Scenarios***

The drinking water utility should take the following into consideration:

- a) Possible circumstances of the crisis;

- b) Relevant characteristics of the drinking water system of individual service areas, such as gravity fed/pumped areas, pressure zones and water quality features/constraints;
- c) Characteristics of the environment of individual service areas, such as rural/urban distinctions and topographical features that provide access or act as barriers (highways, rivers, railways);
- d) Characteristics of the users in individual service areas; and
- e) Its available resources (including personnel).

**5.2.2** Pre-planning in accordance with the disruption scenario based on each crisis scenario, the drinking water utility should:

- a) decide on the type and, where applicable, quantity of ADWS resources to be deployed (bottled water, water tankers) and the timescale for their provision;
- b) identify and coordinate ADWS procurement within and outside the service area(s) affected;
- c) identify possible alternatives for water sourcing, conveyance, treatment and drinking water distribution in cases of water contamination;
- d) identify the responders necessary to conduct field operations during a crisis and provide adequate training and support to permit them to display readiness when required; and
- e) consider quantities and storage capacity for firefighting purposes, if applicable.

### **5.3 Planning to Secure and Mobilize Resources**

Planning to secure and mobilize resources for ADWS provision should include the following:

- a) The drinking water utility should determine the area(s) likely to be affected according to the individual circumstances of the crisis;
- b) Additional considerations such as variable weather conditions, the nature of the service area (rural, urban), topographical features (estuaries, rivers, valleys, hills), the presence of infrastructure (highways, railways, airfields, ports) and socio-economic considerations;
- c) The drinking water utility should organize its drinking water system in a manner that permits as great a degree of flexibility and resilience as is deemed practicable and cost-effective (installing additional valves and interconnections beyond those essential for normal use; installing foundations, power supplies and pipework to accept temporary pumping installations);

NOTE — Such plans could include the distribution of non-drinking water if such provision mitigates risks to public health or public safety (for toilet flushing or firefighting purposes). However, before running drinking water again, the pipes should be flushed and residual chlorine should be checked when appropriate to confirm that it is within the numerical standards.

- d) The drinking water utility should aim to balance users' expectations and the practicability of providing a reasonable daily drinking water allocation;
- e) The drinking water utility should plan the locations and number of TPDs based on the numbers and types of users and service areas;
- f) The drinking water utility should plan the type and scope of resources required for each TPD (containerized drinking water, personnel, vehicles, safety equipment);

NOTE — Resources should be based on the relevant drinking water allocation(s) per capita and the number of users that an individual TPD is designed to support.

- g) In the case that alternative water resources are proposed, the drinking water utility should plan and coordinate these considering options both within and outside the affected service area. Consideration should be given to:
- 1) periods when an alternative water resource could be unavailable due to inadequate water quality and quantity (low source water level; algal bloom);
  - 2) possible alternative(s) for conveyance, treatment and drinking water distribution by use of a temporary system (by utilizing portable treatment systems) which could make a normally unusable water resource viable; and
  - 3) how a water tanker could be filled up from an alternative water resource;
- j) The drinking water utility should include in its ADWS processes measures to support priority points of supply including hospitals, transit camps and relief camps, and ensure that these points receive ADWS provision consistent with their needs and capabilities;

NOTE — Refer Annex C for ADWS provision for users with special needs.

- m) The drinking water utility should make the necessary personnel planning arrangements for ADWS provision to be implemented. All relevant personnel should be trained periodically during normal operations. Training of any third parties anticipated to be involved in ADWS provision should be undertaken either at the request of the drinking water utility or as other opportunities arise. Training should include practical exercises for all relevant personnel and third parties.

NOTE — For the planning and mobilizing resources early financial approvals are desirable.

#### **5.4 Selection of Temporary Points of Distribution**

The drinking water utility should consider the following characteristics of TPDs for its establishment:

- a) Hygiene — the site is safe and free from contamination, such as pollutants or pathogens;
- b) Accessibility — accessible to the affected population, considering factors like proximity, transportation, and mobility of residents. Prioritize locations near temporary shelters, evacuation centers, or areas with a high population density;
- c) Capacity and Flow — the capacity should meet the water needs of the affected population, taking into account the estimated number of people and their daily water requirements and a steady and efficient flow of water to minimize wait times;
- d) Security and Safety Measures — security measures to prevent tampering, theft, or unauthorized access to the water supply and establish safety protocols to prevent accidents, such as slips and falls, at the distribution site;
- e) Accessibility for Vulnerable Populations — consider the needs of vulnerable populations, such as the elderly, disabled, or those with limited mobility, by providing accessible facilities and assistance if needed;
- f) Environmental Considerations — assess the environmental impact of the temporary water distribution, such as groundwater usage or potential runoff, and take appropriate measures to mitigate any negative effects;
- g) Adaptability and Flexibility — be prepared to adapt the TPD's location, operating hours, and capacity based on changing circumstances and evolving needs during the emergency;

- h) Regulatory Compliance — comply with local, state, and federal regulations related to the distribution of drinking water, including permits and licensing requirements;
- i) Community Engagement — involve the affected community, civil societies, NGOs in the decision-making process, gather feedback, and address concerns to improve the effectiveness and acceptability of the TPD.

Periodic quality surveillance of drinking water being distributed must be carried out. Proven methods of ADWS provision not using the drinking water distribution network are described in **6.3**.

NOTE — Examples of TPD methods are described in Annex D.

## **6 INTERNAL AND EXTERNAL COMMUNICATIONS**

### **6.1 General**

The drinking water utility should consider, in advance of any incident requiring ADWS provision, informing the relevant stakeholders more widely about its plans for ADWS delivery. The drinking water utility should develop a communications plan for internal and external communications during the deployment of an ADWS, which should include:

- a) the identification of responsibilities for coordination during a crisis, including ADWS provision deployment and replenishment; and identification of any operational issues that could require escalation for tactical or strategic decisions;

NOTE — Those responsible for ADWS provision should include updates about the effectiveness of those communications and the need to further tailor them to enhance interactions between the drinking water utility and its stakeholders.

- b) use of chosen communications strategy and tools to convey information about the location, operating hours, and procedures of ADWS deployment; and
- c) crisis management decision processes (internal communications; user communications; stakeholder management) for framing and communicating relevant messages.

The strategy should permit two-way communication with stakeholders allowing ADWS deployment to be amended as necessary to address relevant issues. Coordinate with local authorities, emergency services, and relief organizations to ensure adequate resources, personnel, and equipment are available for the operation of the TPDs.

### **6.2 Preparing Stakeholders in Advance of a Crisis**

#### **6.2.1 Tailored Messaging**

The drinking water utility should provide information to users on how the drinking water utility will, and how the users are requested to, respond during an ADWS event. Other stakeholders could require more specific advice, and possibly face-to-face briefings, to ensure that all expectations are discussed and outputs agreed.

#### **6.2.2 Preparing Users**



Users' preparation requirements may, for example, be communicated through the drinking water utility's website; social media; automated calling, texting or emailing; a periodic note attached to the water bill; or public presentations to community bodies.

Communications should include information about the following:

- a) Self-help and self-control in the acquisition of containerized drinking water;
- b) Spread awareness about the conservation of water usage and hygiene;
- c) Drinking water storage and safe retention periods; and
- d) ADWS deployment methods and user interactions.

### **6.2.3** *Preparing Key Stakeholders*

Depending on the relationship with each key stakeholder, more sensitive information regarding preparation requirements could be communicated, including the maximum credible event the drinking water utility plans to be capable of responding to while satisfying the required criteria. Key assumptions, constraints or limitations affecting such a response should be shared with key stakeholders subject to their relevance and appropriate security requirements.

## **6.3 ADWS information during a crisis**

### **6.3.1** *General*

A key aspect of communications on ADWS provision is the need to reassure stakeholders that the drinking water utility remains in control of its planned drinking water distribution activities in response to the crisis. Such reassurance should help to mitigate stress and discourage unhelpful behaviours (panic-buying of excessive quantities of containerized drinking water; unwarranted storage of excessive volumes of drinking water in advance of any supply interruption).

NOTE — Guidance on communications issued by the drinking water utility during a crisis is provided in IS 17392.

### **6.3.2** *Communication*

#### **6.3.2.1** *Tailored Communications*

The drinking water utility should provide information to users on the crisis including provisions to deploy an ADWS and role of users during the deployment of the ADWS. Depending on need, other stakeholders may require more specific, direct and individual briefings.

The drinking water utility should determine, jointly with each stakeholder or their representative(s), the most appropriate means of communications with the stakeholder.

#### **6.3.2.2** *Communicating Users*

Given the dynamic nature of an ADWS response, dynamic communication methods should be employed in addition to more traditional methods.

Dynamic communication methods can include:

- a) the drinking water utility's website;



- b) automated texting and/or email;
- c) websites of external stakeholders (using links to the relevant page(s) of the drinking water utility's website to maintain the currency of information);
- d) media outlets (radio, television, newspapers, websites and other internet portals);
- e) social media;
- f) the drinking water utility's relevant call centre(s) (using temporary staffing or recorded messaging where necessary to manage increased call volumes and resourcing constraints);
- g) loudspeaker announcements (manual, vehicular or airborne).

Traditional communication methods can include printed warning notices, newspapers (reports and paid advertisements), billboards and portable electronic messaging signs. Rules and regulations dealing with privacy policy should be taken into account.

### **6.3.2.3** *Communicating with Other Stakeholders*

Given the dynamic nature of an ADWS response, communication should also be offered to relevant stakeholders depending on their preferences. This communication should supplement existing communication methods and be consistent with the information being supplied to all users.

Such communication methods can include phone communications (at predetermined intervals or adhoc), email updates, text messages, faxed reports, drinking water utility representation within local, regional or national contingency bodies or committees, and regular face-to-face reporting.

### **6.3.2.4** *Communication Tools and Techniques*

Useful communication tools and techniques can include:

- a) pre-prepared ADWS script templates for completion during an event;
- b) frequently asked questions (FAQ) and answer sheets dealing with common issues and concerns associated with ADWS events;
- c) customer response scripts for all relevant drinking water utility personnel;
- d) briefing notes for personnel who may be approached directly by users for the latest information;
- e) regular updates for all drinking water utility personnel and third-party support teams to assist them in answering queries.

## **6.3.3** *What to Communicate*

### **6.3.3.1** *Information to users*

Information distributed to users during a crisis should be consistent and include:

- a) the current situation, its causes and consequences (where available);
- b) the current forecast of the service interruption's duration (where available);
- c) the nature of the ADWS response;
- d) reassurance that the situation remains under control;
- e) guidance and advice on appropriate and inappropriate behaviours by users;
- f) details of the ADWS deployment (or where to find such details);
- g) reassurance on the preservation of drinking water quality and self-help steps to aid its preservation;

- h) where to find further information and the nature of further updates.

The drinking water utility should always maintain the highest integrity in communicating with users and other stakeholders, and never knowingly provide false or misleading comments on progress to restore service.

### **6.3.3.2 Information to other stakeholders**

Supplementary information distributed to other stakeholders during a crisis can include:

- a) reports to responsible bodies (mandatory and voluntary);
- b) details of the drinking water utility's crisis management response;
- c) implications for individual stakeholders;
- d) constraints, risks and opportunities arising from the crisis;
- e) request for support from individual stakeholders;
- f) proposed communication arrangements, information sources and update frequencies.

## **7 IMPLEMENTATION OF ALTERNATIVE DRINKING WATER SERVICE PROVISION**

### **7.1 General**

The two approaches to ADWS provision outlined in 4.2 include various accepted ADWS implementation methods. A drinking water utility's choice among these methods is likely to be governed by its preferred approach determined during the planning stage (see 5).

For each crisis, subject to these pre-existing constraints, the drinking water utility should determine the decision process for establishing which method(s) to use according to the:

- a) circumstances of the crisis;
- b) characteristics of the drinking water system specific to the service area(s) affected;
- c) characteristics of the environment specific to the service area(s);
- d) characteristics of the users; and
- e) available resources (including personnel).

More than one ADWS implementation method can be used during a crisis.

### **7.2 Nonconventional Methods for Drinking Water Distribution Network Use**

#### **7.2.1 General**

In this approach, water is supplied to users via the drinking water distribution network, but not in the normal operational manner. Sometimes the service level can be of a lower standard than during normal service provision.

#### **7.2.2 Distribution of Drinking Water by Erection of Standpipes**

Where water quality is maintained but water quantity is constrained by the crisis, the drinking water utility can operate ADWS provision by erecting temporary standpipes connected to the drinking water distribution network. Such a method can create control issues with regard to the assets (the standpipes and the hydrants on which they are mounted), the quantities of water

discharged and the resulting flow disturbances in the drinking water distribution network. Deployment of this method depends on the drinking water utility's resources to manage the operation of the assets and can be affected by the degree of cooperation anticipated from users.

### *7.2.3 Recharging of Isolated Drinking Water Distribution Network Assets by Water Tankers*

According to circumstances and the event characteristics (treatment plant failure; aqueduct failure), the drinking water utility can use mobile tankers to recharge drinking water system storage assets, such as reservoirs, or the drinking water distribution network itself (by pumped or gravity feed). This action can enable continued drinking water supply to users through the drinking water distribution network.

This method may require approval of concerned authority and is dependent on sustained recharge of the drinking water distribution network and carries an increased risk of contaminating the network.

### *7.2.4 Lowering Supply Pressure*

Drinking water should be supplied through the normal drinking water distribution network, at lower pressure than normal, by controlling valves and other water assets in accordance with circumstances and engineering constraints. This method can require approval of concerned authority for minimum sustained pressure in the drinking water distribution network.

## **7.3 Methods Not Using the Drinking Water Distribution Network**

### *7.3.1 General*

In this approach, TPDs should be established by trained personnel of water utility across the service area(s) affected by the crisis. The drinking water utility should advise able-bodied users to independently approach a TPD to get drinking water according to their determined drinking water allocation. Adequate arrangements should be made for users with special needs. Users should be informed about of TPDs locations within close proximity to their residence or workplace to legitimately claim a need of drinking water.

A representative of drinking water utility should be present to assist users (where resources and/or the number and configuration of TPDs permit). TPDs should be located (by prior agreement where necessary) in central, familiar and accessible places for users. Recommended locations for TPDs such as schools, public parks, community or sports centres can be pre-planned after risk assessment.

Alternatively, in urban areas with high population densities and reduced availability of public spaces, TPDs can be located at the roadside with sufficient controls, including pedestrian and vehicular segregation and clear warning of any temporary obstructions or hazards that a TPD installation may create. In addition, adequate lighting for night-time use should be provided, and provision of security measures should be made available based on local circumstances.

The TPD should include equipment for the hygienic dispensing of drinking water such as water tanks, containerized drinking water and access points. Other equipment can be made available for use by the representative(s) of drinking water utility, such as radio communication equipment, night vision equipment, flashlights, basic tools, first aid kits, and megaphones.

### *7.3.2 Temporary Point of Distribution Methods*

#### *7.3.2.1 General*

One or more of the following TPD methods should be used for distribution of drinking water to users.

#### *7.3.2.2 Static Water Tanks Connected to Multi-Drinking Water Taps*

Static water tanks can be connected to multi-drinking water taps, from which users can draw drinking water. Each static water tank should be replenished by mobile tanker periodically (preferably several times a day) with fresh drinking water from an external resource configured for rapid refilling of mobile tankers. The efficiency of this method depends on the reliability of the replenishment cycles and the minimization of ADWS overuse by users.

In this method, the replenishment may be done by another mobile water tanker, or by the rotation of full mobile tankers or towed bowsers for depleted ones. The drinking water utility should strive to provide water continuously, unless interrupted briefly by the rotation of the mobile tankers or towed bowsers.

#### *7.3.3 Containerized Drinking Water*

A drinking water utility can carry a stock of containerized drinking water for ADWS provision. During a crisis, stock can be rapidly depleted and contingency plans for resupply of stock should be prepared.

To deploy this method, prior arrangements with containerized drinking water producers or suppliers should be made, and stock is likely to be delivered in bulk (palletized and packaged in plastic wrapping for stability/security).

For TPDs utilizing a spacious location, the layout should allow for the safe unloading and breaking down of bulk deliveries under the control of trained personnel. Users should be prevented from undertaking this task.

Alternatively, TPDs located in high-density urban areas (roadside) require an intermediate location to be established where containerized drinking water deliveries may be broken down into manageable quantities for safe delivery.

Arrangements for the storage, separation and recycling of bulk delivery waste materials should be considered. The provisions for environmentally acceptable methods of collection and recycling or disposal of empty drinking water containers should be implemented.

Containerized drinking water may also be delivered directly to users in certain circumstances. This method does not require the use of a TPD. Caution should be exercised to avoid raising stakeholders' expectations that containerized drinking water this is the standard response method in every crisis.

NOTE — Examples of containerized drinking water are described in Annex E.

#### **7.3.4** *Fixed Water Resource*

In this drinking water distribution method, a fixed water resource such as a hydrant, reservoir, underground storage tank or well can be used where the quantity of drinking water in the water resources is sufficient.

The TPD should be located in the service area with adequate measures to protect the resource, such as backflow prevention devices. Typically, multiple drinking water taps are connected to the resource and made available for providing drinking water.

This method is mostly deployed in small-scale events, where a limited proportion of the service area is affected. However, this method could be expanded (with pre-planning) to larger-scale events.

#### **7.3.5** *Mobile Water Tankers or Towed Bowsers*

In this method, drinking water should be carried by mobile tankers or towed bowsers in cycles throughout the service area. Where practicable, the users should be able to receive drinking water on a regular basis consistent with the cycle within close proximity to their residence or workplace to legitimately claim a need of drinking water. Users should be told the route to be followed, approximate timings, and stopping points (or arrangements to flag down the driver). The drinking water utility may provide additional resources to supervise the discharge process where significant numbers of users are gathered.

#### **7.3.6** *Sourcing Water from Other Utility*

Collaborating with neighbouring water utilities may provide a backup source of water. This can be particularly useful in cases of localized infrastructure damage.

#### **7.3.7** *Mobile Water Treatment Units*

Water utilities may have mobile water treatment units on standby. These units can be quickly deployed to treat available water sources, such as rivers or ponds, and make the water safe for consumption.

#### **7.3.8** *Community Water Points*

Establishing community water points with water storage tanks and treatment equipment may serve as distribution hubs where residents can collect clean water during a crisis.

**Annex A**  
(Clause 4.1)  
(Informative)

## **GUIDANCE ON DETERMINING DRINKING WATER ALLOCATIONS**

### **A-1 Pre-determining Minimum Water Allocation Requirements**

If possible, drinking water utilities should work with relevant authorities in the planning stages to determine a minimum per-capita drinking water allocation that takes into account the basic requirements of health or regulations. This value can then be used during the crisis to determine the appropriate scale and method(s) of ADWS provision. Completing such an exercise also allows for establishing predetermined TPD locations with the necessary assets and resources assigned to the TPDs' establishment.

### **A-2 Factors Affecting Minimum Drinking Water Allocation Requirements**

Although it is possible that a predetermined value for minimum per-capita drinking water allocation has been established, several factors could require its re-evaluation and, if necessary, its revision to address users with special needs. The World Health Organization recognizes that, to provide drinking water for the basics of hydration only, several factors exist that can increase this base value. These include consideration of the needs of users who have a requirement for a greater quantity of drinking water, such as young children, woman, pregnant or nursing women, the elderly and people with certain illnesses that can have increased fluid requirements. Vulnerable users can be pre-identified by the drinking water utility or can self-present during the crisis. Also, hydration levels are greatly affected by the climatic conditions and the amount of activity and associated thermal stress experienced by a user. These can result in an increased drinking water allocation being required.

### **A-3 Additional Factors in Determining Drinking Water Allocation Beyond Human Health**

Although the main purpose of ADWS provision is satisfying a per-capita drinking water allocation that meets the basic requirements of human health, many additional factors should be considered during the event. Decisions should be made regarding the level of service provided beyond such basic requirements. For example, will the drinking water utility supply enough water for domestic purposes such as the flushing of toilets, bathing or cooking and others?

These decisions will be influenced by the cause of the event, the maximum estimated duration of service interruption, the drinking water utility's estimation of recovery time and its ability to secure or generate ADWS provision.

The drinking water utility could, for example, determine it necessary to supply water for non-drinking water usage with appropriate warnings about such usage, or it could inform users of precautions for using potentially microbial contaminated water, such as boiling water (and cooling as necessary) before use for drinking, bathing or food preparation.

Consideration can be given to water allocation for drinking purposes at locations that remain functioning during the water crisis. It can be necessary to provide extra supplies to essential workers involved in the restoration of services to the area.

### **A-4 Re-evaluation of Drinking Water Allocation**

As each crisis is unique, any predetermined drinking water allocation (above any minimum regulatory requirement) could be adjusted by the drinking water utility during the crisis depending on the situation and availability of the water resources.

It is important to establish a base per-capita drinking water allocation. However, it is equally important to monitor the conditions of the crisis and not only regularly reassess whether the base requirement is being met, but also adjust that allocation upward, when possible, to return to normal supply conditions.



**Annex B**  
(Clause 5.1)

**THE LOGISTICS OF ALTERNATE DRINKING WATER SERVICE PROVISION**

**B-1 General**

Logistics can be defined as the planning, execution and control of the movement and placement of resources (personnel and/or goods) and of the supporting activities related to such movement and placement, within a system organized to achieve specific objectives.

In the case of ADWS provision,

- a) people can include drinking water utility's personnel, their agents (suppliers, contractors, hauliers), third parties (external water utilities, personnel), emergency services personnel, military personnel, trained volunteers, users and other stakeholders;
- b) resources (goods or assets) can include standpipes, static water tanks, multi-drinking water taps, mobile water tankers, containerized drinking water, pumps and hoses;
- c) movement and placement can include leading or driving animals (towing assets), driving self-propelled vehicles, towing assets (water bowsers, trailers, hose reels), loading and unloading of water tanks, containerized drinking water, lifting and lowering by crane, hoist manual labour and pumping. Such movement can be by foot, road, rail, water or airborne means as appropriate;
- d) supporting activities (during periods of both routine and non-routine operations) can include management of ADWS assets, avoidance of contamination by regular disinfection of ADWS assets, training of people likely to be involved in ADWS provision (including exercises), communication with users and other stakeholders on ADWS mobilization and deployment, contractual negotiation and maintenance of supply chain support and stock rotation (containerized drinking water) and provision of security personnel if warranted.

**B-2 Objectives**

ADWS provision should be integrated with the drinking water utility's operational response system. Such a system should be capable of satisfying the full range of ADWS operational needs from regular small-scale service interruptions to a full crisis management response. The ADWS objectives should be derived from the wider operational response objectives (or during a crisis, the crisis management team's objectives).

The rapid deployment, maintenance, movement and subsequent recovery of the ADWS assets can contribute to the drinking water utility's objectives by a tangible demonstration that it:

- a) has planned its response for the scale of event that has occurred;
- b) remains in control of the situation from an ADWS provision perspective;
- c) recognizes the immediacy of users' needs for ADWS provision;
- d) can cater for those needs in a practical and acceptable manner;
- e) aims to deliver ADWS provision in accordance with pre-planned criteria;
- f) can explain to users where to find ADWS provision and what they should, and should not, do;
- g) intends to support users with special needs; and

- h) continues to have regard for its environmental obligations.

Specific logistical objectives and performance measures should be derived from the ADWS objectives. These objectives are likely to be dynamic and the ADWS logistical response should continue to satisfy the drinking water utility's performance requirements while meeting the changing operational needs.

### **B-3 Resources**

The logistics of ADWS provision are likely to be resource intensive. The scale and type(s) of such resourcing should be consistent with the maximum credible planning scenario(s) for service interruption. The competence of individuals, the condition of assets and the efficiency of supporting activities should all be maintained to a level consistent with agreed planning assumptions.

### **B-3 Preparedness**

ADWS preparedness measures should include:

- a) risk assessments of key criteria, for example the maximum credible service interruption (extent and duration) for each discrete element of the drinking water utility's drinking water system(s)/service area(s), and users' behaviours;
- b) the minimum quantities of drinking water to be provided to users that have been agreed with the relevant authorities;
- c) assumptions about the risk assessment process, the number of people, assets and support resources to be deployed and the effectiveness and efficiency of their deployment;
- d) stress testing and challenging of any assumptions (against limited availability of third-party support, weather conditions, out-of-working-hours events, industrial action, occurrence of a pandemic).

ADWS preparedness measures could include the need for enhanced or reduced levels of asset supervision dependent on the location of assets' deployment.

These preparedness criteria should be fully documented and approved by the management in ADWS plans. Where resource constraints exist their impact on operational objectives and ADWS performance criteria should be discussed with management and relevant stakeholders as necessary.

### **B-4 Execution**

Effective and efficient execution of ADWS plans requires:

- a) prompt and complete communication of the ADWS needs and objectives;
- b) preparedness of resources (personnel, assets) and supporting activities, consistent with preparedness assumptions; and
- c) rapid attention (through appropriate processes) to any variances in actual execution performance compared with preparedness criteria and assumptions.

### **B-5 Management of the Alternative Drinking Water Service Logistical Response**

The drinking water utility should, in conjunction with third parties as necessary, assign responsibility for the management of the ADWS logistical response. These responsibilities should include:

- a) authority to deploy resources (personnel and assets) and mobilize third parties;
- b) authority to control third parties who may:
  - 1) be subject to different organizations' policies and procedures;
  - 2) be operating in unfamiliar areas;
  - 3) be exposed to unfamiliar environmental or health risks (including occupational health risks);
  - 4) inadvertently create a public health risk (if operating unfamiliar equipment or if found to be non-compliant with the drinking water utility's health criteria for personnel in contact with drinking water);
  - 5) have legitimate welfare needs (food, protective clothing, petty cash, lodgings);
  - 6) have specific, independent authority (emergency services, military).
- c) the ability to commit expenditure (vehicle refuelling, containerized water ordering/delivery, scaffolding erection); and
- d) the ability to allocate ADWS resources.

## **B-6 Movement and Placement**

Movement and placement include:

- a) mobilization of facilities where the distribution network is not used;
- b) initial deployment and placement of assets;
- c) commissioning (including erection where necessary) of permanent or temporary filling arrangements for assets (overhead discharge gantries for mobile tankers, temporary supports for static tanks, standpipes and hose reels in the streets);
- d) filling (and periodic refilling) of those assets with drinking water;
- e) the redeployment of those assets (possibly several times) to different locations (and periodic refilling there);
- f) the recovery of those assets back to storage locations at the end of ADWS provision;
- g) the positioning (and repositioning as necessary) of assets to permit their cleaning, maintenance and disinfection in their storage locations;
- h) the collection and disposal, during and after ADWS provision, of waste materials (empty water bottles; pallets; wrapping materials; unrepairable assets) in accordance with the drinking water utility's relevant policies.
- i) mobilization, placement, dismantling and storage can create unusual risks for both the drinking water utility's personnel and other people arising from the:
  - 1) urgency and scale of the event;
  - 2) movement of large, unwieldy and potentially hazardous assets from storage to placement;
  - 3) ADWS placement in locations to which the public can have access;
  - 4) possible inability of the drinking water utility to keep all such assets under its observation and control at all times;
  - 5) need for the public to interact with these assets with varying degrees of control by the drinking water utility; and
  - 6) sabotage of assets due to resentment.

Undesirable behaviours from users towards ADWS provision can occur. For example:

- a) abuse of the drinking water utility or third-party personnel;
- b) climbing on the assets;
- c) moving assets to locations more favourable to themselves;
- d) taking unnecessarily large quantities of the asset (e.g. containerized drinking water);
- e) limiting access to the assets;
- f) deliberate wastage (e.g. leaving taps running);
- g) deliberately contaminating an asset's contents;
- h) stealing an asset.

Risk control measures to address these potential behaviours should be planned for in advance.

## **B-7 Supporting Activities**

### **B-7.1 *Alternative drinking water service asset management***

ADWS assets should be included in the drinking water utility's asset management register and subject to acquisition, periodic inspection, maintenance, use and disposal in accordance with its asset management policy.

The facilities available for the assets' storage should aid the tasks of inspection, maintenance, disinfection, deployment and recovery.

### **B-7.2 *Disinfection and avoidance of contamination***

ADWS assets should be stored and placed in a location and manner that:

- a) minimizes the risk of their contamination; and
- b) aids the process of periodic disinfection.

Procedures for deployment of ADWS assets should minimize the risk of cross-contamination of assets (by avoiding transportation by, or use of, assets (such as pumps) previously used for non-drinking water purposes).

### **B-7.3 *Logistical training and exercise***

Logistical training and exercise include both theoretical and practical components. The practical exercises can be related to mobilization, deployment and commissioning of examples of typical assets. Undertaking practical exercises can test key planning assumptions around, for example: mobilization times, towing, lifting and storage capacities, inter-connectivity of assets and liaison with stakeholders and third parties.

### **B-7.4 *Communication with users and other stakeholders***

Arrangements for communication with users and other stakeholders during ADWS provision should be planned. Details of the mobilization and deployment of people, assets and supporting activities should be regularly supplied to those responsible for such communication and updated as they change. Those responsible for communication with users should, in turn, relay information to aid the effective and efficient deployment of ADWS assets.

### **B-7.5 *Supply chain support***

Examples of ADWS supply chain providers are:

- a) water container and containerized water supplier(s);
- b) drinking water utility contractors;
- c) other water utilities (under mutual aid agreements);
- d) crane or forklift truck providers;
- e) heavy goods vehicle providers (flat-bed or curtain-sided trucks); and
- f) food grade mobile tanker providers.

Planning assumptions should state whether this support can be relied upon (typically requiring some form of contractual agreement – which should include performance metrics) or whether reliance will be placed on the open market. Reliance on the open market will depend on the location and availability of resources. Assumptions should be tested with providers and associated contract arrangements (in and out of working hours) documented. In the execution of such contract arrangements, it is important that both parties fulfil their obligations to the other – including paying the supplier with appropriate promptness. It is expected that this will encourage their continuing support.

**Annex C**  
(Clause 5.3)

**MODIFICATION OF STANDARD ALTERNATIVE DRINKING WATER SERVICE PROCESSES TO SUPPORT USERS WITH SPECIAL NEEDS**

The drinking water utility should plan ADWS provision for users with special needs as follows:

- a) during normal operations, by preliminary identification of such special needs;
- b) during a crisis, by liaising with both internal and external stakeholders to ensure that any dynamic supply adjustments to the requirements of users with special needs are captured and incorporated into the ADWS response.

Modification of standard ADWS processes to support users with special needs can include:

- a) identifying users with special needs within the service area(s), for example through contacts with local health service and social service organizations;
- b) maintaining a database of users with special needs within the service area(s) including relevant details, such as quantity of water required, location and other.
- c) allocating dedicated ADWS planning, deployment and replenishment resources to support users with special needs;
- d) implementing such plans in a manner that satisfies the needs of such users, for example:
  - 1) ensuring all users (and/or their carers if any) understand the ADWS arrangements and the implications for that user;
  - 2) delivering containerized drinking water to users who may be disadvantaged by the standard ADWS process, for example users who are housebound, frail, poor-sighted, deaf or of limited mobility;
  - 3) siting ADWS assets within appropriate distances for those with limited mobility and/or carrying capacity;
  - 4) encouraging neighbours and other community members to look after those users' interests;
  - 5) providing a point of contact with the drinking water utility throughout the crisis;

During the crisis, the drinking water utility's ADWS response should include the need to check if each user has an adequate quantity of water for their current basic needs and for the period until the next check.

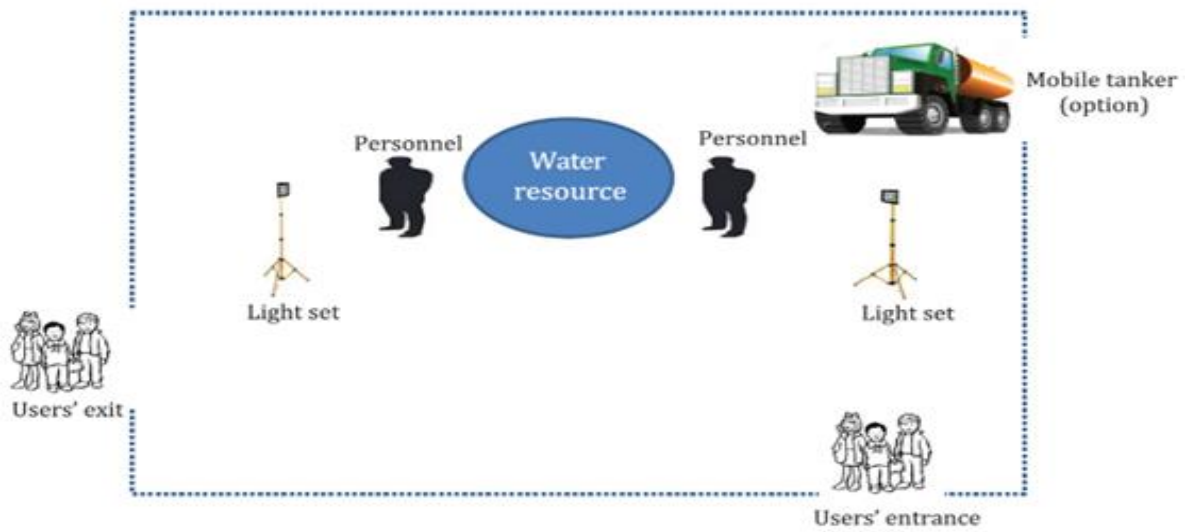
**Annex D**  
 (Clause 5.4)

**EXAMPLES OF LAYOUTS OF, AND ASSETS DEPLOYMENT AT, TEMPORARY POINTS OF DISTRIBUTION**

**D-1 Temporary Point of Distribution Scheme Examples**

The main elements that should be set up in a TPD are illustrated in figure D.1 and figure D.2.

Figure D.1 illustrates the basic components where users are directed to a centralized access point that can be closely controlled by the drinking water utility.



**FIG. D.1 A CENTRALIZED ACCESS POINT TPD SCHEME**

Figure D.2 illustrates the basic components where users receive ADWS provision through static tanks or mobile bowsers/water ATM/ Water kiosks close to their normal point of distribution (at the roadside close to their homes or workplaces). The example TPD in figure D.2 would typically be manned continuously as it is more likely to be visited periodically to ensure its condition and serviceability remain satisfactory and to replenish its static assets' contents.



**Fig. D.2 COMPONENTS OF A TPD CLOSE TO USERS' NORMAL POINT OF DELIVERY**

**D-2 Drinking Water Tanks in Use**



### **D-2.1 Static tanks for use in a temporary point of distribution**

Static tank(s) can be of several types. The type and extent of the static tanks deployed at individual or across multiple TPDs should be determined according to the relevant drinking water allocation(s), number of users and the number of opened TPDs within that part of the service area affected.

### **D-2.2 Mobile tanker**

A mobile tanker can be used for replenishment cycles and/or as a water resource in the TPD. Preferably, the mobile tanker should be attached to a pump to deliver water to other drinking water storage assets. An example is described in E 4.2 and illustrated in figure E.4.

### **D-3 Personal Water Containers**

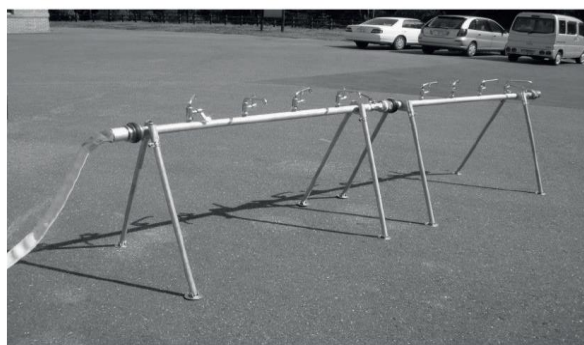
Personal water containers can be distributed to users in the TPD or issued in advance. The bags should be filled with water by the users at the TPD. The same bag is used until the end of the crisis. An example is described and illustrated in E.3.

### **D-4 Bottled Water**

Bottled water can be used as a water resource in the TDP. In this case, there might be no need for multi-drinking water taps at the TDP.

### **D-5 Fixed Water Resource**

A fixed water resource such as a hydrant, reservoir, water tank, automated water transaction machine or temporary tube wells can be used as a water resource for a TDP based on the feasibility, availability and accessibility. A multi-drinking water tap can be connected to the fixed water resource to enable more efficient drinking water distribution for users, see figure D.3. This case may or may not need replenishment.



**Fig. D.3 MULTI-DRINKING WATER TAP**

### **D-6 Rainwater Harvesting**

An alternate drinking water can be resourced through the Rainwater Harvesting System (RWHS). RWHS carries a huge potential as an alternative strategy to cope with drinking water scarcity. RWHS becomes economically feasible when certain steps and risk assessment procedures are

implemented in designing and maintaining the system. Drinking water sufficiency is possible if a sustainable drinking water supply is established via RWHS.

More emphasis may be given to the treatment and quality control of rainwater during crises. The drinking water quality at any point of consumption may be maintained as per IS 10500.

#### **D-7 Automated Water Transaction Machine**

Automated water transaction machines should be encouraged, as per the feasibility and accessibility.

**Annex E**  
*(Clause 7.3.3)*  
**CONTAINERIZED DRINKING WATER**

**E-1 General**

The following examples of containerized drinking water can be used in a crisis (manufacturer's guidance on the useful life of the asset should be followed):

- a) static water tanks for use in TPDs;
- b) personal drinking water bags for users to receive water at TPDs;
- c) bottled water;
- d) mobile tankers for replenishment.

**E-2 Examples of Static Drinking Water Tanks****E.2.1 Rigid Static Tanks**

Rigid water storage tanks are commonly used in India to store water for various purposes, including domestic use, agriculture, industrial applications, and more. These tanks are typically made from durable materials such as concrete, plastic, fiberglass, metal and others depending on the specific requirements and budget.

In regions with space constraints, underground water storage tanks are used to conserve space and protect against temperature variations. They are typically made of concrete or plastic. Elevated water storage tanks are often seen in rural and hilly areas. These tanks are raised on supporting structures to provide water pressure through gravity flow.

**E-2.2 Flexible Tank**

Flexible tanks consist of an exterior cover (resistant to UV radiation) and a filling bag. A flexible tank's multi-drinking water taps should be sized to match the entrance size of any containerized water assets (such as personal bags) the ADWS has been designed to integrate with. Flexible tanks typically include an air-inlet valve and can include a pressure relief valve. The shelf-life of a flexible tank is typically moderately long (5 years or more). Figure E.1 illustrates an example of a flexible tank. It can be stored in folded form and inflated with an air pump when it is to be used as a tank. It can be placed on a flat stand to serve as a water well without pumping.



**Fig. E.1 Flexible Tank**

A flexible tank platform's design should include the following considerations:

- a) Weight should allow easy carrying;
- b) Strong enough to safely support its own and the tank's weight when full;
- c) Stable enough to withstand the rigours of attention by users at all stages from standing alone to supporting a full tank of water;
- d) Safe and easy assembly and dismantling;
- e) Tall enough to permit full gravitational discharge of the flexible tank's contents via the multi-drinking water tap; and
- f) Carry clips or include a connection mechanism to permit attachment of multi-drinking water taps to reduce the risk of damage to the tanks by users.

The number of taps can be determined by hydraulic design or experimentation and their spacing should suit local circumstances. Where personal water bags are used, the taps' diameter should be designed to match the entrance of the personal water bag.

### **E-3 Personal Water Bag**

Design considerations for a personal water bag (see figure E.2) include the following:

- a) volume in accordance with drinking water allocation(s);
- b) flat when empty, for efficient storage;
- c) a sealable, leak-proof opening located in the top of the bag. This should be larger than the size of the multi-drinking water taps to reduce spillage when filling;
- d) a handle to assist in carrying the bag. It should have a load capacity in accordance with the bag's weight when full;
- e) instructions on the bag's operation, cleaning and drying together with relevant warnings in an appropriate language, printed on the front or the back of the bag;
- f) a shelf-life of 15 years or more in dry conditions before use; resistant to UV radiation;
- g) packaged in a portable format that would allow 15 or more years' use;
- h) resistant to wear while in use, including reuse, when filled with water;
- j) capable of being refilled to support continual use for 30 successive days.



**Fig. E.2 PERSONAL WATER BAG**

### **E-4 Examples of Mobile Tankers for Replenishment**

#### **E-4.1 Flexible tank on a platform truck**

Flexible tanks should consist of an exterior cover with the following characteristics.

- a) Should be resistant to UV radiation;
- b) Drain and fill tap. The diameter of the drain tap should be in accordance with the diameter of the filling tap;

- c) A pressure relief valve;
- d) Shelf-life of 5 years or more;
- e) Individual water pump;
- f) Choring strips in accordance with the weight of the tank;
- g) Robust enough to protect itself and the flexible filling bag from damage (when used in accordance with its handling instructions) for the planned life of the product.

The filling bag inside of a flexible tank is typically intended for single use and should be capable of uninterrupted ADWS provision for one month or more. At the end of a particular event, the bag is replaced by a new bag or drained and decommissioned for use in subsequent crises. Figure E.3 illustrates such a flexible tank, strapped to a flat-bed truck. A flexible tank's filling bag should be capable of easy replacement.



**Fig. E.3 FLEXIBLE TANK STRAPPED ON A FLAT-BED TRUCK**

#### **E-4.2 Mobile Tankers**

Mobile water tankers can take many forms, sizes and means of transportation. The tank linings, fittings and accessories should be suitable for contact with drinking water and capable of complete and repeated disinfection over their working lives. See examples of mobile tankers in figure E.4.



**Fig. E.4 Mobile Tanker**

#### **E-5 Packaged Drinking Water**

Drinking water utilities can hold limited stocks of packaged drinking water appropriate to their short-term needs. Contractual arrangements with suppliers are typically used to supplement these stocks. Plastic bottles can cause a deterioration in the quality of drinking water in the bottle after an extended period of storage.