



Training Program

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# DISASTER RESILIENT WATER INFRASTRUCTURE

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For Engineers  
of

GWIL, GWSSB, WASMO, Municipal  
Corporations & Municipalities of GoG

Date- 18-19 July 2024

Venue: GIDM, B/h PDEU, Raysan, Gandhinagar,  
Gujarat



## Background

Disasters, can strike at any moment, posing significant threats to the safety of office occupants, the continuity of business operations, and the integrity of assets. The nature of disaster risk is changing. This is due to rapid urbanization, increased digitalization, interconnection of economies and decline in biodiversity. We are learning to recognize how risks that we thought we understood are interlinked and influenced by emerging and new threats. These present compound challenges to our familiar approaches to disaster risk reduction (DRR). Risks are more systemic and more complex than ever before, contributing to greater losses, and an increased number of people displaced and lives lost.

Gujarat is highly prone to a wide range of natural and human-induced hazards, including cyclones, floods, earthquakes, droughts and industrial accident which often disrupts the normal life of people and affect the development gain during all these years. As a result, disaster management, is not just a matter of emergency response but also involves proactive measures for risk reduction, preparedness, and resilience building

UNDRR defines Infrastructure Resilience is *the timely and efficient prevention, absorption, recovery, adaptation and transformation of national infrastructure's essential structures and functions, which have been exposed to current and potential future hazards. Implementing resilience across all disruption phases should be done through collaborative risk and uncertainty management, multi-hazard assessment, and methods that embrace the systemic nature of national infrastructure*

Infrastructure development has been instrumental in strengthening economic growth. Water infrastructure is critical to human health, economic growth, and environmental sustainability. Water infrastructure systems, including water supply, treatment, and distribution networks, are vulnerable to various disruptions, such as natural hazards, climate change, and aging infrastructure. Insufficiently risk-informed development, unplanned urbanization, and population growth, resulting in an increase in the number of people and the value of economic activity in hazard-exposed areas, heighten the risks from disasters.

Water Supply Department, Municipal Corporation & Municipalities are entrusted with the responsibility pertaining to planning, development and maintenance of all categories of water supply, treatment units, distribution networks and quality control in the State of Gujarat. The said organizations can play a crucial role in developing resilient infrastructure, particularly in ensuring that distribution networks, treatment plant and water storage infrastructure can withstand and recover from various hazards.

Resilient water infrastructure can greatly reduce the impact of disasters on economies and communities. By prioritizing resilience, the concerned organizations can reduce the risk of water service disruptions, protect public health and safety, and support economic growth and development, ultimately ensuring a reliable and sustainable water supply for future generations.

## Objective

The programme has following objectives:

- Develop understanding on Risk, Hazards, Exposure, Vulnerability and Capacity
- Raise awareness about potential risks to water infrastructure
- Enhance the ability of Engineers to develop plan of action of infrastructure resilience (Water treatment, transportation, storage and distribution)
- Encourage adoption of resilient infrastructure design practices
- Provide understanding on operation & maintenance of sustainability of water infrastructure.

## Pre-requisite

There are no pre-requisites for this training course, but prior knowledge on basics of Disaster Risk Management may be beneficial.

## Expected Learning Outcome

- Participants understand the basics of disaster risk management
- Participants can develop action plan on resilience of water infrastructure for their respective areas.
- Participants can adopt better practices for operation & maintenance of key infrastructure.

## Targeted Participants

The course is targeted for the Engineers of **GWIL** (Gujarat Water Infrastructure Limited), **GWSSB** (Gujarat Water Supply and Sewerage Board, **WASMO** (Water and Sanitation Management Organization), Municipal Corporations and Municipalities of Govt. of Gujarat engaged in water treatment, water supply, waste water treatment and water storage infrastructure.

## Training Pedagogy

The training will be held at Seminar Hall, GIDM, facilitated by Subject Matter Experts (SME). The training will include active learning techniques such as presentations, group discussions, interactive exercises, case studies, simulations, exposure visits and hands on experience which will encourage participants to engage actively with the training content

Further, quizzes, tests and skill demonstration will also be included in the program for monitoring learners' progress, identifying areas for improvement, and reinforcing learning outcomes.

### Training Certificate

Certificate of participation will be given to participants who attend all the sessions during the 2-days training program

### Tentative Schedule

Day - 1: 18 <sup>th</sup> July 2024			
Time	Session	Session Details/ Objectives	Resource
8.30-9.30		<b>Breakfast</b>	
9.30-10.00	<b>Registration</b>	<ul style="list-style-type: none"> <li>Online registration of participants</li> <li>Training kit distribution</li> <li>Facility briefing</li> <li>Safety briefing</li> </ul>	<b>GIDM</b>
10.00-10.30	<b>Pre-Test &amp; Introduction of Participants</b>	<ul style="list-style-type: none"> <li>15 Question online Test on DRR</li> <li>Establishment of Ground rules</li> <li>Introduction of participants</li> </ul>	<b>GIDM</b>
10.30-10.45	<b>About GIDM</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>History &amp; Establishment of GIDM</li> <li>Governance mechanism</li> <li>Core areas of GIDM</li> <li>Programs and Achievements</li> </ul>	<b>GIDM</b>
10.45-11.45	<b>Basics of Disaster Risk Management</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>'Disaster Risk' through Hazards, Exposure, Vulnerability and Capacity components</li> <li>Disasters are NOT natural and need for intervention and planning</li> <li>Disaster Management Cycle</li> <li>Conceptual framework of Disaster Risk Reduction</li> </ul>	<b>GIDM</b>
11.45-12.00		<b>Tea break</b>	

<b>12.00 -13.00</b>	<b>Understanding on Disaster Resilient Water Infrastructure</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>• Resilient Infrastructure-Concepts &amp; trends</li> <li>• Overview of water infrastructure and their vulnerabilities</li> <li>• Impact of climate change on water infrastructure</li> <li>• Cascading effect on population due to risk associated with service interruptions</li> </ul>	<b>GIDM</b>
<b>13.00-14.00</b>	<b>Lunch break</b>		
<b>14.00-15.30</b>	<b>Enhancing Resilience in Water Treatment Facilities</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>• Effects of hazards on treatment plants</li> <li>• Layouting and design considerations of various units of treatment plants [Seismic, floods, cyclone, Tsunami, extreme weather etc.]</li> <li>• Use of advanced materials and construction methods in treatments plants</li> <li>• Operation &amp; maintenance strategies for resilience</li> </ul>	<b>KCPL, Ahmedabad</b>
<b>15.30-15.45</b>	<b>Tea break</b>		
<b>15.45-16.45</b>	<b>Strengthening Water Quality Resilience</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>• Water quality parameters (Physical, Chemical, biological)</li> <li>• Water quality standards and regulations</li> <li>• Water quality monitoring &amp; testing methods</li> <li>• Common water borne diseases</li> </ul>	<b>Nirma University</b>
<b>16.45-17.45</b>	<b>Fire Safety Hands on Exercise</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>• Types of Fire</li> <li>• Procedure to use fire extinguisher</li> <li>• Fire risk assessment</li> <li>• Hands on use of fire extinguisher</li> </ul>	<b>GSFA</b>
<b>Day -2: 19<sup>th</sup> July 2024</b>			
<b>9.00-10.00</b>	<b>Breakfast</b>		
<b>10.00-11.30</b>	<b>Integrating Resilience into Water</b>	At the end of the session participants would be able to understand: <ul style="list-style-type: none"> <li>• Overview of water conveyance systems</li> </ul>	<b>VPEP, Ahmedabad</b>

	<b>Conveyance Systems</b>	<ul style="list-style-type: none"> <li>Design of water conveyance systems (Pipe material, size, layout pump, valve etc)</li> <li>Pipeline inspection &amp; maintenance</li> <li>Emerging technologies in water conveyance</li> </ul>	
<b>11.30-11.45</b>	<b>Tea break</b>		
<b>11.45-13.00</b>	<b>Building Resilience in Water storage infrastructure</b>	<p>At the end of the session participants would be able to understand:</p> <ul style="list-style-type: none"> <li>Effects of hazards on water storage infrastructure (overhead tank, sump, wells, tanks, etc.)</li> <li>Layout and design consideration of water storage infrastructure [Seismic, floods, cyclone, Tsunami, extreme weather etc.]</li> <li>Operation &amp; maintenance strategies for resilience</li> <li>Emerging technologies in water storage</li> </ul>	<b>CEPT</b>
<b>13.00-14.00</b>	<b>LUNCH break</b>		
<b>14.00 -15.15</b>	<b>Resilient Wastewater Infrastructure</b>	<p>At the end of the session participants would be able to understand:</p> <ul style="list-style-type: none"> <li>Effects of hazards on sewerage systems</li> <li>Layout and design consideration of for sewerage systems (Materials, joints, shapes, loads, etc.)</li> <li>Operation &amp; maintenance strategies for resilience</li> <li>Emerging technologies in water storage</li> </ul>	<b>IIT-Gandhinagar</b>
<b>15.15-15.30</b>	<b>Tea break</b>		
<b>15.30-16.30</b>	<b>Resilient Pumping Systems for the Future</b>	<p>At the end of the session participants would be able to understand:</p> <ul style="list-style-type: none"> <li>Types of Pumps &amp; their choice</li> <li>Multiple pump system</li> <li>System head curve</li> <li>Selection of pumping units</li> <li>Operation &amp; maintenance of pumps</li> </ul>	<b>GIDM</b>
<b>16.30-17.00</b>	<b>Valedictory Session</b>	<ul style="list-style-type: none"> <li>Post-test</li> <li>Feedback</li> <li>Certificate distribution</li> <li>Group photo</li> </ul>	<b>GIDM</b>